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ABSTRACT

In times of crisis, humans have a tendency to turn to religion for comfort and explanation. The COVID-19 pandemic is no exception. Using daily and weekly data on Google searches for 107 countries, this research demonstrates that the COVID-19 crisis resulted in a massive rise in the intensity of prayer. During the early months of the pandemic, Google searches for prayer relative to all Google searches rose by 30%, reaching the highest level ever recorded. A back-of-the-envelope calculation shows that by April 1, 2020, more than half of the world population had prayed to end the coronavirus. Prayer searches remained 10% higher than previously throughout 2020, particularly so in Europe and the Americas. Prayer searches rose more among the more religious, rose on all continents, at all levels of income, inequality, and insecurity, and for all types of religion, except Buddhism. The increase is not merely a substitute for services in the physical churches that closed down to limit the spread of the virus. Instead, the rise is due to an intensified demand for religion: People pray to cope with adversity. The results thus reveal that religiosity has risen globally due to the pandemic with potential direct long-term consequences for various socio-economic outcomes.

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1. Introduction

The COVID-19 pandemic has impacted the world along multiple dimensions. Countries have suffered losses at varying degrees, including deteriorating mental well-being.¹ At the same time, religion may have positive mental health effects, and the use of religion for coping with the anxiety caused by the pandemic may potentially reduce emotional distress.² This could potentially impact economic losses. Research has documented heightened economic anxiety in the face of the pandemic, which arguably fuels the economic crisis.³ If religion provides stress relief, believers may experience less economic

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¹ Using surveys and observing activity on the Chinese microblogging site Weibo, early research identified mental health effects of COVID-19 in China (Li et al., 2020; Wang et al., 2020; Xiao et al., 2020).

² Reviews in (Pargament, 2001; O. Harrison et al., 2001; Schnittker, 2001). For instance, Miller et al. (2014) found that religious individuals have thicker cortices, a measure of lower depression risk.

³ Fetzer et al. (2020); Binder (2020). Andersen et al. (2020) show that the main part of the decline in consumption in Scandinavia was due to fear rather than lockdowns. In general, economic anxiety has real effects on the economy (Bailey et al., 2018; 2019; Coibion et al., 2019; Puri and Robinson, 2007).

anxiety and be quicker to recover. On the other hand, religion may have exacerbated losses as some religious communities defied social distancing recommendations and continued to have religious mass gatherings, potentially intensifying the spread of the virus.⁴ Moreover, if the pandemic has permanently intensified the use of religion, raising global religiosity, this may have long-term effects on socio-economic factors, such as economic growth, innovation, and gender roles.⁵ Identifying the impact of the COVID-19 pandemic on religiosity is therefore relevant.

This research identifies empirically the extent to which the COVID-19 pandemic has increased religiosity across the globe, whether the phenomenon is global, whether it is long-lasting, and determines who use religion in times of crisis. To identify the instantaneous and global impact on religiosity, the main analysis is based on one key dimension of religion; prayer. Google searches for prayer as a share of all Google searches provide a signal of peoples' interest in prayer in real time. Previous research has documented that Google searches disclose real offline behavior, such as consumption patterns (Goel et al., 2010), unemployment rates (Askitas and Zimmermann, 2009; D'Amuri and Marcucci, 2017), real-life economic behavior (Choi and Varian, 2012), development of the flu (Ginsberg et al., 2009), and also infections by COVID-19 prior to official statistics (Walker et al., 2020). Likewise, whether or not we google religious terms reflects our religious preferences (Yeung, 2019; Stephens-Davidowitz, 2015). Events that instigate intensified actual prayer are clearly visible in the data. Average global prayer search shares rise on Sundays where most Christian masses are held (Stephens-Davidowitz, 2015). Before the COVID-19 pandemic, the Ramadan contributed to the largest yearly rise in global search intensity for prayer (Panel a of Fig. 1). More specific examples include surging prayer search shares in Iran on January 7, 2020, coinciding with the funeral of Qassem Soleimani, the Iranian major general killed by American troops, in Australia on January 5, 2020 when the movement "Prayer for Australia" swept across Australia in the midst of the unprecedented bushfires, and in Albania on November 26, 2019 when a 6.4 magnitude earthquake stroke the country. Countries that search more for prayer on the Internet are also ranked in surveys as being more religious (Fig. A.8).

In March 2020, the share of Google searches for prayer surged to the highest level ever recorded, surpassing all other religious events that otherwise call for prayer, such as Christmas, Easter, and the Ramadan (Fig. 1).⁶ The World Health Organization declared COVID-19 a pandemic on March 11, 2020. The surge in Google searches for prayer was 1.3 times larger than the rise in searches for takeaway and amounted to 12% of the rise in Netflix searches or 26% the fall in searches for flights, which all saw massive changes globally, since most countries were in lockdown and air traffic was shut down (cf. Appendix B.4).⁷ Google searches for prayer fell some after April 2020, but remained 10% above its previous level throughout 2020 (Panel b of Fig. 1).

When googling prayer what you find is specific prayer texts to use when praying. Prayers may be recited from memory, read from a book of prayers, or composed spontaneously as they are prayed. These books or verses of prayer can be found on the Internet. The most common form of prayer in Christianity is to directly appeal to a deity to grant one's requests (Kurian and Smith, 2010). One of the most searched for prayers in March 2020 was "Coronavirus prayer", which are prayers that ask God for protection against the coronavirus, prayers to stay strong, and prayers to thank nurses for their efforts. That people prayed more in response to the pandemic is also evident in surveys. According to a Pew Research Center survey from March 2020, more than half of all Americans had prayed to end the coronavirus during early 2020 (Pew, 2020b). By the end of 2020, one in ten Americans said their faith had been strengthened by the pandemic (Pew, 2021).

Using weekly data on Google searches for prayer for 107 countries across the globe, this research documents that the rise visible in Fig. 1 is a global phenomenon, occurring on all continents and within all major religions, except Buddhism. Searches for topics related to God, Allah, Muhammad, Quran, Bible, and Jesus also rose, and to a lesser extent Buddha, Vishnu, and Shiva. Prayer searches rose when infection numbers and death tolls surged in individual countries, but the strongest trigger was WHO's declaration of COVID-19 as a pandemic on March 11, 2020. Prayer search shares rose more in poorer, more insecure, and more unequal countries, but this heterogeneity is mainly due to these countries being more religious. Thus, what matters for whether people use religion for coping with COVID-19 is not so much the state of the economy, but rather the existing strength of religion in society. To obtain exogenous variation in previous religiosity levels, I exploit variation in religiosity due to earthquake risk.

The results document that the main reason for the rising interest in prayer on the Internet is religious coping: People use their religion to cope with adversity.⁸ They pray for relief, understanding, and comfort. Research has shown that people

⁴ Examples include religious gatherings in a Dallas megachurch (<https://www.wsj.com/articles/despite-coronavirus-some-religious-services-continue-11584310003>), secret church services in Mexico and Brazil (<https://www.theguardian.com/global-development/2020/jun/17/mexico-churches-catholic-mass-covid-19-coronavirus>), and encouragement by the Vatican to continue having masses (<https://www.ncronline.org/news/people/catholic-cardinal-burke-says-faithful-should-attend-mass-despite-coronavirus>).

⁵ Research has documented that religiosity correlates with various socio-economic factors, such as labour force participation, education, crime, health, and even aggregate GDP per capita growth (Campante and Yanagizawa-Drott, 2015; Guiso et al., 2003; Iannaccone, 1998; Iyer, 2016; Kimball et al., 2009; Lehrer, 2004; McCleary and Barro, 2006; Squicciarini, 2019). See (Bentzen, 2021) for a review.

⁶ Figure 1 shows Google search data during 2017–2020. The spike in prayer searches is even more dramatic when including the entire series of available Google search data going back to 2004, but these data include breaks and are not used for the main analysis (Fig. A.18).

⁷ In an attempt to limit the spread of the virus, most countries implemented lockdowns. As a result, many people were at home ordering takeaway and watching Netflix more than usual. These rising internet searches will tend to reduce the share of searches for prayer, as this volume goes into the denominator.

⁸ Pargament (2001), Norenzayan and Hansen (2006), Park et al. (1990), Williams et al. (1991).

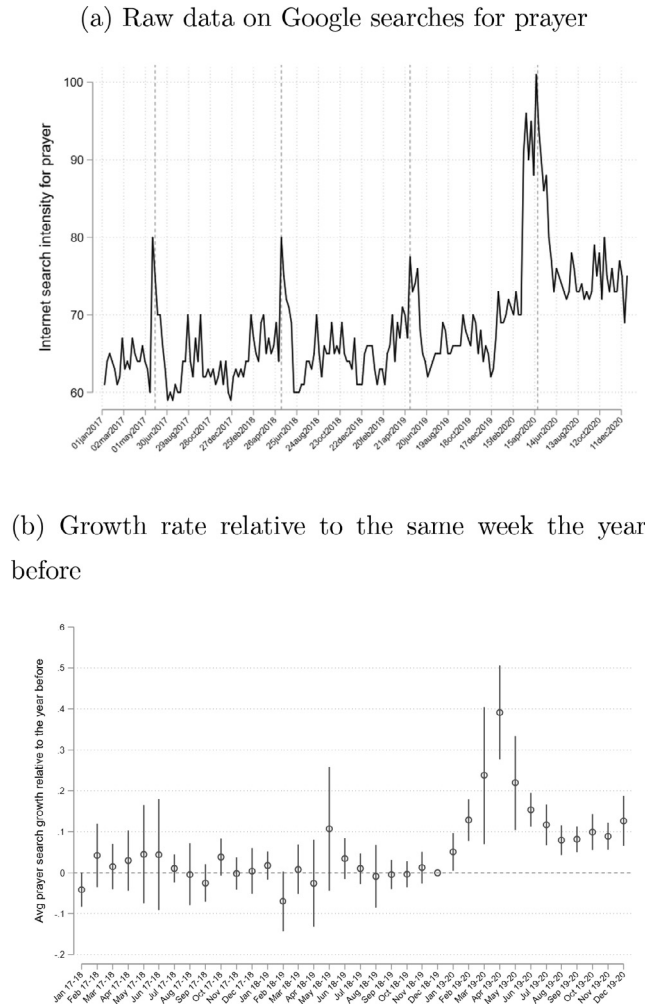


Fig. 1. Worldwide Google searches for prayer as a share of total Google searches 2017–2020. Average global weekly Google searches for prayer 2017–2020, measured as a share of all Google searches, encompassing all topics related to prayer, including alternative spellings and languages. Panel (a) depicts the global level of Google searches over time, where the maximum share was set to 100 by Google Trends. The vertical stippled lines represent the first week of the Ramadan. Panel (b) shows the growth in the prayer search share relative to the same week the year before, after removing variation due to religious holidays. Data source: Google Trends. For the development since 2004, see Fig. A.18. Find more details in Section 4.

struggling with cancer, death in close family, or severe illness are more religious, and also that adversity *causes* people to use their religion more intensively.⁹ Being a pandemic that hit nearly all societies on the planet, the current research reveals what types of societies use religion in coping.

People may google topics related to prayer for a reason unrelated to religious coping. They may be searching for online forums to replace their church that closed down in attempts to enforce social distancing. Based on the literature on religious coping, we would not expect this to be the main explanation for rising prayer search shares. First, people use mainly their intrinsic religiosity (such as personal relation to God and private prayer) rather than their extrinsic religiosity (such as churchgoing) to cope with adversity.¹⁰ Second, the vast majority (98%) of Americans who pray, pray alone and not in church (Barna, 2017). Thus, had the churches been open, we would not expect rising attendance to be as large as rising prayer intensity. Nevertheless, I perform empirical checks, revealing that prayer searches did not rise because of the church closures. First, the rising prayer searches are not a response to country-specific lockdown dates. Second, searches for topics related to “internet church” also rise, but these searches are of a magnitude 100 times smaller than the searches for prayer and thus cannot account for the rise in prayer searches. Third, as opposed to searches for online churches, the rise in prayer searches is not limited to Sundays where most Christian masses are held or to Fridays where the mandatory Muslim Friday-prayer is performed. Instead, the rise in prayer searches occurs on all days of the week. Fourth, detailed data on the specific Google

⁹ Reviews by Ano and Vasconcelles (2005) and (Pargament, 2001) and more recent studies by Bentzen (2019), Norenzayan and Hansen (2006).

¹⁰ E.g., Johnson and Spilka (1991), Pargament (2001), Allport and Ross (1967), Koenig et al. (1988), Miller et al. (2014), Schnittker (2001).

searches within the topic prayer reveals that people search for prayer texts and issues related to spirituality and to a much lesser extent anything related to religious worship places. These results are consistent with findings in surveys: In a survey from April 2020, 24% of Americans responded that their faith had strengthened since the coronavirus, which we would not have expected if people are simply replacing their physical churchgoing with online churching (Pew, 2020a). Again, this is not surprising from a theoretical viewpoint: When faced with adversity, religious individuals do not primarily cope by going to church, akin to depressed individuals in general who rarely use social activity to cope with their situation (e.g., Steger and Kashdan, 2009). Instead, humans tend to turn inward when faced with adversity. Many, it turns out, by using their religion.

Another concern is that the lockdowns may have shifted the composition of internet users towards more religious individuals, thus explaining the surging prayer searches. Perhaps more blue collar workers without access to the Internet at work were sent home and blue collar workers are potentially more religious than average. This is unlikely to explain the results. The rise in prayer searches persisted throughout the re-opening of the economies, and also when restricting the sample to weekends, where the composition of internet users is arguably somewhat more similar compared to prior to lockdown. Some blue collar workers may have worked on weekends - particularly in developing nations -, but taking the back-of-the-envelope calculation at face value, every second adult on Earth had prayed to end the coronavirus. It seems unlikely that a rise in prayer intensity this size is explained by a single population group. The lockdowns also meant that people had more time on their hands. One may conjecture that people simply searched Google for prayer out of boredom. This is also unlikely to explain the results. The measure of prayer searches amounts to Google searches for the topic prayer as a share of all other searches on Google. An alternative explanation to coping has to explain why the bored people chose to google prayer rather than jigsaw puzzles, for instance.¹¹ These alternative explanations are also inconsistent with the finding that variation in lockdown dates cannot explain results.

There are reasons to believe that the rise in Google searches for prayer underestimates the true increase in prayer intensity. First, most prayers are performed without the use of the Internet, instead recited from memory or read from physical books. Second, among those who use the Internet for prayers, Google Trends registers only when people google prayer, whereas those who found their favored prayer and memorized it or enter their preferred website with prayers directly without googling them are not included in the data, even if they continue to pray. Third, the elderly, who were most severely affected by the pandemic, are not the most active internet users and thus their entire prayer intensity will not show up in Google. Fourth, general internet searches rose throughout 2020 since people across the globe were in lockdown. These searches enter the denominator of all other search shares, which mechanically reduces the search shares for these other searches, including prayer. Fifth, the data includes only countries with enough internet users, which turn out to also be less religious and thus more prone to engage in religious coping (Pargament, 2001).

The results inform the literature on the mental health and economic effects of the pandemic. Research has documented symptoms of stress and anxiety among health personnel and the population in China (Li et al., 2020; Wang et al., 2020; Xiao et al., 2020). In the absence of real-time measures of people's mental health, Google searches for prayer reveal that people from across the globe experienced emotional distress in the face of the COVID-19 pandemic, and they used religion to cope. These emotional effects may have economic consequences. Studies have documented rising economic distress in the face of the COVID-19 pandemic (Fetzer et al., 2020; Binder, 2020). In Scandinavia, the main part of the initial economic downturn was due to the perceived risk of the virus rather than government mandated lockdowns (Andersen et al., 2020). In more general, part of the collapse in output during crisis is caused by anxiety and expectations.¹² If religion provides stress relief, believers may experience less economic anxiety, which may make them less likely to change their economic behavior dramatically in response to the crisis. This may mean quicker recovery in these societies. Contrarily, if the rise in religiosity is permanent, it may impact various additional socio-economic confounders. Scholars have found two main opposing consequences of religiosity: Pro-sociality and charity on the one hand and more conservative values and behavior on the other.¹³ The results show that the rise in religiosity continued throughout 2020. Time will show whether global religiosity has risen permanently.

This research also contributes to the literature on religious coping. While previous research has documented a rise in religiosity in the aftermath of natural disasters (Belloc et al., 2016; Bentzen, 2019; Bulbulia, 2004), some countries, such as Northern European countries, are rarely hit. So far, a literature has concluded that mainly the poor and vulnerable use religion in coping (Inglehart and Norris, 2003). The poor and vulnerable are also hit more often by adversity, though. Instead, the COVID-19 pandemic hit globally and thus provides a unique experiment to study which types of societies use religion for coping. It turns out that what matters most for the degree to which people use religion in coping is the existing strength of religion, rather than poverty levels, education, or welfare. Combining this global crisis with daily and weekly data on prayer searches also facilitates testing of the dynamic effects on the use of religion in coping.

¹¹ Google searches for jigsaw puzzles also rose during the lockdowns, but to a much smaller extent than searches on prayer and for a quite different set of countries: tinyurl.com/2t4g69yx.

¹² Bailey et al. (2018), Bailey et al. (2019), Coibion et al. (2019), Puri and Robinson (2007).

¹³ Guiso et al. (2003), Barro and McCleary (2003), Squicciarini (2019), Belloc et al. (2016), Bénabou et al. (2015), Inglehart and Norris (2003), Shariff and Norenzayan (2007), Norenzayan et al. (2016).

That people use religion in crisis further speaks to one of the puzzles of the social sciences: Religion has not vanished with modernization as early scholars otherwise predicted.¹⁴ On the contrary, the role of religion is on the rise in many places and today 84% of the globe believe in God.¹⁵ The use of religion in crisis may be one explanation.

2. Religious coping

The tendency for people to use religion to deal with crisis can be understood within the religious coping terminology.¹⁶ The theory states that people use religion as a means to cope with adversity and uncertainty. They pray, seek a closer relation to God, or explain the tragedy by reference to an Act of God. Research has documented that people who experienced adverse life events, such as cancer, heart problems, death in close family, divorce, or injury are more religious than others (Ano and Vasconcelles, 2005; Pargament, 2001). The impact seems to be causal: Priming subjects in an experiment with thoughts of death makes them rank themselves as more religious (Norenzayan and Hansen, 2006), churchgoing rose in the aftermath of the 1927 Great Mississippi flood (Ager et al., 2016), people hit by the Christchurch 2012 earthquake reported increased religiosity (Sibley and Bulbulia, 2012), and natural disasters more broadly raises religiosity across the globe (Bentzen, 2019). According to the latter study, people are more likely to rank themselves as a religious person, say they find comfort in God, and to state that God is important in their lives when hit by earthquakes, tsunamis, and volcanic eruptions. This holds for people from all continents, belonging to all major religions, from all income groups and educational backgrounds. And the increased religiosity lasts for generations.

Using religion for coping is part of what is termed emotion-focused coping, in which people aim to reduce their emotional distress arising from a given situation (Lazarus and Folkman, 1984). While people use religion for coping with various types of situations, religion is used mainly for coping with negative and unpredictable situations (Pargament, 2001; Bjork and Cohen, 1993; Smith et al., 2000). When facing perceived negative but *predictable* events, such as an approaching job interview, we are more likely to engage in problem-focused coping which means directly tackling the problem that is causing the stress.¹⁷ Folkman and Lazarus (1980) found that work contexts favor problem-focused coping and health contexts tend to favor emotion-focused coping. Likewise, religiosity increases in response to unpredictable natural disasters, such as earthquakes, tsunamis, and volcanic eruptions, but not in response to more predictable ones, such as storms (Bentzen, 2019). Being a negative and highly unpredictable health-related event, the COVID-19 crisis fits the criteria for potentially instigating religious coping. As of April 20, 2020, the COVID-19 pandemic had affected 210 countries and territories, infected more than 2.4 mio. individuals worldwide and taken more than 165,000 lives. By Aug 1 2021, the numbers had soared to nearly 200 mio. cases and 4.2 mio. deaths worldwide.

When faced with adversity, people are more likely to use their private beliefs to cope rather than to go to church (Johnson and Spilka, 1991; Pargament, 2001). Likewise, when depressed, we usually do not go out socializing but instead turn inwards (Steger and Kashdan, 2009; Jacobson et al., 2001). The most frequently mentioned coping strategies among 100 older adults dealing with stressful events were faith in God, prayer, and gaining strength from God. Social church-related activities were less commonly noted (Koenig et al., 1988). Miller et al. (2014) found that individuals for whom religion is more important had lower depression risk measured by cortical thickness, while frequency of church attendance was not associated with thickness of the cortices. Schnitker (2001) found that religious salience and spiritual help-seeking exhibit significant stress-buffering effects, but find no such effects of attendance at religious services. Also, natural disasters strengthen private religious beliefs and affect churchgoing much less (Bentzen, 2019). A priori, we would therefore expect the COVID-19 pandemic to impact private prayer more than churchgoing, even if the churches had been open. The use of religion for coping with adversity may come with mental health benefits for practitioners (reviews in Pargament, 2001; O. Harrison et al., 2001; Schnitker, 2001). In addition to the studies mentioned above, Lang et al. (2015) primed subjects in an experiment on Mauritius with anxiety by having them plan for the next natural disaster. They measured heightened stress levels among subjects, but these stress levels were lower for subjects allowed to perform their usual religious rituals, compared to subjects that were asked to sit and relax in a non-religious space.

The intensified use of religion may translate into a permanently strengthened role of religion, even after disaster has passed. Through 129 retrospective interviews of elderly individuals, Ingersoll-Dayton et al. (2002) found that events such as death of close family or friends intensified participants' felt relationship with God permanently. Bentzen (2019) found that while the main surge in religiosity occurred during the few years immediately following an earthquake, a residual of elevated religiosity remained and was passed on to future generations, even for children of migrants who never lived in the disaster-prone countries. Thus, natural disasters or death in close family can strengthen the role of religion permanently. The same may be true for the COVID-19 pandemic.

Examples abound of people using prayer as a way of dealing with the uncertainty and fear surrounding the COVID-19 outbreak. While the title of a sermon by Pastor Robert Jeffress at an Evangelical Christian megachurch in Dallas asks "Is the

¹⁴ Marx (1844), Weber (1905), Durkheim (1912), Freud (1927).

¹⁵ Norris and Inglehart (2011), Stark and Finke (2000), Iannaccone (1998).

¹⁶ Pargament (2001), Norenzayan and Hansen (2006), Cohen and Wills (1985), Park et al. (1990), Williams et al. (1991).

¹⁷ Religion is also used for celebration, but research shows that religion is used more in response to negative events, rather than positive events (Pargament, 2001).

Coronavirus a Judgement from God?”, political leaders from Mr. Akufo-Addo of Ghana to Mr. Morrison of Australia urged their populations to pray as the coronavirus spread across the globe.¹⁸

3. Data on prayer intensity

To identify when and why prayer intensity started to rise, whether the rise persisted, and whether some are more prone to use religion for coping, the main database will consist of a panel dataset of Google searches for prayer as a share of total Google searches for 107 countries measured weekly during the period 2017–2020 (see also [Appendix A](#) for details). The data on Google searches for prayer was assembled by Google Trends, comprising Google searches for all topics related to prayer, including alternative spellings and searches in all languages. Google Trends provides two types of data: Time-series data and cross-section data. The *time-series* data is available at the hourly, daily or weekly level for individual countries, regions within these countries, and as an average for the world. Weekly data is available as series going back to 2004. The main analysis will include data for the period from the first week of January 2017 to the last week of December 2020 and will focus on data on individual countries, whereas the global average - pictured in [Fig. 1](#) - is used in some robustness checks.¹⁹ Daily data can be downloaded for 9 consecutive months at a time. These daily data will be used for checks of the mechanism and will include data from January 1 to September 1, 2020. The hourly data is available as live data for the past 7 days and is not available going back in time. These hourly data therefore cannot be used for the current analysis. The *cross-section* data is available for either countries or regions within a country. The main analysis in the workingpaper version of this paper was based on the daily data from January 29 to April 1, 2020 ([Bentzen, 2020](#)). The conclusions in the current extended research carry through.

To construct a panel dataset of Google searches for prayer that is comparable across countries, the following three main operations were conducted. First, for each country, Google Trends normalized the search shares to 100 for the highest search share during the period. This means that only the growth rates, and not the levels, of the time-series data have a meaningful interpretation and can be compared across countries. For the cross-country data, the levels *can* be compared across countries. The analysis includes country fixed effects throughout and thus does not compare countries, but the analysis in [Section 4.4](#) identifies the characteristics of the countries who pray more, which means that comparison across countries occurs. To construct a panel dataset where values can be compared across countries, I combined the growth rates from the time-series data with the levels from the cross-section data. I set the level of prayer search shares in the first week of January 2020 equal to the average prayer search share for 2019 for each country and calculated the search shares for the rest of the period based on the growth rates from the time-series data.²⁰ Unless otherwise indicated, all tables and figures are based on these comparable data. Results are robust to not re-scaling the data. For instance, [Fig. 1](#) is not based on this re-scaling. Also, [Fig. A.16](#) normalizes instead the search shares in all countries to 1 on February 15, 2020.

Second, Google Trends provides search data for 225 countries, but a large chunk of these have so few internet searches that the data is unreliable for analysis. These countries include small islands, such as St. Kitts and Nevis, and countries with low internet access in general, such as Western Sahara. These countries are excluded from the main sample, arriving at a sample of 107 countries, representing 70% of the world population (for details on this selection process, see [Appendix A.1](#)).²¹ The development in prayer searches among these 107 countries compared to the world average (as shown in [Fig. 1](#)) do not differ much ([Fig. A.7](#)). If anything, persistence is somewhat lower among the 107 countries compared to the world average.²² Thus, actual persistence in the rise in prayer searches may be higher than the estimates reveal.

Third, several events influence week-to-week fluctuations in searches for prayer on the Internet. Particularly religious events such as Christmas, the Ramadan and Easter. To prevent results from simply capturing the arrival of one of these

¹⁸ <https://www.firstdallas.org/blog/is-the-coronavirus-a-judgment-from-god/>, <https://www.iol.co.za/news/africa/ghana-president-nana-akufo-addo-calls-for-prayer-fasting-for-covid-19-45421569>, <https://www.canberratimes.com.au/story/6692098/my-prayer-knees-are-getting-a-good-work-out-pms-coronavirus-address/>.

¹⁹ The analysis focuses on countries, rather than subnational regions, in order to obtain a sample representative for the world to enable testing the global extent of the effects and to identify the characteristics of the countries that engage more in religious coping. The regional data is only available for some countries and is often based on rather few total internet users.

²⁰ An example of the procedure is as follows. The average prayer search share in 2019 was 3 for Denmark, while that in Morocco was 87. Accordingly, I set the prayer search share on week 1 of 2020 to 3 in Denmark and 38 in Algeria. From week 1 to week 2, prayer search shares fell by 42% in Denmark and by 9% in Algeria. The prayer search share on week 2 of 2020 therefore amounts to 1.7 in Denmark and 41.3 in Algeria, and so forth. For the daily data, I set the search share on January 1, 2020 equal to the average search share for 2019 for each country and again calculate the remaining search shares based on the growth rates from the time-series data.

²¹ 5.41 bio. / 7.67 bio. people in 2019. The countries included in the sample are: Algeria, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Belarus, Belgium, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, Colombia, Congo - Kinshasa, Costa Rica, Croatia, Cyprus, Czechia, Côte d'Ivoire, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Latvia, Lebanon, Lithuania, Malawi, Malaysia, Mauritius, Mexico, Moldova, Mozambique, Namibia, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovakia, South Africa, South Korea, Spain, Sri Lanka, St. Helena, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe.

²² Since the sample includes countries with a certain amount of internet users, this means that poorer countries are somewhat underrepresented (a general problem in most empirical cross-country research). As a consequence, the sample is less religious than average, which implies that religion is most likely used less for coping among the sampled countries than would have been the case for the world at large, cf. results and [Appendix A.1](#).

events, three measures are taken. First, the workingpaper version of this research showed results for dataserie starting on January 29, well after religious events in early January and ending on April 1, 2020, before the onset of Easter and the Ramadan. Those results were therefore not influenced by these major religious events. Second, the main measure of prayer searches in the current analysis is the growth rate in prayer search shares from week $t - 52$ to week t : $gprayer_t = \frac{prayer_t - prayer_{t-52}}{prayer_{t-52}}$. This rate equals 0.5 if the search share is 50% higher compared to the same week in the previous year. All main results are robust to using instead the level of the search shares, cf. [Appendix B.7](#). Third, as the growth-based measure does not remove bias based on religious holidays that do not follow the same weeks in the Gregorian calendar, such as Easter and Ramadan, all results include religious holiday dummies that are equal to one during the time of the Ramadan, Easter, Pentecost, and Ash Wednesday and their 52-week lags (except panel (a) of [Fig. 1](#) that includes the raw data).

To identify the specific contents of the searches for prayer, I retrieved information from Google Trends on topics and search queries that relate to the searches within the prayer topic (see also [Appendix B.2](#)). Search queries are actual searches, while topics encompass a broader set of searches within that topic. Search queries are language-specific, while topics are not. For instance, close to 90% of the searches within the prayer topic encompass searches for the term “prayer” in different languages. Google Trends provides the top-25 topics and queries related to the topic “prayer”, where top-25 is based on either largest growth or largest total volume. These will be used to examine the mechanism in [Section 4.3](#).

A rising prayer search share reveals that new people are searching for topics related to prayer or that someone who already searched for prayer is searching for prayer again.²³ Falling search shares for prayer are more difficult to interpret. Google searches for prayer will fall as people memorize the prayers or access their prayer websites directly without googling them. For instance, searches for prayer surge on the first week of the Ramadan only to drop the week after, even though Muslims pray every day during Ramadan (cf. [Fig. 1](#)).

To measure the extent of the COVID-19 pandemic, the data on search shares for prayer were linked with data on cases of infection by COVID-19, deaths by COVID-19, Google searches for anosmia, and lockdown dates for different countries. Daily data on cases and deaths were provided by the European Centre for Disease Prevention and Control (ECDC) since December 31, 2019 (see also [Appendix A.2](#)). Weekly averages were calculated to match with the weekly data on prayer search shares. These numbers depend on the amount of testing in each country and general policies regarding registration of cases and deaths, and are therefore neither comparable across countries nor across time (where policies may change). Inclusion of country fixed effects throughout takes care of the lack of comparability across countries. In an attempt to account for the lack of comparability across time, measures of the timing of the first case or death will be used, but the main results will depend on a measure independent of the registered cases and deaths: The point in time when COVID-19 was declared a pandemic by the WHO; March 11, 2020.²⁴ Anosmia, the loss of the sense of smell, is a symptom of COVID-19 and Google searches for anosmia reveal outbreaks of COVID-19 before official statistics ([Walker et al., 2020](#)). Google searches for anosmia will therefore be used as an additional measure of the extent of the pandemic. Dates of lockdown for various types of lockdown for individual countries was compiled by [Porcher \(2020\)](#) in the Response2covid19 database. To measure the closure of religious worship places, I use the dates of bans on mass gatherings.

To identify the characteristics of those who search more for prayers on the Internet, the Google searches were combined with data on various characteristics of the countries, such as religiosity levels before COVID-19, the share of Christians, Muslims, Hindus, and Buddhists, and various socio-economic characteristics, described in more detail in [Section 6](#). Find further variable descriptions in [Appendix A](#) and the summary statistics of all main variables in [Tables A.7 and A.8](#).

4. Results

The research consists of four main analyses. First, the timing, degree of persistence, and global extent of the rise in prayer searches is examined ([Section 4.1](#)). Second, the reason for the rise is identified by linking the prayer searches to specific markers of the exposure to the COVID-19 pandemic ([Section 4.2](#)). Third, the mechanism behind the rise is established by disentangling religious coping from church closures ([Section 4.3](#)). Fourth, the heterogeneity of the rise is further examined by identifying whether prayer intensity rose more for certain religions or socio-economic groups ([Section 4.4](#)).

4.1. Timing, persistence, and global spread of the rise in prayer

[Figure 1](#) documented that prayer searches rose in the first part of 2020 and continued to be higher than previously throughout the year. The absence of any systematic growth prior to 2020 indicates that the rise in prayer searches is most likely specific to 2020. While panel a depicted the raw data of the level of Google searches for prayer as a share of total Google searches, panel b depicted estimates based on the most simple estimations of the following equation:

$$gprayer_t = \alpha + \beta prayer_{t-52} + \gamma_{p2020} + \kappa_{ht} + \delta t + \varepsilon_t \quad (1)$$

²³ Google Trends removes data from one person googling prayer many times over a short period of time.

²⁴ Another reason for not using the actual numbers of cases and deaths is the inability to interpret falling prayer searches. As the dataserie stopped before prayer searches started to fall, the data in the workingpaper version of this paper could be linked to the number of cases and deaths, showing that searches for prayer rose with the number cases and deaths, but that this was exclusively explained by differences in prayer searches before and after March 11, as will also be concluded in the current research.

Table 1
The timing of the rise in prayer search shares: World vs countries.

Dependent variable: Growth rate in prayer search shares [0,1]							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial prayer		-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.0047*** (0.001)	-0.031*** (0.003)	-0.031*** (0.002)
Jan-Feb 2020	0.092*** (0.026)	0.085*** (0.023)	0.081*** (0.027)		0.086*** (0.023)	0.088*** (0.022)	
Mar-Apr 2020	0.29*** (0.027)	0.30*** (0.023)	0.29*** (0.032)		0.32*** (0.037)	0.33*** (0.036)	
May-Dec 2020	0.11*** (0.015)	0.13*** (0.013)	0.13*** (0.033)		0.088*** (0.024)	0.10*** (0.024)	
Jan-Feb 2019				-0.011 (0.021)			-0.0039 (0.016)
Mar-Apr 2019				0.0084 (0.025)			0.024 (0.020)
May-Dec 2019				0.038 (0.025)			0.023 (0.021)
R-squared	0.67	0.76	0.76	0.61	0.083	0.27	0.27
Observations	104	104	104	104	11,128	11,128	11,128
Period	2018–2020	2018–2020	2018–2020	2017–2019	2018–2020	2018–2020	2017–2019
Panel	World	World	World	World	Country	Country	Country
Trend	N	N	Y	Y	Y	Y	Y
Country-trend	N	N	N	N	N	Y	Y
MeanDepVar	0.090	0.090	0.090	0.024	0.16	0.16	0.11

OLS estimates. The observations are weeks in columns (1)–(4) and countries × weeks in columns (5)–(7). The period of analysis is 2018–2020 in columns (1)–(3) and (5)–(6) and 2017–2019 in columns (4) and (7). All regressions include religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags. MeanDepVar measures the mean of the dependent variable. Robust standard errors in parentheses in columns (1)–(4), clustered at the country level in columns (5)–(7). *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer search shares rose when measured as a global average and for individual countries, but not before 2020.

where $gprayer_t$ measures the growth rate of the average global Google search share for prayer from week $t - 52$ to week t , compared to the level in week $t - 52$. $prayer_{t-52}$ measures the level of prayer search shares 52 weeks earlier, included to account for the fact that growth rates may be mechanically lower for societies with initially higher religiosity levels. γ_{p2020} is a set of period dummies for 2020 included to examine the timing of the rise in prayer searches. κ_{ht} is a set of dummies for large religious holidays that do not occur within the same weeks each year in the Gregorian calendar: Ramadan, Easter, Pentecost, and Ash Wednesday. For each type of holiday, two sets of dummies are included: one set equal to one during the particular time of the holiday and another set equal to one 52 weeks prior to the holiday. δt is a time trend added to account for general developments in prayer intensity.²⁵ Panel b of Fig. 1 depicted estimates of γ from a regression of $gprayer_t$ regressed on the religious holiday dummies and dummies for the particular months during the period.

Instead of the simple time-series data in Fig. 1, the main analysis will include panel data for countries measured in different weeks. To examine how results compare across the two types of data, columns (1)–(4) of Table 1 document estimates using the time-series data on the global average (as used in Fig. 1), while columns (5)–(7) show results for the panel-data. Column (1) replicates results from panel b of Fig. 1 for the period 2018–2020. The estimates document that average prayer search shares rose by 9.2% in January–February 2020, by 29% in March–April 2020, and remained 11% higher throughout 2020, compared to the two previous years. The result is unchanged when accounting for the initial level of prayer searches (column 2) and when accounting for a potential general trend in prayer searches by adding a time trend (column 3). The negative estimate on initial prayer searches indicates that growth rates are higher when prayer searches were initially further from their maximum. The results in column (4) confirm that the prayer search share did not change significantly during the three years preceding COVID-19 (i.e., there are no pre-trends). This means that the rise during 2020 is not a simple artifact of a pattern occurring every year. The results are similar when using the panel data for the 107 countries with sufficient internet activity for the period 2018–2020 (column 5). If anything, persistence is lower in the panel data, which is most likely because the sample countries are less religious compared to the rest of the world (cf Appendix A.1 for calculations). The result is unchanged when including a country-specific time-trend (column 6). Again, there are no pre-trends in the period 2017–2019 (column 7).

To further examine the spatial heterogeneity of the average rise in prayer searches in 2020, Fig. 2 depicts the average growth in prayer searches, $gprayer$, on a map. Of the 107 countries in the sample, 103 experience positive average growth in prayer searches during 2020, compared to 2019. The four countries that experience average negative growth are Israel, Kazakhstan, St Helena, and Thailand.

²⁵ The time-trend is a continuous variable that rises with each week in the sample starting from week 1 early January 2017 to week 208 late December 2020.

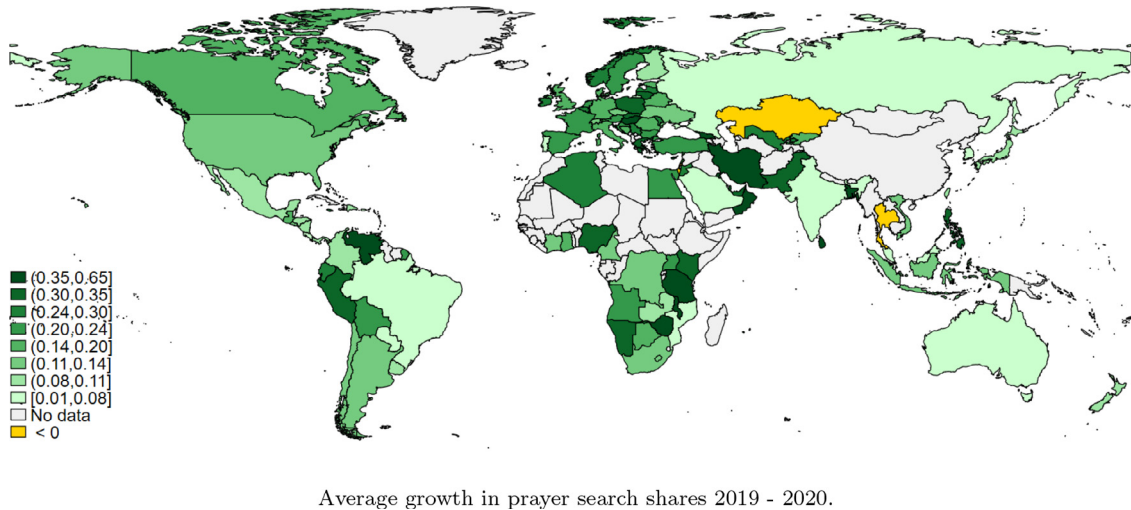


Fig. 2. The spatial spread of prayer search growth during 2020. Average growth in prayer search shares 2019 - 2020.

The rise documented in Fig. 2 may cover heterogeneity in terms of the timing of the rise.²⁶ To examine this and further robustness and dynamics of the results, the following equation will be estimated:

$$gprayer_{ct} = \alpha + \beta prayer_{c,t-52} + \gamma_{p2020} + \kappa_{ht} + \delta t_c + \delta_c + \varepsilon_{ct} \tag{2}$$

where $gprayer_{ct}$ and $prayer_{c,t-52}$ are growth and initial levels of prayer search shares for the individual countries as in columns (5)–(7) of Table 1. δt_c are country-specific time-trends added to account for general developments in prayer intensity that are country specific (also added in column (7) of Table 1). δ_c are country fixed effects added to account for anything particular to the individual countries. γ_{p2020} now consists of two-months dummies throughout 2020 to examine whether persistence lasts throughout 2020.

Table 2 explores the results. Column (1) replicates the result in column (5) of Table 1, but now revealing that persistence lasts until around October 2020, where-after the rise in prayer searches is statistically indistinguishable from zero. The result is unaltered when adding country fixed effects (column 2).²⁷

To examine heterogeneity of these dynamics across space, columns (3)–(6) restrict the sample to individual regions.²⁸ The initial rise in prayer searches during March and April of 2020 occurred across the globe: Prayer searches rose by around 30% in Asia, Africa, the Americas, and in Europe, even though the timing of the arrival of the COVID-19 disease differed across these regions. This simultaneous rise in prayer searches occurs for nearly all countries in the sample, just after March 11, where WHO declared COVID-19 a pandemic as examined further in Section 4.2 (see also Figs. A.16 and A.17).

The persistence of the rise in prayer searches differed across the regions, though: Prayer searches remained around 15% higher than previously throughout 2020 in the Americas and Europe, but could not be distinguished from previous years in Asia and Africa starting already from July 2020. The lack of persistence in Asia could be because prayer searches rose in the end of 2019, as the first infections by COVID-19 were registered in China in November 2019. This is not the case: Prayer searches did not rise significantly in 2019 compared to 2018 in any of the World’s regions (Table A.16). If anything, prayer search shares fell during November and December in China from 2018 to 2019.

While several explanations can be envisioned for the difference in persistence, one explanation anchored in the religious coping literature is based on the degree of unexpectedness of the pandemic. According to the literature, religion is used mostly to cope with *unexpected* disasters and less so with *expected* disasters. In modern times, Asia and Africa have been hit by more epidemics or disease outbreaks compared to Europe and the Americas. While the most recent large pandemic before COVID-19 that hit Europe was the Spanish flu during 1920–1921, the most recent pandemic to hit Asia was SARS in 2002–2003. This means that COVID-19 may have been less surprising for Asian and African societies, relative to the recent disease history of these societies. As a consequence, COVID-19 did not instigate the same use of religion for coping as it did

²⁶ Figure A.19 depicts the average growth across the first four months of 2020 and the latter 8 months. While the correlation between the two averages is positive (0.34), it is not very high (Fig. A.20).

²⁷ As the regression in column (2) includes a lagged dependent variable (the initial prayer search share) and country fixed effects simultaneously, a concern is Hurwicz (1950)–Nickell (1981) bias. As the estimates are identical in columns (1) and (2), the bias seems miniscule, which may be due to the long dataserries, cf. Barro (2015). The conclusion is robust to excluding country fixed effects throughout Table 2 in Table A.14 and to excluding the initial prayer search share (Table A.15). More generally, all results using growth rates regressed on initial levels are reproduced using instead the level of prayer search shares as dependent variable and no controls for initial levels in Appendix B.7, where no Hurwicz–Nickell bias is present.

²⁸ The standard errors in columns (3)–(6) are potentially somewhat biased, as they are clustered at merely 20–32 clusters.

Table 2
The rise in prayer search shares: Further dynamics and heterogeneity.

Dependent variable: Growth rate in prayer search shares [0,1]						
	(1)	(2)	(3)	(4)	(5)	(6)
Jan-Feb 2020	0.072*** (0.022)	0.072*** (0.022)	0.086* (0.044)	0.048 (0.062)	0.0097 (0.014)	0.12*** (0.042)
Mar-Apr 2020	0.31*** (0.036)	0.31*** (0.036)	0.28*** (0.062)	0.32*** (0.105)	0.25*** (0.030)	0.39*** (0.075)
May-Jun 2020	0.11*** (0.024)	0.11*** (0.024)	0.097* (0.053)	0.13 (0.078)	0.17*** (0.034)	0.086*** (0.027)
Jul-Aug 2020	0.086*** (0.026)	0.086*** (0.026)	0.032 (0.059)	0.099 (0.075)	0.17*** (0.038)	0.083*** (0.032)
Sep-Oct 2020	0.047* (0.027)	0.047* (0.027)	-0.070 (0.065)	0.045 (0.058)	0.17*** (0.029)	0.10*** (0.031)
Nov-Dec 2020	0.043 (0.029)	0.043 (0.029)	-0.059 (0.059)	-0.062 (0.079)	0.14*** (0.034)	0.17*** (0.038)
R-squared	0.28	0.31	0.31	0.44	0.46	0.26
Observations	11,128	11,128	3328	2080	2392	3328
Countries	107	107	32	20	23	32
Country FE	N	Y	Y	Y	Y	Y
Region	All	All	Asia	Africa	Americas	Europe

OLS estimates across countries \times weeks in 2018–2020. The dependent variable is the weekly growth rate in prayer search shares from 52 weeks earlier. All regressions include a constant; the level of prayer search shares 52 weeks earlier; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a year trend. Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** The rise in prayer searches persisted throughout 2020, but only in Europe and the Americas. Prayer searches also rose in Asia and Africa, but stagnated towards the end of 2020.

in other parts of the globe. An alternative explanation applying only to Asia is that prayer searches rose less within Buddhist countries as we shall see in Section 4.4.

4.2. Prayer and the COVID-19 pandemic

The results so far established that a rise in Google searches for prayer occurred simultaneously for most countries in the sample during the early months of 2020 and persisted in some parts of the globe. This section proceeds to test whether the rise was related to specific dimensions of the COVID-19 pandemic. One hypothesis is that individuals in countries that were more severely hit would use religion more intensively compared to those less severely hit (call this the Physical Exposure Hypothesis). An alternative hypothesis is that as fear of the pandemic potentially spreads faster than the pandemic itself, the use of religion depends on the timing of the global onset of the pandemic, rather than the arrival of COVID-19 into ones' country (call this the Emotional Exposure Hypothesis). To disentangle the two hypotheses, I estimate equations of the form:

$$gprayer_{ct} = \alpha + \beta prayer_{c,t-52} + \gamma covid19_{ct} + \kappa_{ht} + \delta t_c + \delta_c + \delta_t + \varepsilon_{ct} \tag{3}$$

which resembles Eq. (2), but instead of period dummies, includes different measures of exposure to the COVID-19 pandemic: A dummy variable, *pandemic*, equal to one on March 11, and thereafter, a dummy equal to one after the country registered its first 10 cases of COVID-19 infected individuals, a dummy equal to one after the country registered its first death by COVID-19, a dummy equal to one after Google searches for anosmia reached 10 (out of 100), and a dummy equal to one during the periods in which the country banned mass gatherings.²⁹ Since most of these measures of pandemic exposure vary across countries and time, time fixed effects, δ_t , may be added to account for all time-specific movements in prayer searches. To identify the impact of the COVID-19 pandemic, the time-period is restricted to the period 2019–2020.

Depending on the measure of exposure to COVID-19, γ can be interpreted as the average rise in prayer searches (as a share of searches 52 weeks earlier) after COVID-19 was declared a pandemic or after COVID-19 hit the particular country. While it is theoretically probable that causality in Eq. (3) instead runs from religiosity to COVID-19 exposure, this seems an unlikely explanation for the results. The increases in prayer search shares documented here are the largest ever recorded. For reverse causality to explain the results, one would have to come up with another explanation for this sudden rise in prayer intensity. Also, the main results are based on the pandemic dummy, which does not suffer from reverse causality or other endogeneity issues, as the WHO announcement occurred centrally and independent of country-specific conditions.

Table 3 documents the estimates of Eq. (3), where the initial level of prayer searches, country-fixed effects, country-specific time trends, and dummies for religious holidays are accounted for throughout. Estimates of γ thus reveal the impact

²⁹ The reason that some of the dummies turn on only after 10 cases or Google searches instead of 1 is that the latter would imply a much earlier measured exposure, which potentially includes noise. The conclusion is unaltered when using instead dummies that turn on at 1 case or anosmia search.

Table 3
The impact of COVID-19 on weekly prayer search shares.

Dependent variable: Growth rate in prayer search shares [0,1]										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pandemic dummy	0.25*** (0.032)				0.18*** (0.061)	0.21*** (0.055)	0.21*** (0.042)			
Case dummy		0.24*** (0.033)			0.12* (0.060)			0.14** (0.066)		
Death dummy			0.23*** (0.036)			0.087 (0.056)			0.17** (0.070)	
Anosmia dummy				0.17*** (0.038)			0.070 (0.046)			0.092* (0.048)
R-squared	0.37	0.37	0.36	0.36	0.37	0.37	0.37	0.40	0.40	0.40
Observations	5564	5250	5250	5564	5250	5250	5564	5250	5250	5564
Countries	107	105	105	107	105	105	107	105	105	107
Time Fe	N	N	N	N	N	N	N	Y	Y	Y

OLS estimates across countries \times weeks during 2019–2020. The dependent variable is the weekly growth rate in prayer search shares from 52 weeks earlier. All regressions include a constant; the 52 week lag of the prayer search share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific year trend. Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer searches rose with cases, deaths and searches for anosmia, but the main part of the rise is due to WHO's announcement of the pandemic.

of COVID-19 on the change in prayer searches for countries with similar initial prayer intensities, similar trends in prayer searches, and measured at similar timing of religious holidays. The model in column (1) documents that prayer search shares were 25% higher after March 11, 2020 compared to the year before.³⁰ The average rise in prayer searches is similar when measuring instead COVID-19 exposure by the registration of the first COVID-19 infections or deaths in a country or the extent of Google searches for anosmia (columns 2–4). These results are not caused by a distinct cluster of countries (Fig. A.25). Instead, the average rise in prayer searches occurs for all observations in the sample for all four measures of COVID-19 exposure.³¹

To disentangle the impact of WHO's announcement of COVID-19 as a pandemic from the physical arrival of the disease in each country, the pandemic dummy is added to the regression together with the measures of physical exposure to the disease (columns 5–7). The estimate on the pandemic dummy falls by less than a third, whereas the estimates on physical exposure fall by nearly two thirds, some becoming statistically indistinguishable from zero. Thus, the majority of the intensified interest in prayer on the web was independent of the physical arrival of COVID-19, and instead occurred at the same point in time for all countries: When the WHO declared COVID-19 a pandemic. This is consistent with the Emotional Exposure Hypothesis and can be reconciled within the framework of religious coping: People use religion to cope with emotional distress, which may worsen before people themselves or their families caught the disease. Similarly, earthquakes raise religiosity, including earthquakes that only caused damage in neighboring districts or districts further away (Bentzen, 2019). The finding that searches for prayer rise simultaneously in most countries just after March 11, is visible in the raw data (Fig. A.16 and A.17) and is also consistent with the spatial spread of the “pray for italy” movement which surged in March 2020 in several African countries located far from Italy and well before these countries were hit (Fig. A.10).

One concern is that something else happened on March 11, unrelated to the COVID-19 pandemic and which caused the rise in searches for prayer on the Internet. Three of the measures of exposure to COVID-19 vary differently over time for the different countries, and thus time-fixed effects can be added to the regressions (columns 8–10). The conclusion is unaltered: Prayer searches rose significantly when COVID-19 affected countries across the globe. Interestingly, the insignificant estimates from columns (6) and (7) turn significant, indicating that whatever happened over time, potentially unrelated to the pandemic, was biasing the rise in prayer searches downwards. Thus, prayer searches rose both as a consequence of the declaration of COVID-19 as a pandemic and as the disease spread to the particular societies.

4.3. Mechanisms

Google searches for prayer may rise due to people using religion to cope with the pandemic (religious coping), but also for a reason unrelated to religious coping: Since the churches closed down to prevent the disease from spreading, part of the intensified prayer searches may be replacing physical church attendance (call this the replacement theory). Surely, the pandemic would most likely have resulted in more churchgoers had the churches been open. The theory of religious coping suggests, though, that the rise in private prayer (and other dimensions of intrinsic religiosity) would be substantially larger. Furthermore, a recent survey of Americans documents that those who pray do so in solitude (Barna, 2017). Thus, a priori

³⁰ The estimate on the pandemic dummy rises to 0.27 when restricting the sample to the sample with information on cases and deaths.

³¹ The upper-right cluster of observations visible in most panels comprise 278 observations, exclusively from three consecutive weeks starting on March 15, 2020.

Table 4
The impact of COVID-19 on prayer search shares.

	Dependent variable: Growth rate in searches for...			
	Prayer		Church	Mosque
	(1)	(2)	(3)	(4)
Ban on mass gathering	0.21*** (0.037)	0.034 (0.048)	−0.16*** (0.060)	−0.21*** (0.051)
Pandemic dummy		0.34*** (0.053)		
R-squared	0.38	0.39	0.49	0.28
Observations	4056	4056	3120	2613
Countries	104	104	80	67

OLS estimates across countries \times weeks during 2019–2020. The dependent variable is the weekly growth rate in prayer search shares from 52 weeks earlier. All regressions include a constant; the 52 week lag of the prayer search share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific year trend. Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer searches were not higher in periods with bans on mass gatherings, after accounting for the general rise after March 11.

we would not expect that the act of searching for prayer on the Internet was meant to replace behavior previously done in church. Nevertheless, I proceed to investigate the matter econometrically.

First, searches for prayer on the Internet started to rise already in January and February 2020, before the first church closures (Fig. 1 and Tables 1 and 2). If searches for prayer were simply a replacement of the physical churches, we would expect prayer searches to start rising after the first churches closed down. Table 4 investigates this more directly by estimating the same equation as Table 3, but now adding the dummy equal to one during the periods with bans on mass gatherings, zero otherwise. Column (1) shows that prayer searches rose significantly more during periods with bans on mass gatherings. Column (2), however, shows that this can be accounted for entirely by the pandemic dummy. This indicates that prayer searches rose equally much in periods where churches were open compared to periods where churches were closed. This is not what we would have expected if the rise in prayer searches is entirely a replacement of the physical churches. One concern is that this result is simply due to the measure of bans being an imprecise measure capturing something irrelevant. Columns (3)–(4) document that searches for churches or mosques were significantly lower in periods with bans on mass gatherings. This is what we would expect as people would search the Internet less for physical places for religious worship when these locations were closed, which puts more confidence that the measure of bans is reliable.

One may conjecture that the measure of bans does not capture the actual decline in people going to church; that people stopped going to church after March 11, before the actual bans were in place in their countries. Anecdotes do not support this idea. Examples of continued religious mass gatherings despite bans include religious gatherings in a Dallas megachurch, secret church services in Mexico and Brazil, and encouragement by the Vatican to continue having masses.³² Somewhat more formally, the development in Google searches for online churches also seems to contradict the replacement theory. Figure 3 depicts the raw data on the global average of daily searches for topics related to internet church during the first four months of 2020.³³ Not surprisingly, people started searching more for internet churches after March 11 (panel a). However, the magnitude of searches for online churches is miniscule compared to searches for prayer (panel b). If searches for prayer on the Internet were simply a replacement of the physical churches, we would expect these individuals to search for online churches directly, which Fig. 3 reveals that they do only to a very limited extent.

Result: Searches for internet church rise during the month of March 2020, but the share is minuscule compared to the size of the search shares for prayer. Furthermore, the searches for internet church rise mainly every Sunday, while prayer searches rise on all days of the week.

Figure 3 further reveals that the pattern of the searches for online churches is very different from the pattern of the searches for prayers. Searches for internet churches rise mainly on Sundays (the three peaks in panel a of the figure), which is not surprising given that most Christian masses are held on Sundays. If prayer was merely a replacement for physical churches, we would expect to see the same pattern for prayer searches. Instead, searches for prayer rise throughout the week, at odds with the replacement theory.

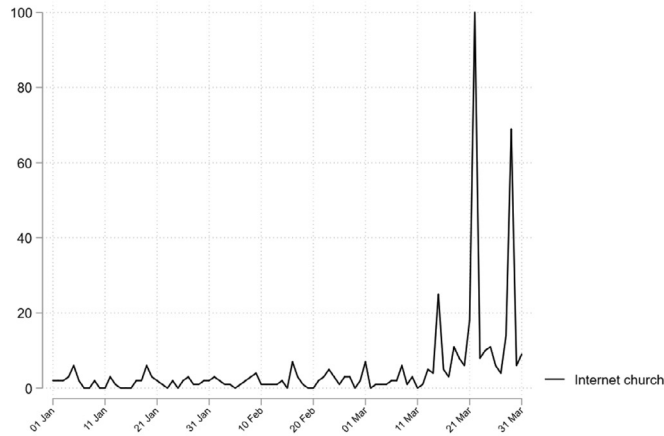
The differences across weekdays are investigated more formally in Table 5, exploiting the panel data based on the daily data. The longest period for which these daily data are available is 9 consecutive months. The estimation is similar to that

³² <https://www.wsj.com/articles/despite-coronavirus-some-religious-services-continue-11584310003>, <https://www.theguardian.com/global-development/2020/jun/17/mexico-churches-catholic-mass-covid-19-coronavirus>, <https://www.ncronline.org/news/people/catholic-cardinal-burke-says-faithful-should-attend-mass-despite-coronavirus>.

<https://www.theguardian.com/global-development/2020/jun/17/mexico-churches-catholic-mass-covid-19-coronavirus>, <https://www.ncronline.org/news/people/catholic-cardinal-burke-says-faithful-should-attend-mass-despite-coronavirus>.

³³ The picture is similar when observing the raw weekly data for the entire 2020: <https://tinyurl.com/3y7eu8jz>

(a) Searches for the topic "internet church"



(b) Searches for the topics "internet church" and "prayer"

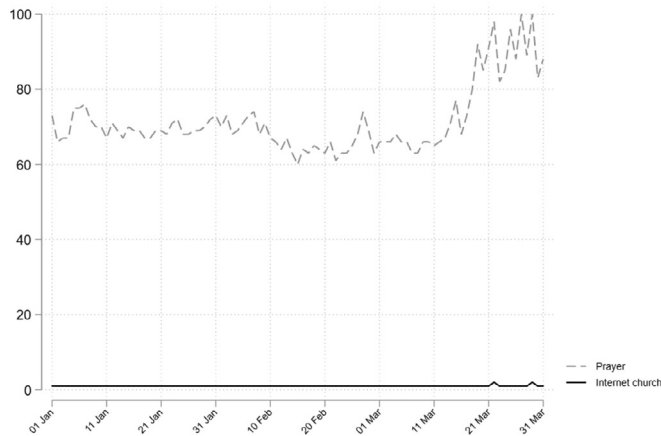


Fig. 3. Global Google searches for prayer and internet church. Global average of Google searches for topics related to prayer and internet church Jan 1 - Apr 1 2020.

Table 5
The rise in prayer search shares by weekdays.

Dependent variable: Prayer search shares								
Sample:	(1) All	(2) Sun	(3) Mon	(4) Tue	(5) Wed	(6) Thu	(7) Fri	(8) Sat
Pandemic dummy	5.50*** (0.934)	7.38*** (1.228)	5.59*** (1.153)	4.22*** (0.903)	5.70*** (1.110)	4.68*** (1.599)	4.85*** (1.034)	6.49*** (1.101)
R-squared	0.36	0.59	0.68	0.78	0.25	0.29	0.38	0.45
Observations	24,255	3465	3465	3465	3465	3465	3465	3465
Countries	99	99	99	99	99	99	99	99

OLS estimates. Units: Days × countries. Period: January 1 to August 31, 2020. All regressions include a constant, country fixed effects, country-specific time trends, and religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday. Column (1) includes the full sample of all weekdays, while the remaining columns are restricted to one weekday: Sundays (2), Mondays (3), Tuesdays (4), Wednesdays (5), Thursdays (6), and Fridays (7), and Saturdays (8). Robust standard errors clustered at the country level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer search shares increased on all days of the week.

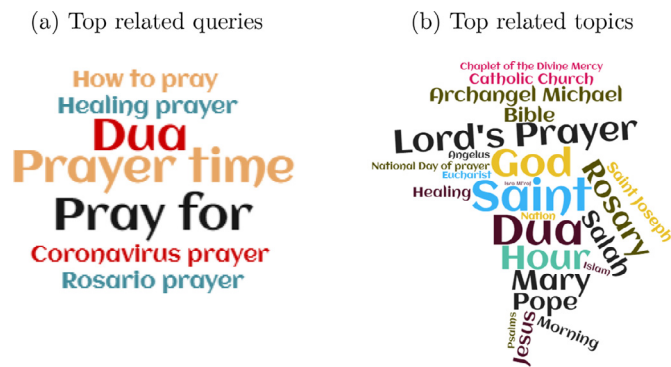


Fig. 4. Contents of the prayer searches. Top-25 search queries within the prayer topic (panel a) and top-25 topics that relate to the prayer topic (panel b), measured on March 10–30 2020. As 88% of the queries within the prayer topic includes searches for prayer in different languages, panel a includes only the 12% searches that do not directly mean “prayer”.

of column (1) in Table 3, but differs in certain aspects. First, the models in Table 5 are based on (daily) data from January 1 to August 31, 2020, whereas the models in Table 3 are based on (weekly) data from the full year of 2020. Second, when applying the same criteria for “enough” internet users as in the weekly data, we are left with data for 99 countries with daily information on the prayer search share (instead of 107 with weekly data). Third, the nature of the data does not allow calculating the yearly growth rate and thus the dependent variable is the *level* of the prayer search share. Fourth, the set of controls are similar in terms of controlling for country fixed effects, country-specific time-trends, and religious holidays, but the model in Table 3 naturally does not include the 52 week lag of the prayer search share or the religious holidays. Column (1) shows the results for the full sample: The prayer search share rose significantly since March 11, compared to the level in January and February. The sample is restricted to Sundays in column (1), Mondays in column (2) and so on. The results reveal that prayer searches rose significantly on all days of the week after COVID-19 was declared a pandemic on March 11. If the prayer searches are simply a replacement for the closure of the physical churches or mosques, we would have expected the rise to occur mainly on Sundays where most Christian masses are held or on Fridays where the communal prayer in Islam is held. The homogeneous distribution of prayer searches throughout the week stems well with the idea that prayer is an act done at home in solitude on any day of the week.

So far, the evidence supports the theory that the rising volume of searches for prayer on the Internet in the aftermath of COVID-19 is due to religious coping: People use their religion to cope with the adversity caused by COVID-19. As a last check of this hypothesis, another piece of information provided by Google Trends is exploited. The data on Google searches for prayer used throughout this research encompass all topics related to prayer and searches for prayer in all languages. Google Trends provides data for the top-25 actual search queries within this overall topic “prayer” and also data on which top-25 topics are most closely related to the “prayer” topic. To prevent capturing queries relating to Easter and the Ramadan, I restrict the time-period for this exercise to searches conducted between March 10, and 30 2020. 88% of the queries are simply searches for prayer in various different languages, which is not very informative. The remaining 12% are depicted in panel (a) of Fig. 4. The most searched for queries within the prayer topic are “prayer time”, which most likely refers to Muslim prayer times, “dua” which is an Islamic prayer asking God for help, and “pray for” which refers to prayers for someone or something. An example of the latter is the “pray for Italy” movement initiated when Italy was severely hit by COVID-19 as the first country after China (Fig. A.10). The remaining top-25 queries are “coronavirus prayer”, “healing prayer”, “how to pray”, and “rosario prayer”. When googling “prayer for coronavirus”, various websites offer prayers related to the coronavirus, such as prayers to prevent the virus from spreading and prayers to thank nurses and other care-takers for their work in relation to the pandemic (see Appendix B.2). Rosario prayers are a set of Catholic prayers that ask God for a special favor.

Panel (b) shows that the topics most related to the prayer topic include God, Saint, Dua, Hour, and the Lord’s prayer. Hour refers to the Muslim prayer times and the Lord’s prayer is a Christian prayer taught by Jesus as the way to pray according to the New Testament. Next comes topics comprising Mary, Rosary, Pope, Salah, Bible, and Archangel Michael. Salah means bless or pray in Arabic. Archangel Michael is viewed by Christians as the protector against the forces of evil. Overall, these top-25 topics or queries related to the prayer topic mainly cover specific prayers or religious figures for help in needy times. There are no searches for online churches, which we would have expected had the prayer searches mainly involved a replacement for the physical religious meeting places.

Result: Searches related to the prayer topic comprise searches for specific prayers, prayer practices, religious figures, and spirituality.

4.4. Characteristics of those who pray more

This section examines the characteristics of those who use religion for coping. Reviewing 26 studies on religious coping, Pargament (2001) finds that religious coping is unsurprisingly used mainly by the more religious. Seven of the studies

examine heterogeneity with respect to income, education or social status. Five of these find that there is no difference in the use of religious coping based on income or education, while the remaining two studies find that poorer and less educated individuals use religion more in coping. Based on this review, we would expect that prayer is used more intensively in more religious societies, relatively independently of development levels (call this the Strength of Religion Hypothesis). These studies, though, are based on fairly small samples, the majority being below 300 individuals. On the other hand, in a sample of 100 countries, [Norris and Inglehart \(2011\)](#) conclude that religion provides a sense of existential security, which is most needed among vulnerable populations, especially those living in poorer nations, facing personal survival-threatening risks. Based on this, we would expect religion to be used more intensively to cope emotionally with COVID-19 in poorer, more unequal, and more insecure states (call this the Vulnerability Hypothesis). As there is a stark negative correlation between religiosity and various measures of development and insecurity ([Norris and Inglehart, 2011](#)), the two hypotheses can easily be mistaken.

To disentangle the two hypotheses, I examine the heterogeneity in the use of prayer by adding an interaction term between the pandemic dummy and various country-characteristics to [Eq. \(3\)](#):

$$gprayer_{ct} = \alpha + \beta prayer_{c,t-52} + \gamma pandemic_{ct} + \lambda pandemic_{ct} \times characteristic_c + \kappa_{ht} + \delta t_c + \delta_c + \varepsilon_{ct} \quad (4)$$

where $characteristic_c$ includes different measures of country characteristics: the religiosity level in country c before the onset of the pandemic, a dummy equal to one for each of the major religions, and various measures of development, inequality, and insecurity. While numerous such measures exist, I chose measures available for at least 70 countries from the Quality of Government Dataset constructed by [Teorell et al. \(2020\)](#). The rise in prayer search shares after March 11 now equals $\gamma + \lambda characteristic_c$. If the rise in prayer search shares after March 11 is larger for the more religious, certain religious denominations, or certain socio-economic characteristics, this is captured by $\lambda > 0$.

Panel (a) of [Fig. 5](#) shows the estimates of [Eq. \(4\)](#) for different religiosity levels in 2019, measured by the average Google search shares for prayer in 2019.³⁴ Prayer search shares rose at all quartiles of previous prayer intensity, but only significantly for the top-3 quartiles. Also, prayer searches rose more for countries that prayed more in 2019. This pattern is confirmed when using instead global surveys conducted well before the COVID-19 pandemic to measure prior religiosity levels (the World Values Survey and European Values Study). Prayer searches rose more in countries where a larger share of the population answered that they prayed more, went more to church, or felt that God was important in their lives ([Tables A.17–A.19](#)).

Previous religiosity levels most likely correlate with various other country-characteristics. A concern therefore is that the result in panel (a) is caused by these country-characteristics rather than religious per se. To disentangle, I exploit exogenous variation in religiosity due to earthquakes ([Belloc et al., 2016](#); [Bentzen, 2019](#); [Bulbulia, 2004](#)). Confirming the results in panel (a), panel (b) shows that prayer search shares rose more in countries with higher earthquake risk.³⁵ The imprecision of the estimate on the rise in prayer searches for the highest quartile of earthquake risk may capture that religion is used mainly to cope with unforeseeable adversity. Earthquakes in areas often hit by earthquakes do not raise religiosity as much as earthquakes in areas less often hit ([Bentzen, 2019](#)). Therefore, the group of countries in high-risk earthquake zones may encompass both countries so used to earthquakes that religiosity is not impacted and countries where religiosity is higher due to more earthquakes.

Panel (c) of [Fig. 5](#) shows that prayer search intensity rose for Christians (both Catholics and Protestants), Muslims, and Hindus, but not for Buddhists. The finding that most major religions use religion in coping is consistent with findings by [Abu-Raiya and Pargament \(2015\)](#) and observations by [Pargament \(2001\)](#) (p.3): “while different religions envision different solutions to problems, every religion offers a way to come to terms with tragedy, suffering, and the most significant issues in life.” The countries are categorized into the major denominations based on there being at least 25% adherents to the particular denomination. Based on this definition, the countries categorized as Buddhist in the sample are Japan, Sri Lanka, Taiwan, Thailand, and Vietnam. These findings are consistent with the results by [Bentzen \(2019\)](#) who found that religiosity rose for all major religious denominations, except Buddhism.³⁶ The difference in the use of religion for coping within Buddhism compared to the rest is also evident from [Fig. 5](#), which documents that Google searches for god, allah, jesus, mohammad, bible, quran, buddha, vishnu, and shiva also rose during March 2020, but that the amount of searches for buddha, vishnu, and shiva, was not larger in March 2020 than during holy events during the year, such as Buddhas birthday or Hindu holidays for Lord Shiva or Lord Vishnu. Searches for Buddha, in particular, was much larger around Buddhas birthday on May 8, 2019 than during March 2020. Thus, while Buddhist traditions may also use religion for coping, these traditions seem more focused on celebration. Also, the countries categorized as Buddhist in the sample have experienced more epidemics than the rest of the world during the past 50 years. Thus, the rise in fear and emotional distress around March 11 may have been lower in these countries, instigating a lower need for religious coping altogether.

³⁴ Four dummy variables were constructed based on the quartiles of the prayer search share in 2019 and [Eq. \(4\)](#) was run for each of them. Each solid dot in [Fig. 5](#) represents $\gamma + \lambda$ for each of the dummies.

³⁵ The measure of earthquake risk is based on the location of high-risk earthquake zones constructed by [Bentzen \(2019\)](#). When using earthquake risk as exogenous variation in religiosity, the sample is restricted to countries located within 1500 km of an earthquake zone, as varying degrees of earthquake risk should not matter for religiosity for societies located such far from earthquake zones, cf. [Bentzen \(2019\)](#). Earthquake risk is calculated as $\frac{2512 - \text{Distance}}{2512}$, where 2512 is the maximum distance to high-risk earthquake zones in the sample. Find more details on the earthquake risk measure in [Section A.3](#).

³⁶ The (insignificant) fall in prayer search shares for Buddhists is mainly due to the development during the second half of 2020. When restricting the sample to the first half, the estimate turns positive, but is still insignificant.

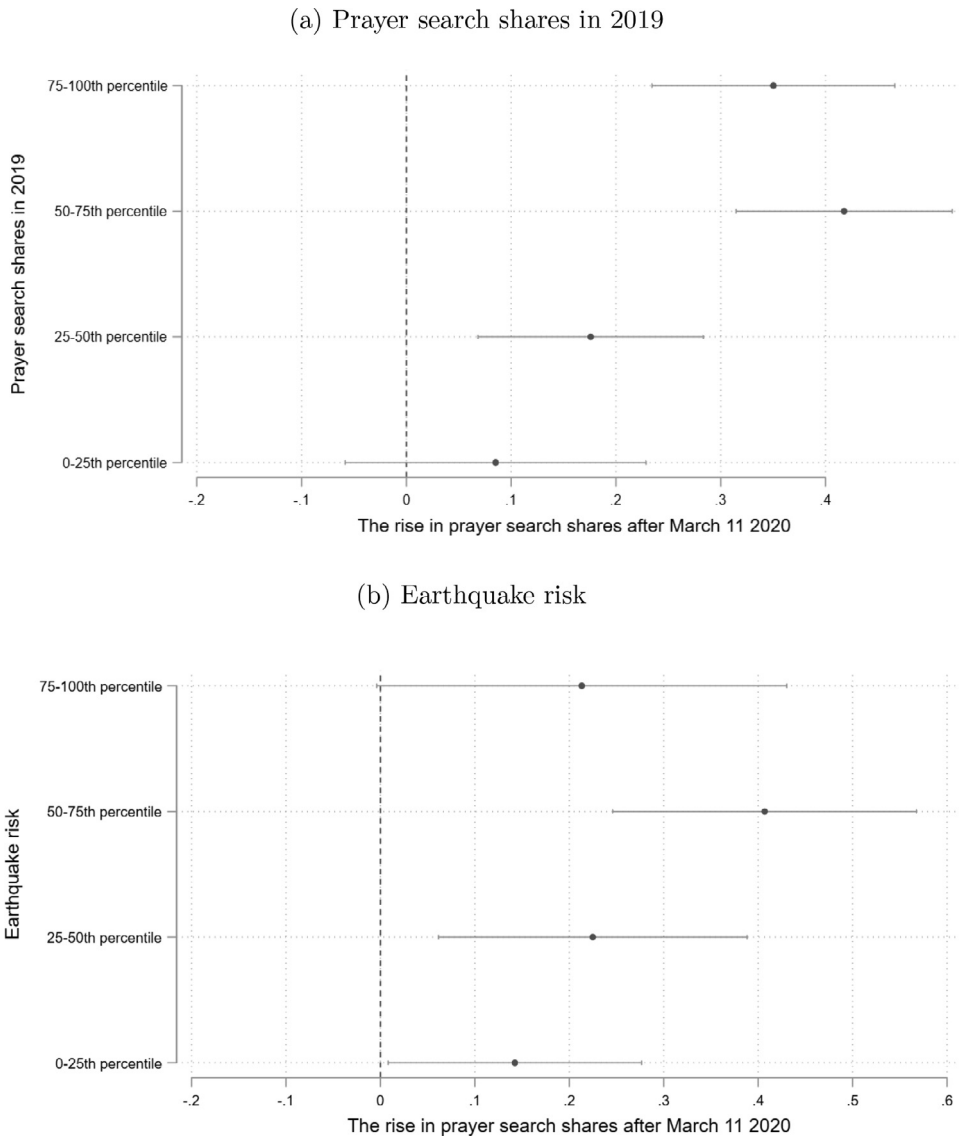


Fig. 5. The rise in prayer search shares for different denominations. The rise in prayer intensity for different prayer search shares in 2019 in Panel (a), different earthquake risk intensities in panel (b), divided into quartiles, and different major religious denominations in Panel (c). Each dot represents the estimate of the rise in prayer search shares after March 11, in an OLS regression, where the rise in prayer search shares is allowed to vary with initial religiosity levels in panel (a), with earthquake risk in panel (b), and with religious denominations in panel (c), controlling for the initial prayer search share, country-specific time trends, country fixed effects, and religious holidays. The denominations are defined based on there being at least 25% adherents to the particular denomination in a country. The horizontal lines represent the 95% confidence bounds. See more details in [Appendix A.1](#) and [4.4](#). **Result:** Prayer intensity rose for all religious denominations, except buddhists, and rose more in more religious countries.

To test whether prayer has been used more to cope emotionally with COVID-19 in poorer, more unequal, and more insecure states in keeping with the vulnerability hypothesis or whether poor and rich use prayer equally much for coping, [Table 6](#) shows estimates of [Eq. \(4\)](#) adding interaction terms with different measures of economic development, inequality, and mortality. The models in panel A of [Table 6](#) seem to confirm the vulnerability hypothesis at first. Prayer search shares rose more in poorer countries, where development is measured by GDP per capita (col 1) and the share of people living below 1.9US\$ a day (col 2). Prayer search shares also rose more in less educated countries (col 3); more unequal countries (measured by the Gini coefficient in column 4 and a measure of the degree to which economic development is unevenly distributed in column 5); more fragile states (col 6); states with higher adult mortality rates (col 7); and in states with lower quality property rights institutions (col 8).

However, the results in panel A may also be a product of the strength of religion hypothesis, as more religious societies are on average poorer, more unequal, and more insecure. To disentangle the two hypotheses, the models in panel B add the interaction between the pandemic dummy and the previous religiosity level measured by the average prayer search share in

(c) Religious denominations

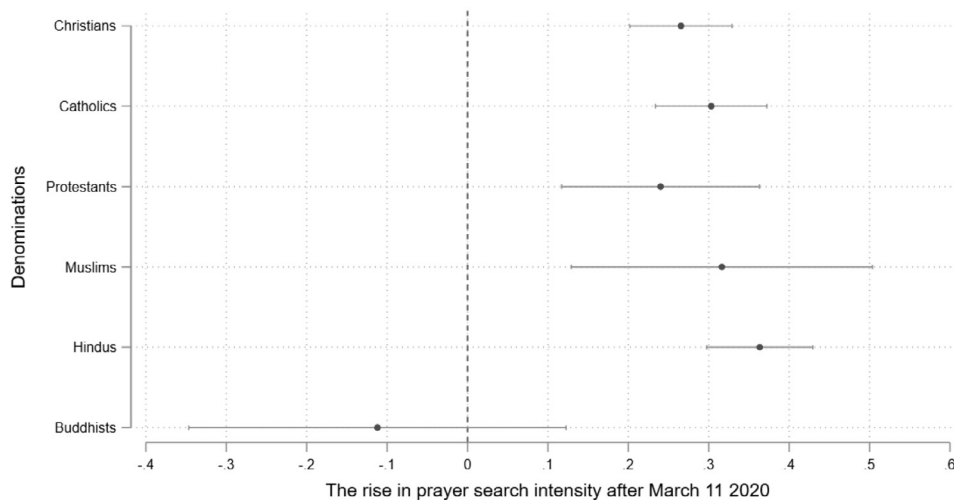


Fig. 5. Continued

2019. Throughout all columns, the interactions with the socio-economic characteristics fall, some by up to a factor 6. Seven of the eight estimates on the interactions fall so substantially that they turn insignificant (without much different standard errors). The one factor that remains significant is education: Prayer searches rose more in less educated societies, even after accounting for the heterogeneous effect due to religiosity.

The interaction with general religiosity (measured by prayer search shares in 2019) is significant in seven of the eight models in Panel B. Including the interaction with prayer search shares in 2019 alone produces a highly statistically significant estimate of 0.0057 (Table A.17).³⁷ Thus, moving from the lowest quartile in previous religiosity levels (9) to the highest (38), prayer search shares grew by 0.17 units more, which amounts to the mean growth in prayer search shares. This indicates that part of what seemed like vulnerability was simply due to these countries being more religious. Before dismissing the vulnerability hypothesis entirely, one may conjecture that these societies are potentially more religious *because* they are poor, unequal, and uncertain.³⁸ Thus, part of the impact of the socio-economic confounders may work through religiosity. To investigate, I again exploit variation in religiosity due to earthquake risk, arguably unaffected by the socio-economic confounders.

Recall that earthquake risk does not generate meaningful variation in religiosity for societies located more than 1500 km from earthquake zones. Thus, panel C restricts the sample to countries within 1500 km of high-risk earthquake zones and replicates the estimation in Panel A using this sample. The models in panel D add the interaction between the pandemic dummy and prayer search shares in 2019 instrumented with an interaction between the pandemic dummy and earthquake risk. The First stage F statistic is above 10 in most specifications, indicating that the instrument is valid.³⁹ Apart from the estimate on the interaction with property rights institutions, all parameter estimates on the interaction between the pandemic dummy and the socio-economic characteristics drop. Some again drop by a factor 6. None of the eight socio-economic confounders influence the use of religion in coping with the pandemic significantly.

The instrumented interaction with prayer search shares in 2019 remains significant in seven of the eight models in Panel D. The results confirm that the heterogeneity with respect to the socio-economic characteristics found in Panel A is mainly due to the fact that poorer, more unequal and insecure countries are more religious. Similarly, Table A.20 finds that the rise in prayer search shares is larger in countries with lower security and lower quality public services, larger demographic pressures, lower development measured by the human development index, and higher infant mortality rates. Again, these differential effects - except the interaction with infant mortality - vanish when the rise in prayer searches is allowed to

³⁷ The measure of prayer search shares in 2019 ranks from 1 to 74.

³⁸ This would be consistent with the secularization hypothesis, which states that the role of religion diminishes as countries modernize, originally put forth by Marx (1844), Weber (1905), Durkheim (1912), Freud (1927).

³⁹ The exclusion restrictions are rather unlikely to be violated: Earthquake risk most likely does not influence the rise in prayer search shares after March 11, 2020 through other channels than previous religiosity levels.

Table 6
The rise in prayer search shares across country characteristics.

Dependent variable: Growth in prayer search shares								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A	GDP	Poverty	Educ	Gini	Uneven	Fragile	AdultMort	PropRights
Pandemic dummy	0.93*** (0.223)	0.21*** (0.039)	0.42*** (0.057)	0.022 (0.116)	−0.0032 (0.076)	0.050 (0.080)	0.11 (0.065)	0.36*** (0.075)
Pandemic x Variable	−0.076*** (0.025)	0.17* (0.088)	−0.11*** (0.027)	0.055** (0.027)	0.50*** (0.132)	0.034** (0.013)	0.011*** (0.004)	−0.022* (0.013)
R-squared	0.37	0.36	0.37	0.36	0.37	0.36	0.37	0.36
Observations	5460	4056	4992	4680	5304	5304	5356	5408
Countries	105	78	96	90	102	102	103	104
Panel B								
Pandemic dummy	0.58* (0.310)	0.13** (0.063)	0.27** (0.117)	0.16 (0.113)	0.018 (0.075)	0.048 (0.079)	0.084 (0.066)	0.13 (0.138)
Pandemic x Variable	−0.048 (0.031)	0.12 (0.088)	−0.073** (0.035)	−0.017 (0.033)	0.29 (0.206)	0.015 (0.019)	0.0033 (0.004)	−0.0036 (0.016)
Pandemic x Prayer 2019	0.0040** (0.002)	0.0038* (0.002)	0.0038* (0.002)	0.0058*** (0.002)	0.0034 (0.003)	0.0046* (0.002)	0.0050** (0.002)	0.0056** (0.002)
R-squared	0.37	0.36	0.37	0.36	0.37	0.37	0.37	0.37
Observations	5460	4056	4992	4680	5304	5304	5356	5408
Countries	105	78	96	90	102	102	103	104
Panel C								
Pandemic dummy	0.94*** (0.328)	0.20*** (0.043)	0.44*** (0.077)	0.063 (0.165)	−0.068 (0.107)	0.065 (0.114)	0.084 (0.090)	0.33*** (0.103)
Pandemic x Variable	−0.076** (0.036)	0.50*** (0.170)	−0.11*** (0.035)	0.043 (0.044)	0.67*** (0.218)	0.031 (0.020)	0.013** (0.006)	−0.018 (0.017)
R-squared	0.34	0.32	0.34	0.31	0.34	0.33	0.34	0.33
Observations	3796	2964	3588	3328	3796	3796	3848	3848
Countries	73	57	69	64	73	73	74	74
Panel D								
Pandemic dummy	0.14 (0.484)	−0.048 (0.128)	0.14 (0.211)	0.27 (0.251)	−0.040 (0.124)	−0.015 (0.122)	−0.039 (0.085)	−0.29 (0.264)
Pandemic x Variable	−0.022 (0.044)	0.096 (0.228)	−0.062 (0.045)	−0.091 (0.101)	−0.17 (0.561)	−0.026 (0.031)	−0.0027 (0.009)	0.026 (0.023)
Pandemic x Prayer 2019	0.016** (0.007)	0.015* (0.008)	0.011 (0.008)	0.016* (0.009)	0.019* (0.011)	0.022** (0.009)	0.016** (0.007)	0.021** (0.009)
R-squared	0.19	0.15	0.19	0.16	0.18	0.18	0.19	0.18
Observations	3796	2964	3588	3328	3796	3796	3848	3848
Countries	73	57	69	64	73	73	74	74
FirstStageF	15.2	14.7	14.4	10.7	8.23	9.50	21.6	9.31

OLS estimates across countries \times weeks during 2019–2020. The dependent variable is the weekly growth rate in prayer search shares from 52 weeks earlier. All regressions include a constant; the 52 week lag of the prayer search share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific time trend. Panel A includes an interaction between the pandemic dummy and various socio-economic variables listed in the column titles and described in more detail in [Appendix A.5](#). Panel B adds an interaction between the pandemic dummy and prayer search shares in 2019. Panel C shows the Panel A regressions using a sample restricted to countries within 1500 km of high-risk earthquake zones. Panel D instruments the interaction between prayer search shares in 2019 and the pandemic dummy with an interaction between earthquake risk and the pandemic dummy. The scalar FirstStageF is the robust Kleibergen-Paap first stage F statistic. Robust standard errors clustered at the country level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer search shares rose more in poor, unequal, and insecure countries. But this is exclusively because these societies are more religious.

vary with previous religiosity.⁴⁰ This means that the use of religion for coping is independent of countries' socio-economic status. Instead, what matters is how religious they were to start, consistent with the strength of hypothesis.

These results are consistent with the majority of the studies surveyed by [Pargament \(2001\)](#) and with the results by [Bentzen \(2019\)](#), both documenting that the use of religion for coping occurs across all socio-economic groups. Thus, the availability of religion as a coping tool seems to be more important than the “need” for such a tool, where need is defined by economic and insecurity measures. COVID-19 generated a need for coping with emotional stress, and societies used religion to cope, independent of whether they were rich or poor, uncertain or secure. These results also mean that studies documenting differential effects of religious coping for poor and vulnerable societies should be aware that these differential effects could be simply a result of higher religiosity levels in these societies.

⁴⁰ As the pandemic was most severe for the elderly, the significant interaction with infant mortality may signal that infant mortality captures insecurity in general or that people tend to fear more for their children than their elderly, despite the latter being in more danger. The significant interaction with infant mortality, though, may also be a false-positive. In the panel D type models, the relevant conclusion is that only one out of 16 interactions with socio-economic characteristics is significant, while the same is true for 12 of 16 interactions with initial prayer.

5. The relative size of the rise in prayer

To get a sense of the relative size of the rise in actual prayer, the following back-of-the-envelope calculation was made. A conclusion from [Section 4.4](#) is that the factor that matters most for the difference in the size of the rise in prayer search shares is existing religiosity levels (ignoring the potential impact of infant mortality for a moment). Combining this insight with results from a Pew Research Center survey from March 2020 showing that 55% of American adults had prayed to end the coronavirus by the end of March 2020 ([Pew, 2020b](#)), the global average rise in prayer related to COVID-19 can be backed out. For a conservative estimate, let's first assume that the share of Americans who prayed to end the coronavirus remained unchanged throughout 2020.

Equipped with measures of global and US religiosity, the number of people across the globe who had prayed to cope with the pandemic can be backed out. The average global religiosity across all religiosity measures used in the analysis (cf [Table A.17](#)), weighted with the population size in each country yields the number 0.654 (with a standard deviation of 0.19).⁴¹ The religiosity level in the USA calculated using the same method is 0.671. Since previous religiosity levels is the only factor that matters for the intensity of the use of religious coping, a back-of-the-envelope estimate of the share of the people in the sample that prayed for the coronavirus is therefore very close to 55%. The sample of 107 countries represents 70% of the world population⁴² and the average religiosity level in the sample is no different from the average across countries outside the sample with information on the survey-based religiosity measures. Thus, we can reasonably extend these calculations outside the sample to include the entire world to conclude that more than half of the world adult population have prayed to end the coronavirus. This large number is reconcilable with the finding that the rise in Google searches for prayer in March 2020 was larger than searches for the topic takeaway and amounted to 12% the rise in searches for Netflix, and 26% the fall in searches for flights, which all changed tremendously in the month of March 2020, where most of the world's countries were in lockdown (cf [Appendix B.4](#)). Three matters make these conservative estimates. First, the share of Americans who had prayed to end the pandemic was probably not stagnant throughout 2020. Second, the sample of countries used in the analysis is less religious than average global religiosity and thus the general effects may be underestimated. Third, if the socio-economic variables analyzed in [Table 6](#) do matter for coping after all - which may be the case for infant mortality - the estimated share of people across the globe who had prayed would be even larger, as the USA is at the top of the world's income distribution.

6. Conclusion

Google searches for prayer provides a measure of the interest in prayer in real time. In March 2020, Google searches for prayer rose to the highest level ever recorded, which indicates an increased interest in prayer in the midst of the COVID-19 pandemic. Prayer search shares rose by 30% compared to previously and remained 10% higher than normal throughout 2020. The rising prayer search shares coincided with WHO's announcement of COVID-19 as a pandemic on March 11, 2020 and with the arrival of COVID-19 in the individual countries, measured by either registered cases or deaths or by the first Google searches for anosmia, an indicator of infections by COVID-19 before official statistics. A back-of-the-envelope calculation shows that more than half of the world's adult population had prayed to end the coronavirus. This increased interest in prayer occurs on all continents, for all major religious denominations, except Buddhism, and for all levels of development and insecurity. The increase is larger for more religious countries.

The rising prayer intensity is a result of religious coping: When faced with uncertainty and adversity, humans have a tendency to use religion for comfort and explanation. The use of religion for coping is - not surprisingly - more pervasive for more religious societies. The extent of the use of religion during the pandemic reveals the extent of the emotional distress experienced throughout the world during 2020. The use of religion in coping may moreover explain the puzzle that the role of religion has not declined as early scholars otherwise predicted: All types of societies use religion for coping with adversity, even modern secular societies. Indeed, the rise in prayer mainly persisted throughout 2020 in Europe and the Americas, whereas prayer search shares returned to normal much more quickly in Asia and Africa. Perhaps because Asia and Africa have experienced more epidemics in modern times. Previous research documents that religion is used mainly to cope with unpredictable adversity, rather than predictable ditto.

If religion dampens the emotional distress caused by COVID-19, it also influences the general well-being of societies. All other things equal, we would expect COVID-19 to cause less emotional distress in more religious societies. Religious coping may even reduce economic anxiety and through that reduce economic fluctuation caused by economic anxiety. On the other hand, the permanently higher religiosity levels instigated by the pandemic may impact various socio-economic confounders, such as innovation rates and gender roles. The future will show whether the rise in religiosity persists beyond 2020 and whether real economic impacts of this potentially strengthened role of religion follow.

⁴¹ All religiosity measures were scaled between 0 and 1.

⁴² 5.41 bio. / 7.67 bio. people in 2019

Declaration of Competing Interest

The submitted manuscript has been written by Jeanet Sinding Bentzen. The funding was received from Department of Economics at the University of Copenhagen. There were no conflicts of interest.

Appendix A. Data

A1. Google searches for prayer and other religious terms

Google Trends provides access to a sample of actual search requests made on Google. It is anonymized (no one is personally identified), categorized (determining the topic for a search query) and aggregated (grouped together). The Google Trends data thus displays interest in a particular topic from around the globe. The data is available back to 2004, but there was a trend break on Jan 1 2016, where the data was improved. The data is downloadable from [google.trends](https://www.google.com/trends/).

Google Trends normalizes the search data in the following way: 1) Each data point is divided by the total searches of the geography and time range it represents to compare relative popularity, 2) The resulting numbers are then scaled on a range of 0 to 100.

Google Trends filters out some types of searches: 1) Searches made by very few people: Google Trends only shows data for popular terms, so search terms with low volume appear as “0”. 2) Duplicate searches: Google Trends eliminates repeated searches from the same person over a short period of time. 3) Special characters: Google Trends filters out queries with apostrophes and other special characters.

Google Trends provides two methods of accessing what people search for. *Search terms* show matches for all terms in a query, in the language given. If you search the term “prayer,” results include terms like “prayer” or “coronavirus prayer”. If you specify “coronavirus prayer,” results include searches for “coronavirus prayer,” as well as “prayer for coronavirus”. *Topics* are a group of terms that share the same concept in any language. If you search the topic “London,” results include topics such as “Capital of the UK” or “Londres,” which is “London” in Spanish. The estimations throughout the paper are based on the topics, rather than the search terms.

Google Trends provides two types of data: Time-series data and cross-section data. The time-series data is available for one a country or a subnational region at a time or as an average for the world. These data are available at a weekly, daily, or hourly frequency. The daily frequency is available for 9 consecutive months at a time and the hourly frequency is available for the past day. The cross-section data is available for countries or subnational regions as an average over a specified period of time. The main analysis uses countries measured at a weekly frequency.

For the time-series data, Google Trends normalized the search shares to equal 100 for the highest search share during the period. For the cross-country data, the search share was set to 100 for the country with the highest search shares in the sample. This means that only the growth rates, and not the levels, of the time-series data have a meaningful interpretation and can be compared across countries. For the cross-country data, the levels *can* be compared across countries. The analysis includes country fixed effects throughout and thus does not compare countries, but in [Section 4.4](#) I identify the characteristics of the countries who pray more, which means that comparison across countries occurs. To construct a panel dataset which is comparable across countries, I combined the growth rates from the time-series data with the levels from the cross-section data. For each country, I downloaded the average prayer search shares for 2019 based on the cross-section data, set this to the search share on the first week of 2020, and calculated the search shares for the rest of the period based on the growth rates from the time-series data.

The data used throughout this paper are based on data with searches for the topic “prayer”. This means that the data is independent of languages and includes all searches related to the topic “prayer”. The main data includes search shares for prayer during the period week 1 of 2017 to week 52 of 2020. The period before 2020 enables examining whether there are pre-trends in the data.

Google Trends provides data for prayer search shares for 225 countries, but a large chunk of these have so few Google searches that the data is too unreliable for analysis. These countries include small islands, such as St. Kitts and Nevis, and countries with low internet access in general, such as Western Sahara. These countries are excluded from the sample, arriving at a sample of 107 countries, using the following method. In order to remove countries from the sample that have too few Google searches for the data to be reliable, the amount of searches is backed out by observing the fluctuations in the data (Google Trends does not provide data on the actual number of Google searches). [Fig. A.6](#) shows an example of a country that is excluded due to large fluctuations in the search shares for prayer (Tonga) and a country with much lower fluctuation (Germany), which enters the baseline sample. I define two criteria meant to capture the quality of the data: I first remove countries from the analysis with more than one “extreme” fluctuation in prayer searches. Extreme fluctuations are defined as prayer search shares that rise (or fall) by 50 units (on a 100 unit scale) in one week, only to fall (or rise) again with 50 units or more during the following week. 50 units amounts to two standard deviations. This removes mainly small islands such as St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines, and countries where internet access in general is very low, such as Turkmenistan, Western Sahara, and Sudan. Next, I remove countries where the search share for prayer equals zero for two consecutive weeks or more. When searches equal exactly zero for two consecutive weeks or more, this signals imprecise data as exemplified in [Fig. A.6](#).

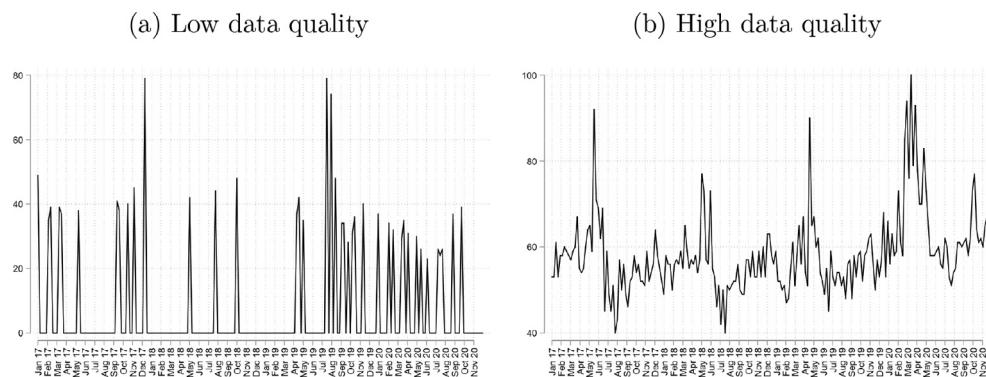


Fig. A.6. Example of high and low data quality.

The resulting 107 countries included in the analysis represent appr. 70% of the world population⁴³. The 107 countries included in the main analysis are: Algeria, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Belarus, Belgium, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, Colombia, Congo - Kinshasa, Costa Rica, Croatia, Cyprus, Czechia, Côte d'Ivoire, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Latvia, Lebanon, Lithuania, Luxembourg, Malaysia, Mauritius, Mexico, Moldova, Mozambique, Namibia, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovakia, South Africa, South Korea, Spain, Sri Lanka, St. Helena, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe.

The 118 countries with some data on prayer search shares in Google Trends, but that were excluded due to low Google search activity through the described process are: Afghanistan, Albania, American Samoa, Andorra, Anguilla, Antigua and Barbuda, Armenia, Aruba, Azerbaijan, Bahamas, Barbados, Belize, Benin, Bermuda, Bhutan, British Virgin Islands, Brunei, Burkina Faso, Burundi, Cambodia, Cape Verde, Caribbean Netherlands, Cayman Islands, Central African Republic, Chad, China, Comoros, Congo - Brazzaville, Cook Islands, Cuba, Curaçao, Djibouti, Dominica, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Falkland Islands (Islas Malvinas), Faroe Islands, Fiji, French Guiana, French Polynesia, Gabon, Gambia, Gibraltar, Greenland, Grenada, Guadeloupe, Guam, Guernsey, Guinea, Guinea-Bissau, Guyana, Haiti, Iceland, Iraq, Isle of Man, Jersey, Kiribati, Kosovo, Laos, Lesotho, Liberia, Libya, Liechtenstein, Luxembourg, Macao, Madagascar, Maldives, Mali, Malta, Marshall Islands, Martinique, Mauritania, Mayotte, Micronesia, Mongolia, Montenegro, Montserrat, Morocco, Myanmar (Burma), Nauru, Nepal, New Caledonia, Niger, North Macedonia, Northern Mariana Islands, Palau, Palestine, Papua New Guinea, Rwanda, Réunion, Samoa, San Marino, Senegal, Seychelles, Sierra Leone, Sint Maarten, Slovenia, Solomon Islands, Somalia, South Sudan, St. Barthélemy, St. Kitts and Nevis, St. Lucia, St. Martin, St. Pierre and Miquelon, St. Vincent and the Grenadines, Sudan, Suriname, Svalbard and Jan Mayen, Syria, São Tomé and Príncipe, Tajikistan, Timor-Leste, Togo, Tonga, Tunisia, Turkmenistan, Turks and Caicos Islands, U.S. Virgin Islands, Vanuatu, Western Sahara, Yemen, Åland Islands.

Removing data with large fluctuations in prayer searches not only removes countries with few individuals using Google in general, but also potentially removes less religious countries where fewer individuals search for prayer on the Internet. Thus, omitted societies may be *less* religious than those in the sample. On the other hand, the countries with low internet activity are most likely also poorer. As poorer societies are on average more religious, the omitted societies may be *more* religious than the countries in the sample. To investigate, I use the cross-country data on average prayer search shares for 2019 as a measure of religiosity. These are available for 221 countries. Average prayer search shares in 2019 equaled 32.0 (on a scale of 1 to 100 with a standard deviation of 23.3 and standard error of 2.2) for the 114 countries excluded from the analysis and 24.9 for the 107 countries included in the main sample (with a standard deviation of 19.2 and a standard error of 1.9). The difference in means between the two is statistically different from zero, according to a standard *t*-test. This indicates that the countries in the sample are significantly less religious than those excluded. According to the analysis, less religious societies were less likely to search the Internet for prayers in the midst of the COVID-19 pandemic. If anything, this data correction may result in an underestimation of the true rise in actual global prayer. As Google Trends provides data for global Google searches, which are not impacted by this selection process, the impact of the selection for the results can be estimated. Fig. A.7 reproduces the development in prayer searches for the global average from panel b of Fig. 1 (marked by the grey squares), but adds the corresponding development in prayer searches in the sample of 107 countries (marked by the black circles). The two curves are very similar until May 2020. Thereafter, persistence is somewhat lower among the 107 countries compared to the world average. Thus, actual persistence in the rise in prayer searches may be higher than

⁴³ 5.41 bio. / 7.67 bio. people in 2019

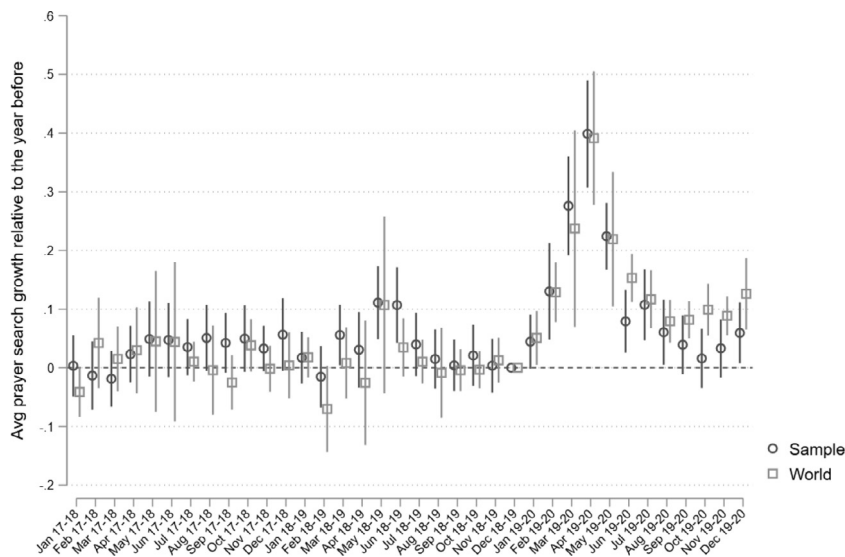


Fig. A.7. Worldwide Google searches for “prayer” compared to the year before. Replication of panel b of Fig. 1, but including the corresponding average for the 107 countries in the sample.

the estimates reveal. The same definition is applied to the daily data, arriving at 103 countries with enough daily internet activity to be used for analysis.

Even after removing countries with low internet activity, some weekly fluctuations in the data are too extreme to represent real fluctuations in the interest in the topic prayer on the Internet. After removing countries with more than one “extreme” fluctuation, 0.14% of the observations are “extreme” observations, i.e. spike up (or down) on one week with more than 50 units, only to fall down (or rise) again with 50 units or more on the following week. These extreme fluctuations were cut in half.

The workingpaper version of this paper was focused exclusively on the first four months of 2020 and used exclusively daily data. The conclusions carry through to the current analysis (Tables A.7–A.13).

A2. Measures of exposure to COVID-19

Data on affected cases and deaths by the COVID-19 for the globe are provided by the European Centre for Disease Prevention and Control (ECDC). The data is available on a daily basis since December 31, 2019 for all countries that were affected by the COVID-19 pandemic. The measure of cases measures the total number of registered people infected by the COVID-19. The variable does not account for who had recovered again, which means that the variable can only increase with time. Likewise, deaths by COVID-19 measures the total number of registered deaths by COVID-19. These two measures are both dependent on the extent of testing being done in the particular countries. Testing strategies vary across countries in terms of how much they test, both before and after death.

Pandemic dummy is a dummy equal to one after March 11 when the WHO declared COVID-19 a pandemic, and zero otherwise.

First case dummy is a dummy equal to one after the country had its’ first 10 registered cases of COVID-19, zero otherwise.

First death dummy is a dummy equal to one after the country had its’ first registered death by COVID-19, zero otherwise.

Anosmia dummy is a dummy equal to one after Google searches for anosmia reached 10 units (out of a total of 100), zero otherwise. Source: Google Trends.

Ban on mass gathering dummy is a dummy equal to one when a country had implemented bans on mass gatherings, zero otherwise. Source: Response2covid19 database by Porcher (2020).

A3. Previous levels of religiosity

The analysis and robustness checks include the following measures of religiosity before COVID-19.

Prayer 2019: Average Google searches for prayer as a share of total Google searches from January 1, to December 31, 2019.

The remaining measures of religiosity in Table A.17 are based on answers to questions asked by the World Values Survey and European Values Study. These are surveys distributed to a total of 505,000 individuals across the globe over the period 1981–2014.

Moments of prayer: The share of respondents in a country who answered yes to the question “Do you take some moments of prayer, meditation or contemplation or something like that?”.

Ever prayed: This variable is based on the question “Apart from weddings and funerals, about how often do you pray these days?” Respondents can answer “More than once a week”, “Once a week”, “Once a month”, “Only on special holy days”, “Once a year”, “Less often”, or “Never, practically never”. The variable “Ever prayed” measures the share of respondents in a country who answered anything but “Never, practically never”. This variable was only asked in Muslim countries.

Weekly pray: The share of respondents in a country who answered “More than once a week” or “Once a week” to the above question.

God: This variable is based on the question “How important is God in your life? Please use this scale to indicate. 10 means “very important” and 1 means “not at all important”. The variable “God” measures the share of respondents in a country who answered anything but “not at all important”.

Very God: The share of respondents in a country who answered “very important” to the above question.

Ever church: This variable is based on the question “Apart from weddings and funerals, about how often do you attend religious services these days?” Respondents can answer “More than once a week”, “Once a week”, “Once a month”, “Only on special holy days”, “Once a year”, “Less often”, or “Never, practically never”. The variable “Ever church” measures the share of respondents in a country who answered anything but “Never, practically never”.

Weekly church: The share of respondents in a country who answered “More than once a week” or “Once a week” to the above question.

Earthquake risk: This variable is the inverse of the distance to the highest earthquake risk zones. Data on earthquake risk zones are provided by the United Nations Environmental Programme as part of the Global Resource Information Database (UNEP/GRID), who divided earthquake risk into five categories based on various parameters such as ground acceleration, duration of earthquakes, subsoil effects and historical earthquake reports. High risk earthquake zones are defined by Bentzen (2019) as the two zones with highest risk, zones 3 and 4. The reasoning for using distances instead of the average of earthquake risk zones is that the measure is meant to provide exogenous variation in religiosity. The impact of earthquake risk on religiosity is psychological and the use of religion for coping can be strong in areas close to high-risk zones, even though these areas face low risk of earthquakes (Bentzen, 2019). Therefore, distances are more relevant than averages across the earthquake risk zones. When using this measure, the sample is restricted to countries within at least 1500 km of a high-risk earthquake zone.

A4. Religious holidays

The analyses include various dummies to control for the fact that some religious holidays fall in different weeks of the Gregorian calendar from year to year.

Ramadan: A dummy equal to one if the particular week included the period of the Ramadan from first to the last day, zero otherwise.

LRamadan: A dummy equal to one if the week 52 weeks earlier included the period of the Ramadan, zero otherwise.

Easter: A dummy equal to one if the particular week included the period of the Easter including both Palm Sunday and Easter Sunday, zero otherwise.

LEaster: A dummy equal to one if the week 52 weeks earlier included the period of the Easter, zero otherwise.

Pentecost: A dummy equal to one if the particular week included the Pentecost, zero otherwise.

LPentecost: A dummy equal to one if the week 52 weeks earlier included the Pentecost, zero otherwise.

Ash: A dummy equal to one if the particular week included Ash Wednesday, zero otherwise.

LAsh: A dummy equal to one if the week 52 weeks earlier included Ash Wednesday, zero otherwise.

A5. Data on economic and political uncertainty

The variables in Table 6 are chosen from a comprehensive dataset provided by the Quality of Government Institute (Teorell et al., 2020), which gathers data from various studies on the quality of government and related matters. The search was limited to variables available for at least 70 of the countries in the sample in Panel A of Tables 6 and A.20.

Education measures the human capital index by Penn World Tables.

Fraction measures the degree of ethnic fractionalization in 2000, measured by Alesina et al. (2003). The definition of ethnicity involves a combination of racial and linguistic characteristics. Fractionalization reflects the probability that two randomly selected people from a given country will not share a certain characteristic, the higher the number the less probability of the two sharing that characteristic.

Fragile States Index produced by Haken et al. (2019), 2016 at The Fund for Peace (<http://ffp.statesindex.org/>) measures the pressures on states, their vulnerability to internal conflict, and societal deterioration. The index is based on twelve primary social, economic and political indicators (each split into an average of 14 sub-indicators). For each indicator, the ratings are placed on a scale of 0 to 10, with 0 being the lowest intensity (most stable) and 10 being the highest intensity (least stable). Table 6 shows results using the index, but also some of the subcomponents of the index: 1) **Economic Decline Indicator** considers factors related to economic decline within a country. For example, the indicator includes patterns of progressive economic decline of the society as a whole as measured by per capita income, Gross National Product, unemployment

rates, inflation, productivity, debt, poverty levels, or business failures. 2) **Security** includes measures related to internal conflict, small arms proliferation, riots and protests, fatalities from conflict, military coups, rebel activity, bombings, and political prisoners. The measure increases as security deteriorates. 3) **Public Service** includes measures related to policing, criminality, education provision, literacy, water and sanitation, infrastructure, quality healthcare, telephony, internet access, energy reliability, roads. The measure increases as public service deteriorates. 4) **Uneven Economic Development** measures the extent to which economic development is unevenly distributed. Includes measures related to the GINI coefficient, income share of highest 10%, income share of lowest 10%, urban-rural service distribution, access to improved services, and slum population. 5) **Demographic Pressure** includes measures related to natural disasters, disease, environment, pollution, food scarcity, malnutrition, water scarcity, population growth, youth bulge, and mortality.

GDP per capita measures the real PPP adjusted GDP per capita in 2000, provided by the Penn World Tables. The logarithm is taken in Table 6, while the level is shown without logs in Table A.20.

Gini is a dummy equal to one if the average Gini coefficient over the period 1991 to 2010 exceeded the median level. The Gini coefficient measures the degree of economic inequality.

Human Development Index measures the Human Development Index in 2010 from the U.N Human Development Report.

Mortality measures the adult mortality rate per 1000 population, provided by the World Health Organization.

Poverty measures the poverty gap at Purchasing Parity Adjusted 1.9US\$ a day, 2011, measured by the World Development Indicators.

Property rights institutions measures property rights institutions by Heritage Foundation.

Rule of law measures rule of law by Freedom House.

TFP measures total factor productivity by the Penn World Tables.

A6. Summary statistics

Table A.7 shows summary statistics for the variables included in the main analysis that vary across weeks and countries. Table A.8 shows summary statistics for the variables included in the main analysis that vary only across countries.

Table A.7
Summary statistics for time-varying variables.

Variable	Mean	Std. Dev.	N
Google prayer search share	24.664	20.7	11128
Growth rate in prayer search share	0.158	0.435	11128
Initial prayer search share	22.816	19.529	11128
Growth rate in church search share	0.081	0.676	8424
Growth rate in mosque search share	0.126	0.717	6864
Pandemic dummy	0.404	0.491	11128
COVID-19 cases dummy	0.405	0.491	10710
COVID-19 deaths dummy	0.385	0.487	10710
Anosmia dummy	0.409	0.492	11128

Table A.8
Summary statistics for cross-country variables.

Variable	Mean	Std. Dev.	N
Average prayer search share 2019	24.916	19.175	107
Earthquake risk	0.805	0.23	81
Moments of prayer	0.722	0.188	69
Ever prayed	0.820	0.19	46
Pray weekly	0.58	0.269	46
God important	0.913	0.097	84
God very important	0.539	0.299	84
Ever went to church	0.782	0.162	83
Go to church weekly	0.33	0.236	83
Fraction Christians	0.612	0.352	107
Fraction protestants 2000	0.118	0.185	107
Fraction catholics 2000	0.335	0.348	106
Fraction Muslims	0.192	0.314	107
Fraction Hindu	0.02	0.086	107
Fraction Buddhist	0.034	0.13	107
Poverty gap at 1.95USD a day	2.442	5.888	78
GDP per capita 2000 (PPP)	8.892	1.291	105
Human Development Index	0.699	0.164	102
Avg gini 1991–2010	39.852	9.685	90
Uneven Economic Development	5.259	2.098	102
Fragile States Index	61.699	23.549	102
Adult mortality rate	139.252	78.596	103
Property Rights	48.077	25.857	104

Appendix B. Robustness checks

The main data used in the workingpaper version of this paper was *daily* Google search shares for prayer for the period Jan 29 to Apr 1 2020 (Bentzen, 2020). The current version of the paper uses instead *weekly* Google search shares for prayer for a much longer period from 2017 to 2020. When they were not directly relevant to the current version of the paper, I have not reproduced the previous robustness checks. They all corroborated the findings of the current version of the paper: That daily Google searches for prayer rose significantly during March 2020, compared to January and February 2020; that the shares rose continuously after March 11; that the result was not driven by specific observations; that the rise in prayer searches was less dependent on the arrival of the COVID-19 in the individual countries and more dependent on the declaration of COVID-19 as a global pandemic on March 11; that the rise in prayer search shares is similar across continents; that the rise was larger for poorer and more insecure countries, but that this was entirely explained by these countries being more religious.

B1. Correlations between google searches and surveys

Figure A.8 shows the correlation between average Google search shares for prayer in 2019 and the share of survey respondents who replied that they pray weekly in Panels (a) and (c) and the share of respondents who replied that they take moments of prayer, meditation, and contemplation. Panels (a) and (b) show the raw correlation, while Panels (c) and (d) removes variation across continents (i.e. a regression of Google searches for prayer on the particular survey measure and a list of continent dummies). The correlation is high and significant and prayer search shares alone explain around 30% of the variation in religiosity based on surveys. This substantiates that Google searches capture real prayer intensity stated in surveys.

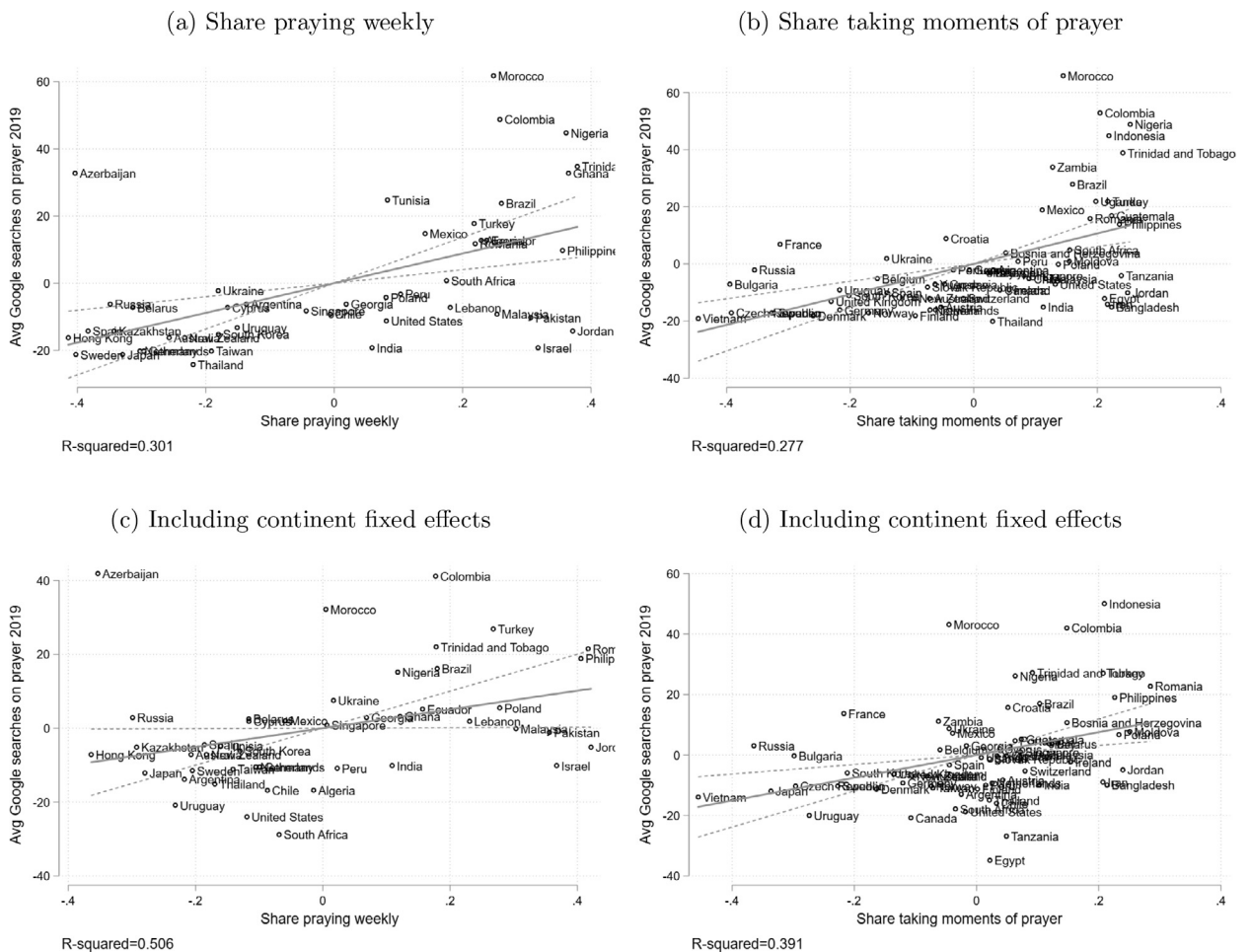


Fig. A.8. Relation between survey answers on prayer and Google search shares for prayer. Correlation between the share of Google searches for prayer in 2019 and the share of survey respondents answering that they pray weekly in Panels (a) and (c) and the share of survey respondents answering that they take moments of prayer, meditation, and contemplation in Panels (b) and (d). Panels (a) and (b) depict the raw correlation, while Panels (c) and (d) depict the correlation after controlling for continent fixed effects. The grey line represents the fitted line, while the stippled lines represent the 95% confidence intervals. The measures are described in Section Appendix A.

B2. Contents of google searches for prayer march 2020

Figure A.9 documents the development in the specific Google searches that contributed to the most to the rise in searches for the prayer topic during March 2020. For each topic, Google Trends provides information on the top-25 search terms and the top-25 rising search terms. The combination of the two lists provides a list of search terms that are both large in levels and rising over the period. Four main search terms dominated the global rise in searches for the topic “prayer” during March 2020. Fig. A.9 shows the development over time in these search terms. The “Pray for Italy” trend swept across the globe in March 2020 as Italy was the first country outside Asia affected by the COVID-19 virus. Spiritual Communion is a Christian practice of desiring union with Jesus Christ. Searches for spiritual communion spike every Sunday, particularly after March 11, and are examples that some Google searches for prayer are replacing physical church attendance.

The map in Fig. A.10 shows the global spread in Google searches for “pray for italy”. The map illustrates that searches that are specific to the situation in one country can surge in other countries, even far from the country in question.

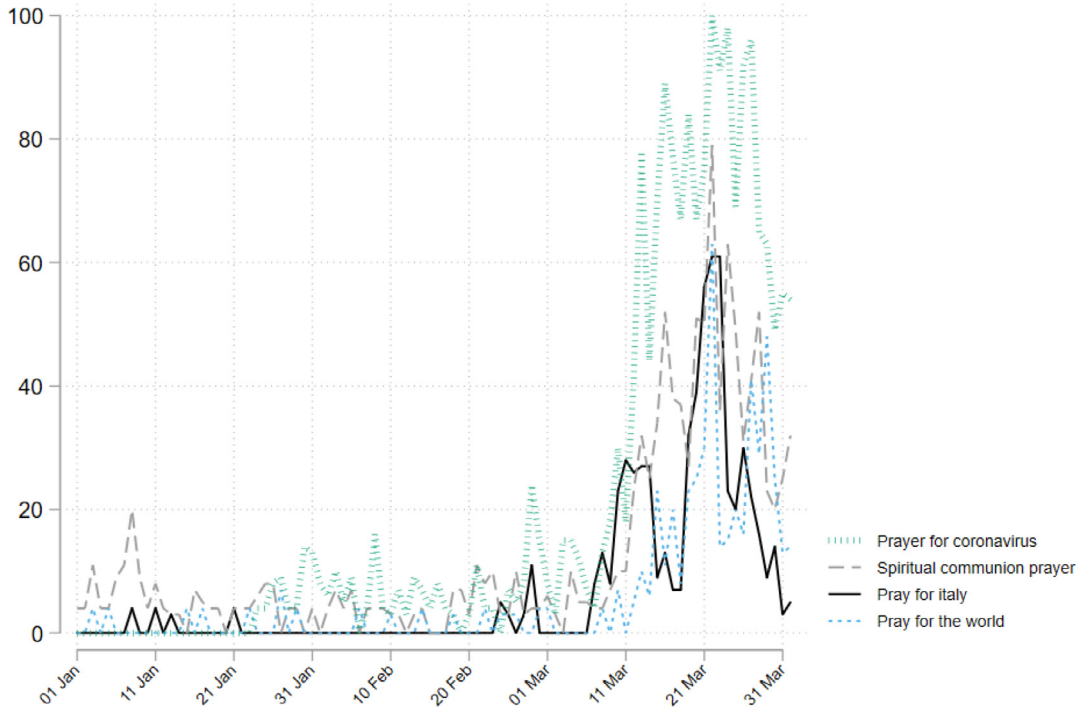


Fig. A.9. Top search terms within the topic “Prayer”. The figure shows the four largest contributors to the rise in the global average of the development in daily searches for prayer. Searches for “prayer for coronavirus” includes searches for “prayer for COVID-19”.

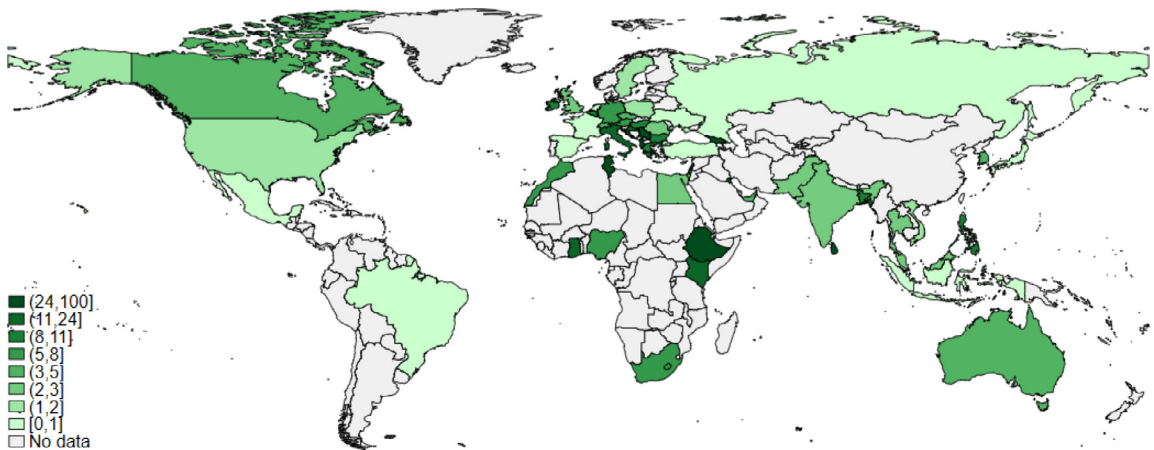


Fig. A.10. Geographic spread of searches for “pray for italy” March 5–30 2020.

B3. Examples of prayer websites

Figures A.11, A.12, A.13, and A.14 show screenshots of websites that one encounters when googling “coronavirus prayer”. The websites contain instructions on how to pray as well as specific prayer texts.

**60 MINUTE PRAYER GUIDE:
PRAYING FOR THE CORONAVIRUS PANDEMIC**

You'll need: A Bible, Worship music, Water, Soap, Tissues, Pens, Pack of plasters / band aids, Hand sanitizer

PAUSE (5 minutes)

PRAY
Psalm 46 aloud

BE STILL
Breathe deeply, and welcome the Holy Spirit

REJOICE (5 minutes)

PRAY
Psalm 91 aloud

SING
A song of worship about the greatness of God

ASK (30 minutes - 5 minutes per topic)

PRAY FOR THE CONTAINMENT OF THE VIRUS

Using water and soap, thoroughly wash your hands.
Ask God to slow and halt the spread of the Covid 19 Coronavirus.
Take a moment to pray for God's particular intervention in the nations most affected.

Fig. A.11. Example of a guide to a coronavirus prayer.

Pray for people who are infected with COVID-19 or facing quarantine.

Jesus, during Your ministry on Earth You showed Your power and caring by healing people of all ages and stations of life from physical, mental, and spiritual ailments. Be present now to people who need Your loving touch because of COVID-19. May they feel Your power of healing through the care of doctors and nurses.

Take away the fear, anxiety, and feelings of isolation from people receiving treatment or under quarantine. Give them a sense of purpose in pursuing health and protecting others from exposure to the disease. Protect their families and friends and bring peace to all who love them.

Fig. A.12. Example of a coronavirus prayer. The website of World Vision: <https://www.worldvision.org/disaster-relief-news-stories/prayers-people-affected-new-coronavirus>.



Fig. A.13. Example of website with COVID-19 prayers. The website of the Church of England: <https://www.churchofengland.org/more/media-centre/coronavirus-covid-19-liturgy-and-prayer-resources>.

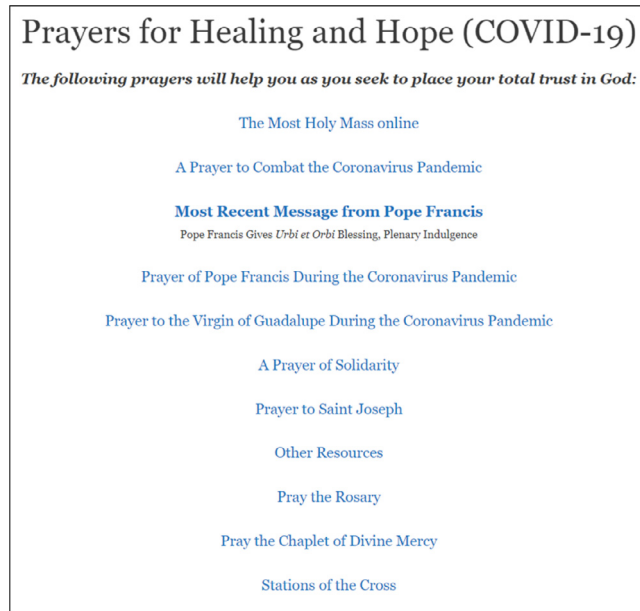


Fig. A.14. Example of website with list of COVID-19 prayers. The website of website of My Catholic Life: <https://mycatholic.life/catholic-prayers-a-prayer-for-healing-and-hope/>.

B4. The relative size of the increase

Figure A.15 shows the increase in Google searches for prayer relative to searches for other topics that rose during the COVID-19 pandemic. The purpose is to illustrate the relative size of the rise in prayer searches. The COVID-19 pandemic resulted in massive lock downs and quarantines across the globe, meaning that people were at home and not allowed to go out. In addition, most international air traffic was shut down.

Figure A.15 shows that searches for topics related to take-out and Netflix rose during the month of March 2020, while searches for flights fell as one would expect. The volume of searches for prayer was higher than searches for takeaway (by a factor 4.8), but lower than searches for Netflix (25%) and flights (28%). Like prayer, the Google searches for take-out, Netflix, and flights encompass all searches for topics related to these in all languages.

The relative sizes of the increases in the searches are calculated using the following formula for Netflix and take-out:

$$\frac{\Delta \text{prayer}}{\Delta \text{other}} = \frac{\text{maxprayer}_{\text{mar}} - \text{avgprayer}_{\text{feb}}}{\text{maxother}_{\text{mar}} - \text{avgother}_{\text{feb}}} \tag{B.1}$$

where $\text{maxprayer}_{\text{mar}}$ is the maximum level of search shares for prayer reached during the month of March 2020 and $\text{maxother}_{\text{mar}}$ is the maximum level of search shares for either Netflix or Take-Out reached during the month of March 2020. $\text{avgprayer}_{\text{feb}}$ is the average level of search shares for prayer during February 2020 and $\text{avgother}_{\text{feb}}$ is the average level of search shares for Netflix or take-out during February 2020.

Instead of $\text{maxother}_{\text{mar}}$, the calculation for flights included the $\text{minother}_{\text{mar}}$, which is the minimum level of search shares for flights reached during the month of March 2020. This way, the spike in searches for flights in early March does not influence the calculation. This surge may be due to people anticipating a change in rules for flight traffic.

Searches for prayer rose by 134% the rise in Google searches for take-out, by 12% the rise in searches for Netflix, and by 26% the fall in searches for flights.

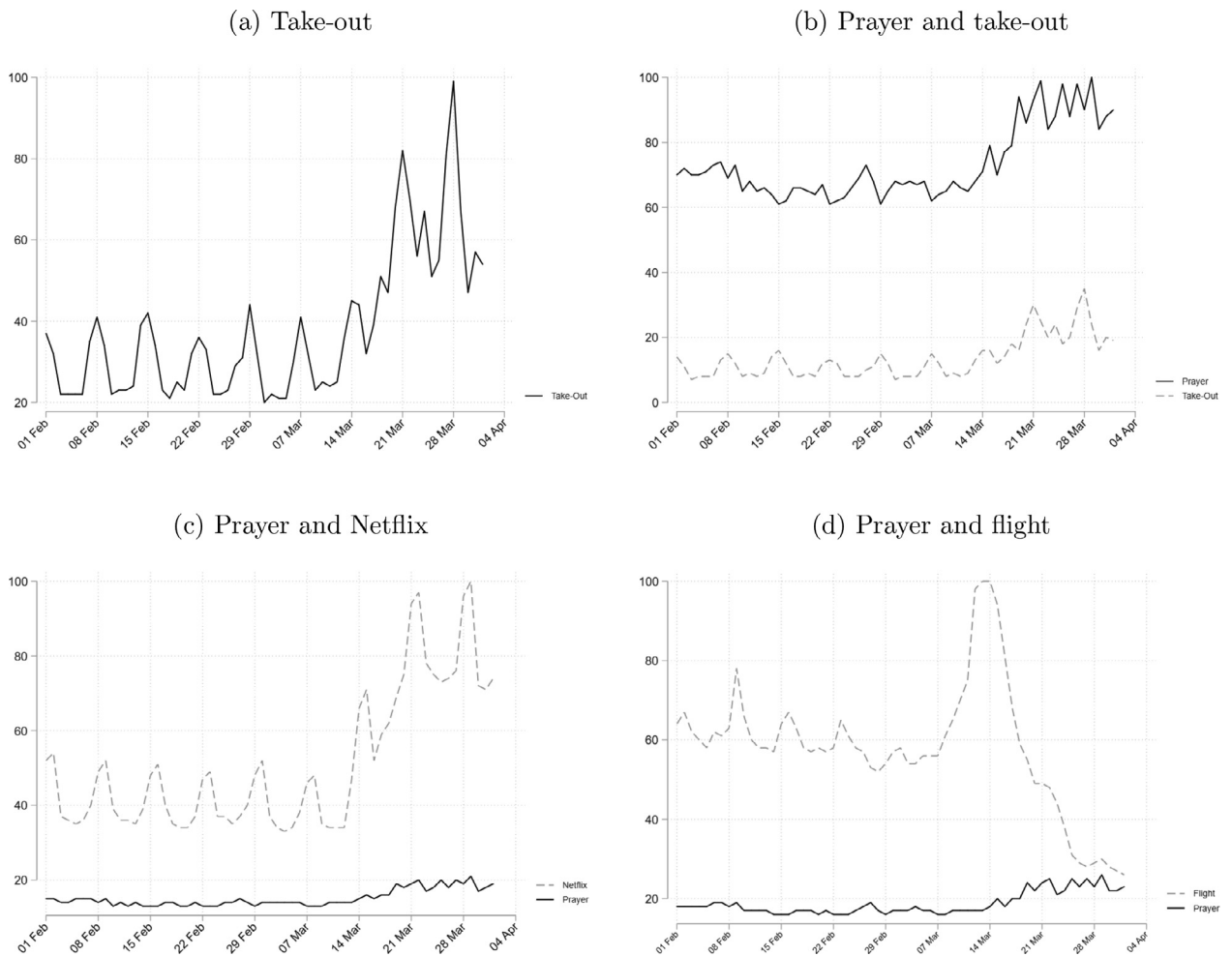


Fig. A.15. Google searches for other terms affected by COVID-19. Global average of Google searches on different topics over the period Feb 1 to April 1, 2020. The searches are set to 100 by Google Trends for the largest search within each panel. The size of the increases are therefore not comparable across panels, but they are comparable within one panel.

Result: Google searches for prayer compares in size to movements in other tendencies that were impacted by COVID-19.

B5. The timing of the rise in prayer searches

To illustrate the timing of the rise in Google searches for prayer around March 11, Fig. A.16 shows the daily search-shares for prayer during the period February 15 to April 1, 2020 for the 99 countries with reliable daily data on Google search shares, split into fourteen regions. Each panel shows two groups of countries within the particular region. The darker curves represent the average for the particular group, while the lighter curves represent the raw data for each country. The search-shares are set to 1 on February 15, and the figure thus illustrates the change in search-shares, relative to the level on this date. The vertical line represents March 11. Search-shares for prayer rose around mid March for most regions, even for the most secular regions of Northern Europe.

Figure A.17 documents the distribution of the countries based on when the prayer search shares rose significantly for the first time during 2020. A significant rise is defined as the first time prayer search shares grew by more than one standard deviation for 2 consecutive weeks or more. 102 of the 107 countries experienced such a “significant rise” during 2020, 76 experienced the rise before April 1, 2020. A similar analysis was conducted based on the daily data for the first four months of 2020 in the workingpaper version of this paper (Bentzen, 2020), showing that the majority of the countries experienced the rise between March 14 and March 25.

Figure A.18 shows that the spike in Google searches for prayer in 2020 is even more pronounced when using the entire dataserries available from Google Trends, starting Jan 1 2004. There is a trend break in the data on Jan 1 2016, where Google Trends’ data collection method was improved.

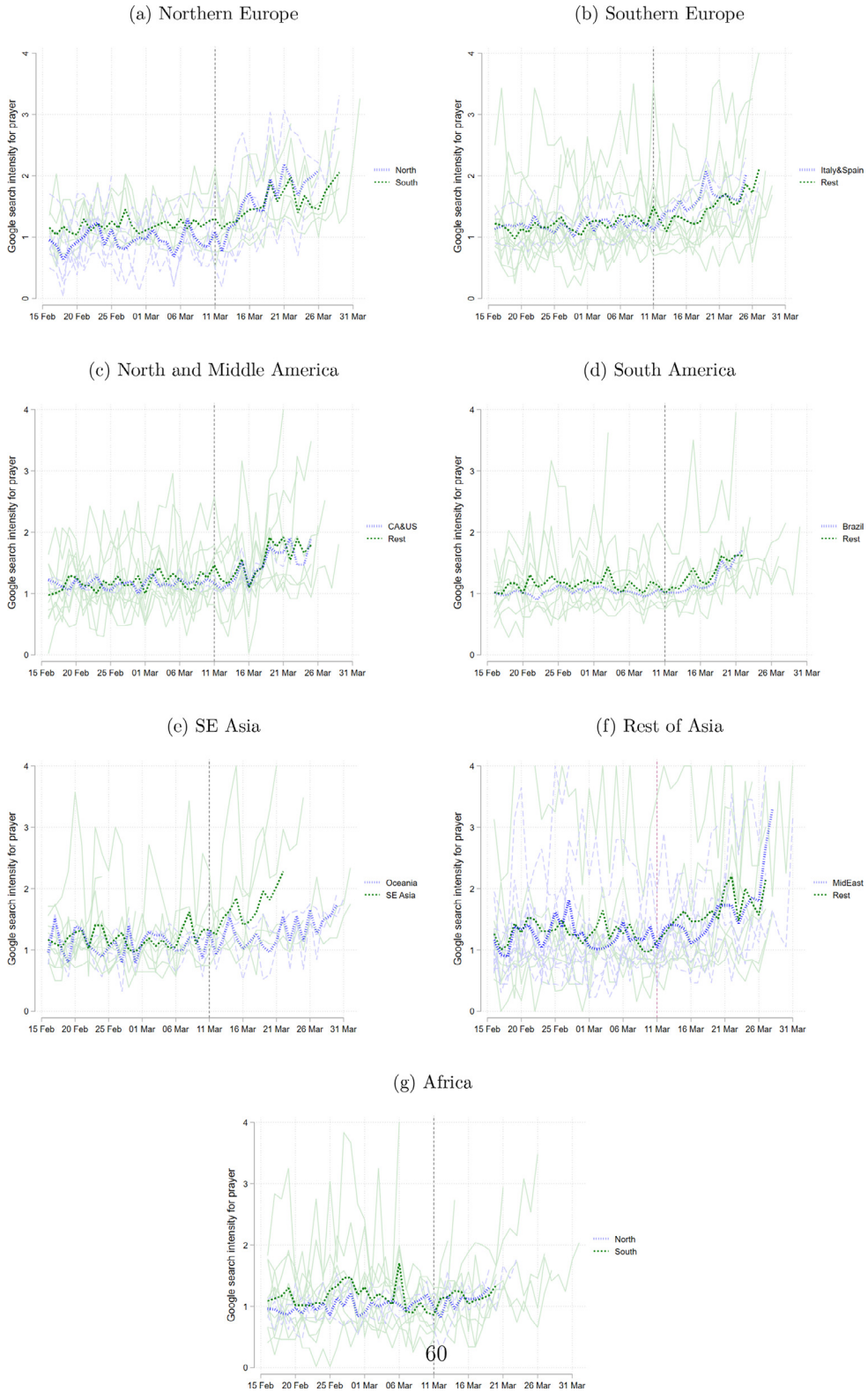


Fig. A.16. Daily Google searches for the topic “prayer” by region. Google searches for prayer as a share of the total number of Google searches on the particular day, set to 1 on February 15, 2020. A country drops out of the sample after it reaches its’ peak during the period Feb 15 to Apr 1. The searches encompass topics related to prayer, including alternative spellings and languages. The light-coloured lines represent a country. The darker-coloured lines represent the average prayer intensity for the particular group.

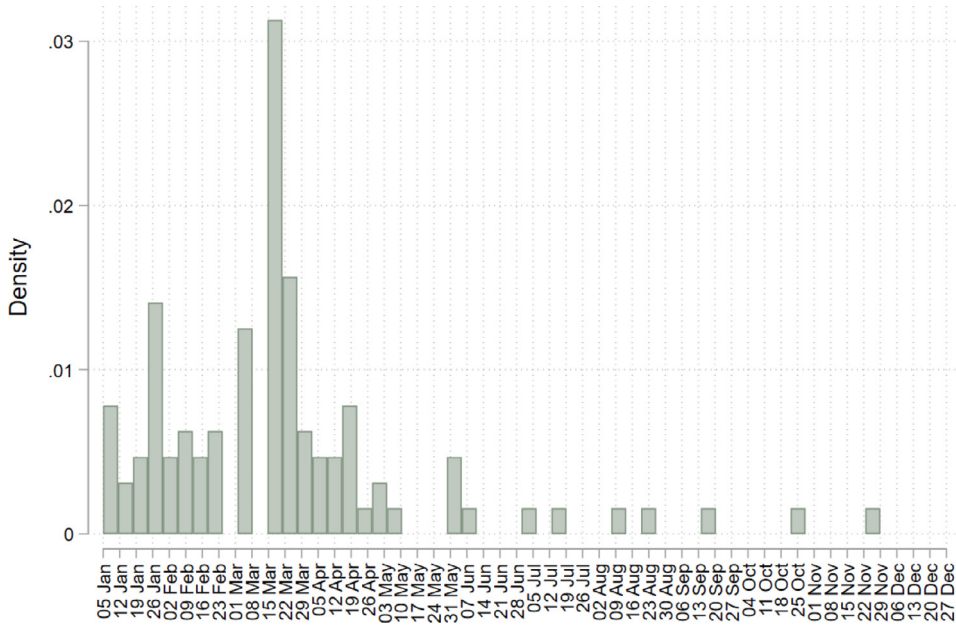


Fig. A.17. Distribution of the countries based on first day with two-weeks rise in prayer search shares. The histogram shows the distribution countries, based on the first week when their prayer search shares rose more than one standard deviation above their previous level for two consecutive weeks.

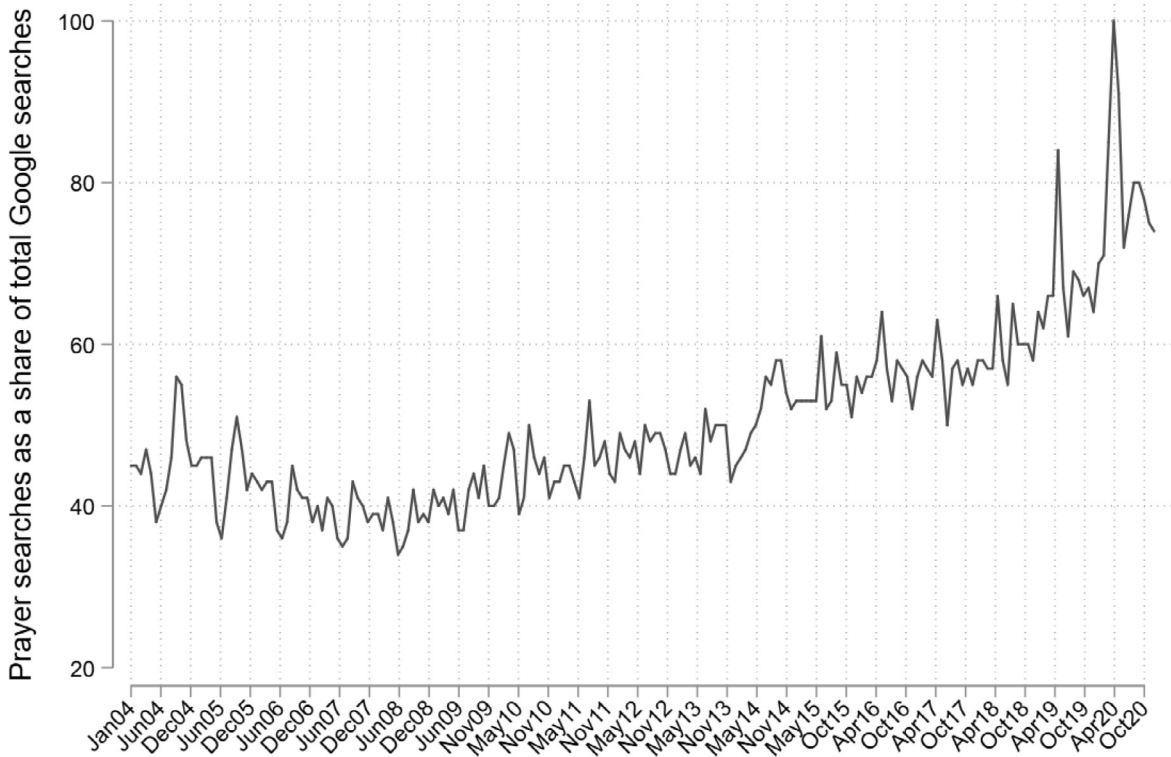


Fig. A.18. Global Google searches for prayer Jan 2004 to Dec 2020. The figure replicates panel a of Fig. 1 with data going back to January 1, 2004.

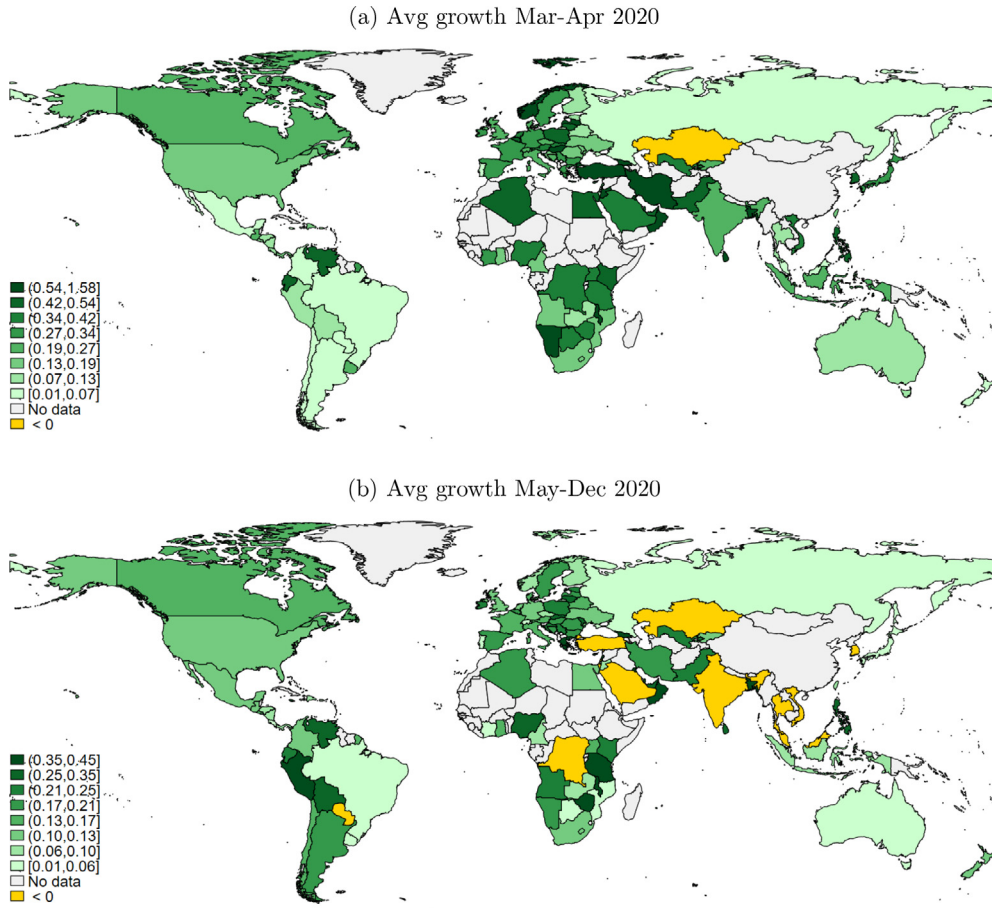


Fig. A.19. The spatial spread of prayer search growth during 2020. The figure replicates Fig. 2, but calculates the average for two separate periods: The average yearly growth rate from March and April 2019 to March and April 2020 in panel a and the average yearly growth rate from the period May-Dec 2019 to the same period in 2020 in panel b.

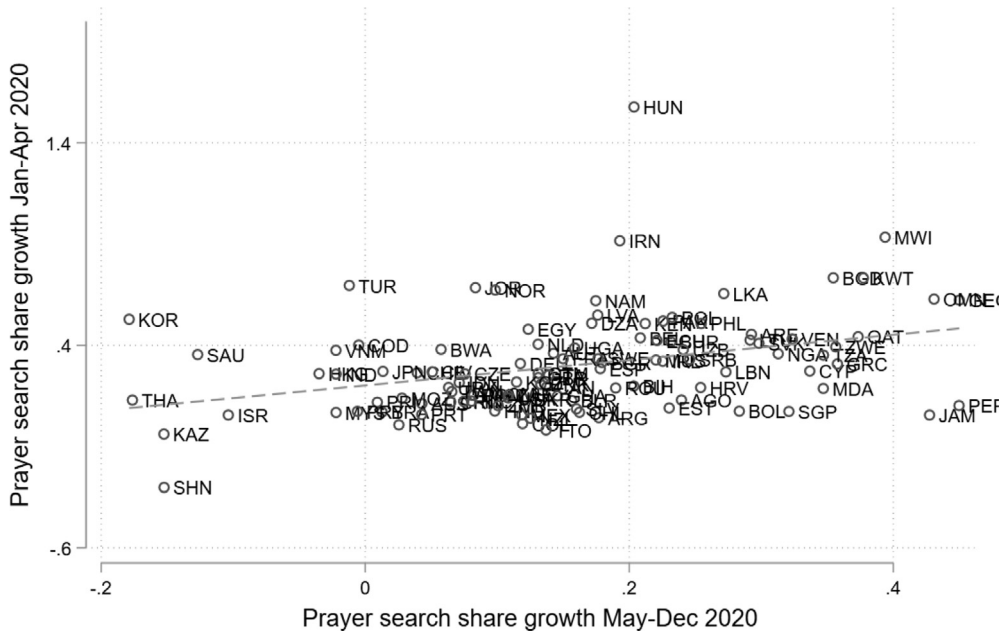


Fig. A.20. The correlation between prayer search growth early vs late 2020.

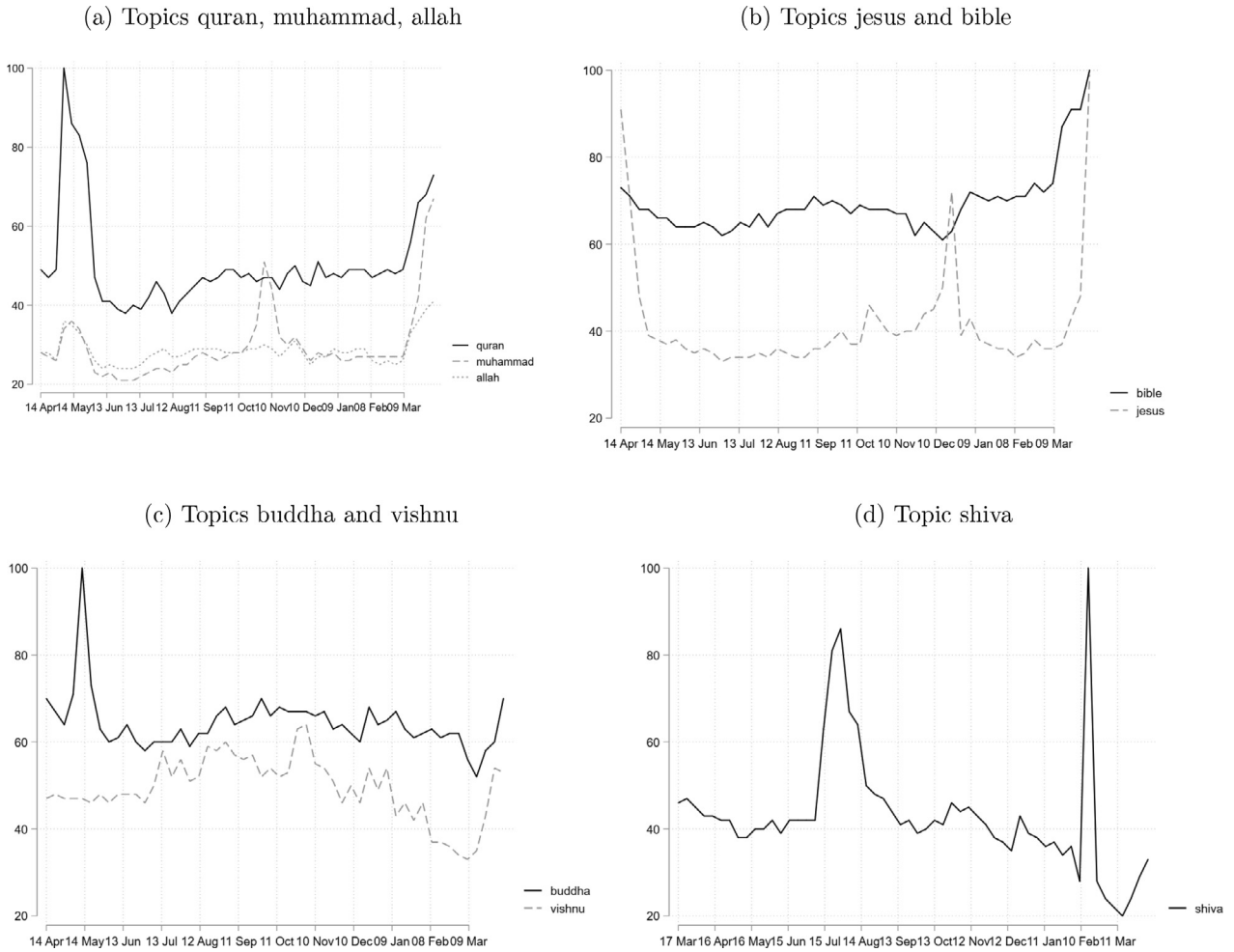


Fig. A.21. Google searches for religious topics Apr 14 2019 – Apr 14 2020. Global average of Google searches on religious topics over the period April 14, 2019 to April 14, 2020. Google Trends sets the searches to 100 for the largest search within each time series. The search shares are therefore not comparable across panels, but they are comparable within one panel.

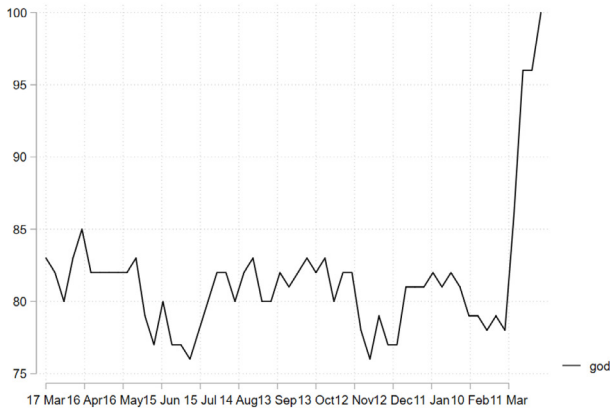
B6. Alternative google searches for religious topics

Figure A.21 documents rising search shares during the first four months of 2020 for other religious search topics. The period includes the full year from Apr 14 2019 to Apr 14 2020.⁴⁴ The end date coincides partly with Easter 2020, which may influence the rise for the Christian search terms, but should not matter for the remaining religious terms.

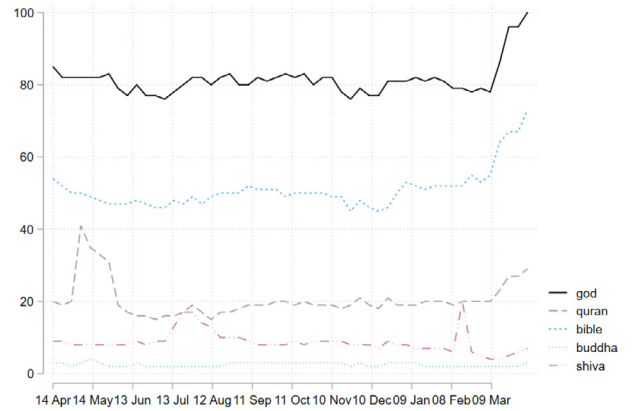
Result: Search shares rise in March 2020 for all religious terms. In March 2020, searches for muhammad, allah, bible, jesus, and god surpass the search shares across all other religious events during the year. Searches for buddha peak on May 12, Buddhas birthday, quran peaks on the first day of the Ramadan, vishnu peaks on No. 10, Vaikuntha Chaturdashi, the Hindu holiday for Lord Vishnu and Lord Shiva, shiva peaks on Feb 21, Maha Shivratri, the worshipping of Lord Shiva.

⁴⁴ These dates were chosen as the most recent one-year period in the workingpaper version of this research.

(e) Topic god



(f) Topics god, quran, bible, buddha, shiva



(g) Topics god and prayer

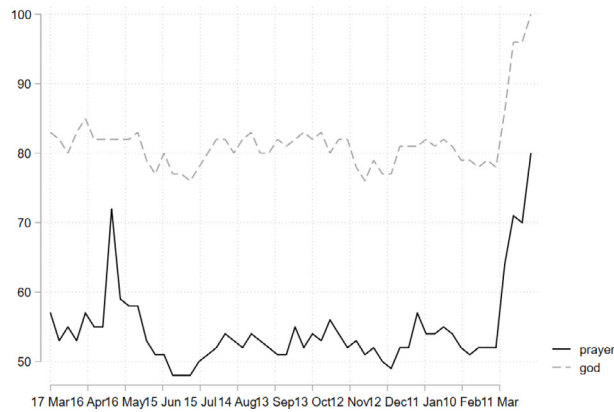


Fig. A.21. Continued

B7. Levels instead of growth rates

The dependent variable throughout the main body of the paper is the weekly growth rate from 52 weeks earlier, $w - 52$, to week w , except in Table 5 which is based on the daily data. The dependent variable in the main analysis of the workingpaper version of the paper was the *level* of the prayer search shares throughout. This section reproduces all the tables from the main body of this paper with the level of prayer searches as the dependent variable and excluding the control for initial prayer search shares as was also done in the workingpaper version. The results are robust to using this alternative specification.

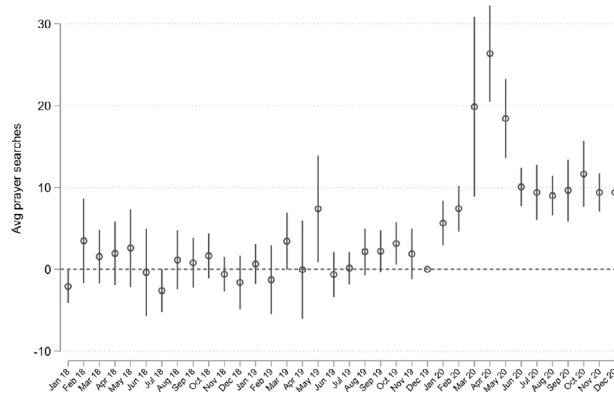


Fig. A.22. Worldwide Google searches for prayer as a share of total Google searches 2018–2020. Replication of panel b of Fig. 1, but with the level of prayer search shares as dependent variable instead of the growth rate.

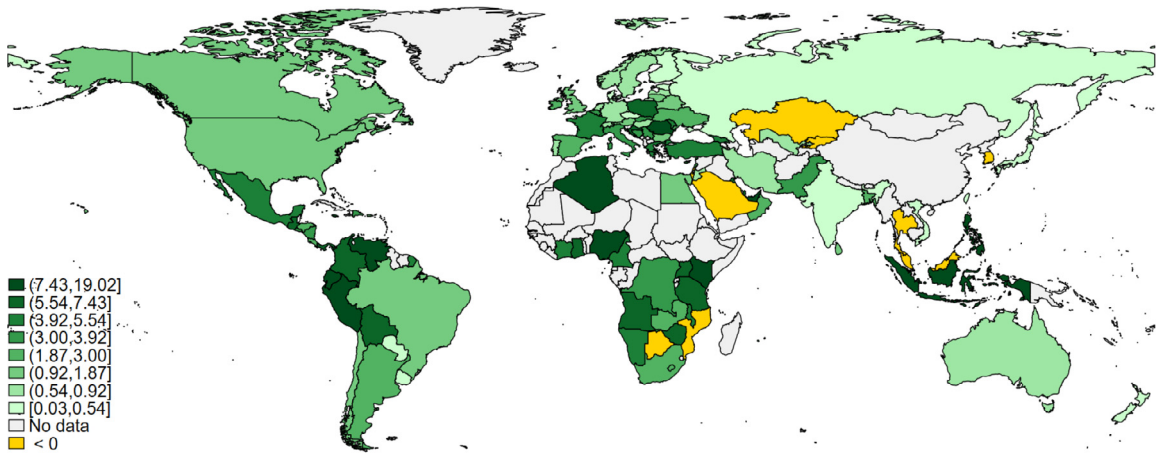


Fig. A.23. The spatial spread of the change in prayer searches 2019–2020. The figure replicates Fig. 2 for the average change in prayer searches from 2019 to 2020 instead of the growth rate.

Table A.9

The timing of the rise in prayer search shares: World vs countries.

Dependent variable: Prayer search shares							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Jan-Feb 2020	5.30*** (1.519)	5.30*** (1.519)	5.10*** (1.809)		1.42*** (0.373)	1.42*** (0.375)	
Mar-Apr 2020	20.5*** (1.542)	20.5*** (1.542)	20.2*** (2.127)		7.02*** (0.694)	7.02*** (0.697)	
May-Dec 2020	9.43*** (0.871)	9.43*** (0.871)	9.01*** (2.204)		3.42*** (0.556)	3.42*** (0.559)	
Jan-Feb 2019				-0.45 (1.349)			0.043 (0.330)
Mar-Apr 2019				1.36 (1.627)			0.63* (0.329)
May-Dec 2019				2.77* (1.654)			0.58 (0.412)
R-squared	0.81	0.81	0.81	0.57	0.013	0.90	0.90
Observations	104	104	104	104	11,128	11,128	11,128
Period	2018–2020	2018–2020	2018–2020	2017–2019	2018–2020	2018–2020	2017–2019
Panel	World	World	World	World	Country	Country	Country
Trend	N	N	Y	Y	Y	Y	Y
Country-trend	N	N	N	N	N	Y	Y

The table replicates Table 5 with the level of prayer search shares instead of the growth rate. The table therefore does not control for the initial level of prayer searches, meaning that columns (1) and (2) are identical.

Table A.10
The rise in prayer search shares: Further dynamics and heterogeneity.

Dependent variable: Prayer search shares						
	(1)	(2)	(3)	(4)	(5)	(6)
Jan-Feb 2020	0.95*** (0.358)	0.95*** (0.358)	0.52* (0.271)	2.98* (1.613)	-0.078 (0.679)	0.86*** (0.221)
Mar-Apr 2020	6.42*** (0.639)	6.42*** (0.639)	4.09*** (1.032)	10.3*** (1.935)	9.37*** (1.298)	4.16*** (0.685)
May-Jun 2020	3.62*** (0.545)	3.62*** (0.545)	1.74** (0.660)	6.98*** (1.832)	5.87*** (1.323)	1.79*** (0.470)
Jul-Aug 2020	2.67*** (0.560)	2.67*** (0.560)	1.19 (0.818)	3.90** (1.861)	5.59*** (1.420)	1.29*** (0.463)
Sep-Oct 2020	2.51*** (0.568)	2.51*** (0.568)	0.033 (0.891)	3.62* (1.817)	6.21*** (1.309)	1.64*** (0.444)
Nov-Dec 2020	1.49*** (0.507)	1.49*** (0.507)	-0.22 (0.833)	0.14 (1.594)	4.00*** (1.245)	2.25*** (0.445)
R-squared	0.90	0.91	0.92	0.68	0.88	0.92
Observations	11,128	11,128	3328	2080	2392	3328
Countries	107	107	32	20	23	32
Country FE	N	Y	Y	Y	Y	Y
Region	All	All	Asia	Africa	Americas	Europe
Mean prayer	24.9	24.9	15.2	44.1	37.8	13.4

The table replicates Table 2 with the level of prayer search shares as dependent variable instead of the growth rate. Therefore the table also does not control for the initial level of prayer searches.

Table A.11
The impact of COVID-19 on weekly prayer search shares.

Dependent variable: Prayer search shares										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pandemic dummy	6.32*** (0.750)				5.85*** (0.818)	6.51*** (0.957)	6.46*** (0.976)			
Case dummy		5.13*** (0.641)			1.13* (0.574)			1.47* (0.752)		
Death dummy			4.70*** (0.829)			0.30 (0.945)			1.34 (1.185)	
Anosmia dummy				2.96*** (0.985)			-0.25 (1.172)			0.071 (1.252)
R-squared	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Observations	5564	5250	5250	5564	5250	5250	5564	5250	5250	5564
Countries	107	105	105	107	105	105	107	105	105	107
Time Fe	N	N	N	N	N	N	N	Y	Y	Y

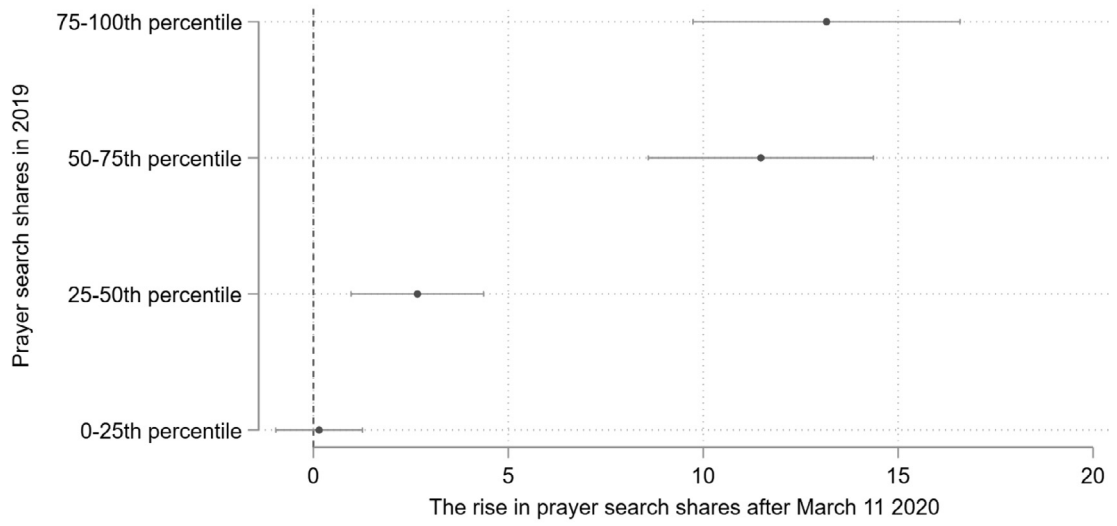
The table replicates Table 3 with the level of prayer search shares as dependent variable instead of the growth rate. Therefore the models also do not control for the initial level of prayer searches.

Table A.12
The impact of COVID-19 on prayer search shares.

Dependent variable: Google searches for...				
	Prayer		Church	Mosque
	(1)	(2)	(3)	(4)
Ban on mass gathering	4.17*** (0.746)	0.20 (0.820)	-1.70* (0.997)	-2.86* (1.580)
Pandemic dummy		8.01*** (1.010)		
R-squared	0.90	0.91	0.80	0.89
Observations	4056	4056	3120	2613
Countries	104	104	80	67

The table replicates Table 4 with the level of prayer search shares as dependent variable instead of the growth rate. Therefore the models also do not control for the initial level of prayer searches.

(a) Prayer search shares in 2019



(b) Earthquake risk

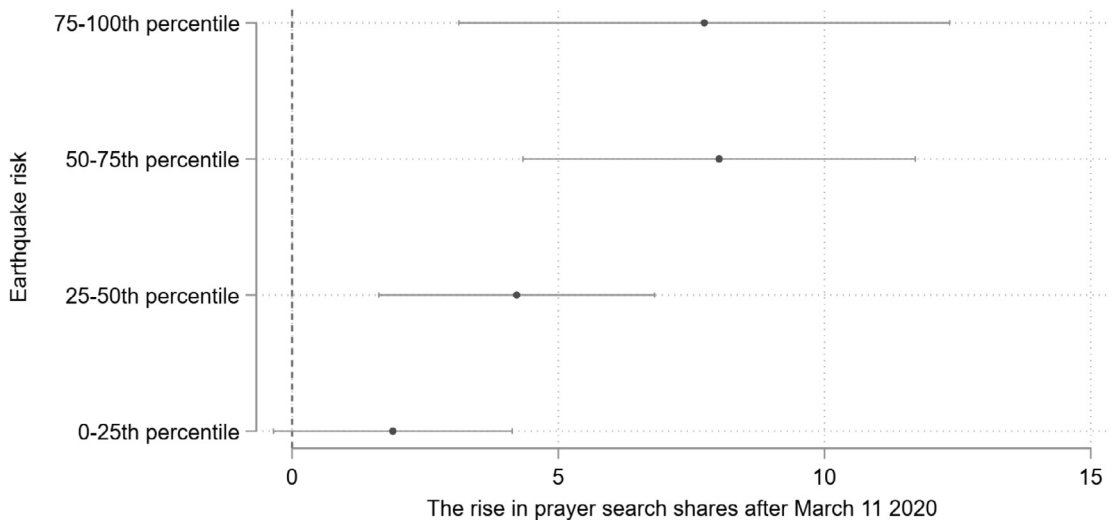


Fig. A.24. The rise in prayer search shares for different religiosity and denominations. The figure replicates Fig. 5 using the level of prayer search shares as dependent variable instead of the growth rate. Therefore the models also do not control for the initial level of prayer searches.

(c) Religious denominations

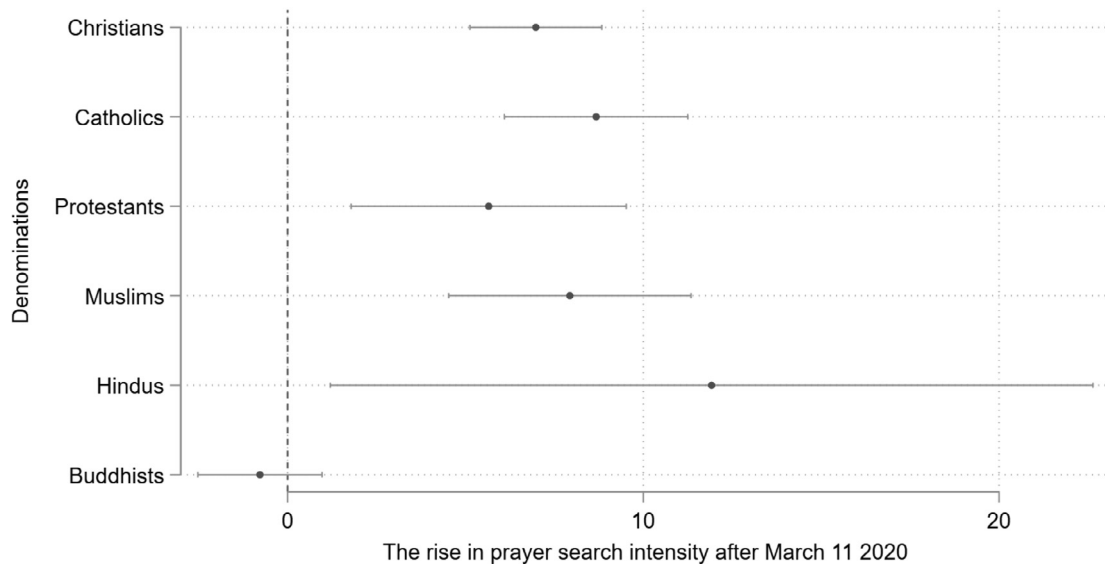


Fig. A.24. Continued

B8. Additional robustness checks of the main results

Result: The results are not driven by specific observations.

Table A.13

The rise in prayer search shares across country characteristics.

Dependent variable: Prayer search shares		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A		GDP	Poverty	Educ	Gini	Uneven	Fragile	AdultMort	PropRights
Pandemic dummy		27.8*** (5.291)	5.76*** (0.890)	11.4*** (1.176)	-7.40*** (2.671)	-3.89*** (1.474)	-2.46 (1.568)	0.43 (1.214)	12.7*** (1.727)
Pandemic x Variable		-2.40*** (0.575)	2.37 (1.531)	-3.07*** (0.537)	3.53*** (0.711)	20.1*** (2.875)	1.48*** (0.268)	0.44*** (0.082)	-1.29*** (0.266)
R-squared		0.91	0.92	0.91	0.91	0.91	0.91	0.91	0.91
Observations		5460	4056	4992	4680	5304	5304	5356	5408
Countries		105	78	96	90	102	102	103	104
Panel B									
Pandemic dummy		5.22 (5.816)	0.072 (1.040)	1.94 (1.533)	-0.76 (2.721)	-2.35* (1.341)	-2.61** (1.243)	-0.84 (0.989)	2.08 (2.018)
Pandemic x Variable		-0.59 (0.587)	-1.24 (1.340)	-0.98** (0.483)	0.027 (0.942)	5.31 (4.123)	0.45* (0.261)	0.034 (0.105)	-0.43* (0.239)
Pandemic x Prayer 2019		0.26*** (0.041)	0.27*** (0.049)	0.24*** (0.042)	0.28*** (0.050)	0.25*** (0.052)	0.26*** (0.042)	0.28*** (0.051)	0.26*** (0.041)
R-squared		0.92	0.92	0.91	0.92	0.91	0.91	0.92	0.92
Observations		5460	4056	4992	4680	5304	5304	5356	5408
Countries		105	78	96	90	102	102	103	104
Panel C									
Pandemic dummy		21.0*** (7.085)	3.79*** (0.810)	10.3*** (1.548)	-6.33 (3.838)	-3.99** (1.837)	-1.33 (1.818)	0.10 (1.650)	9.61*** (1.982)
Pandemic x Variable		-1.72** (0.762)	15.4*** (2.343)	-2.74*** (0.694)	3.09*** (1.095)	19.6*** (4.114)	1.12*** (0.335)	0.43*** (0.138)	-0.88*** (0.307)
R-squared		0.92	0.93	0.92	0.93	0.92	0.92	0.92	0.92
Observations		3796	2964	3588	3328	3796	3796	3848	3848
Countries		73	57	69	64	73	73	74	74
Panel D									
Pandemic dummy		0.14 (0.484)	-0.048 (0.128)	0.14 (0.211)	0.27 (0.251)	-0.040 (0.124)	-0.015 (0.122)	-0.039 (0.085)	-0.29 (0.264)
Pandemic x Variable		-0.022 (0.044)	0.096 (0.228)	-0.062 (0.045)	-0.091 (0.101)	-0.17 (0.561)	-0.026 (0.031)	-0.0027 (0.009)	0.026 (0.023)
Pandemic x Prayer 2019		0.016** (0.007)	0.015* (0.008)	0.011 (0.008)	0.016* (0.009)	0.019* (0.011)	0.022** (0.009)	0.016** (0.007)	0.021** (0.009)
R-squared		0.19	0.15	0.19	0.16	0.18	0.18	0.19	0.18
Observations		3796	2964	3588	3328	3796	3796	3848	3848
Countries		73	57	69	64	73	73	74	74
FirstStageF		15.2	14.7	14.4	10.7	8.23	9.50	21.6	9.31

The table replicates Table 5 using the level of prayer search shares as dependent variable instead of the growth rate. Therefore the models also do not control for the initial level of prayer searches.

Table A.14

The rise in prayer search shares excluding country fixed effects.

Dependent variable: Growth rate in prayer search shares [0,1]					
	(1)	(2)	(3)	(4)	(5)
Jan-Feb 2020	0.072*** (0.022)	0.086* (0.044)	0.047 (0.062)	0.0099 (0.014)	0.12*** (0.042)
Mar-Apr 2020	0.31*** (0.036)	0.28*** (0.062)	0.32*** (0.105)	0.25*** (0.030)	0.39*** (0.075)
May-Jun 2020	0.11*** (0.024)	0.097* (0.053)	0.13 (0.077)	0.17*** (0.034)	0.085*** (0.027)
Jul-Aug 2020	0.086*** (0.026)	0.032 (0.059)	0.098 (0.074)	0.17*** (0.038)	0.083** (0.032)
Sep-Oct 2020	0.047* (0.027)	-0.069 (0.065)	0.045 (0.058)	0.17*** (0.029)	0.10*** (0.031)
Nov-Dec 2020	0.043 (0.029)	-0.059 (0.059)	-0.063 (0.079)	0.14*** (0.034)	0.17*** (0.038)
R-squared	0.28	0.25	0.42	0.43	0.25
Observations	11,128	3328	2080	2392	3328
Countries	107	32	20	23	32
Region	All	Asia	Africa	Americas	Europe

Replication of Table 2, excluding country fixed effects.

Table A.15

The rise in prayer search shares excluding initial prayer search shares.

Dependent variable: Growth rate in prayer search shares [0,1]						
	(1)	(2)	(3)	(4)	(5)	(6)
Jan-Feb 2020	0.070*** (0.024)	0.070*** (0.024)	0.12** (0.050)	0.00045 (0.063)	0.022 (0.018)	0.10** (0.045)
Mar-Apr 2020	0.29*** (0.037)	0.29*** (0.037)	0.29*** (0.066)	0.32*** (0.101)	0.23*** (0.035)	0.33*** (0.079)
May-Jun 2020	0.095*** (0.026)	0.095*** (0.026)	0.089* (0.051)	0.063 (0.090)	0.20*** (0.033)	0.049 (0.034)
Jul-Aug 2020	0.075*** (0.028)	0.075*** (0.028)	0.0065 (0.057)	0.029 (0.086)	0.19*** (0.036)	0.091** (0.038)
Sep-Oct 2020	0.023 (0.029)	0.023 (0.029)	-0.11 (0.064)	-0.020 (0.074)	0.17*** (0.027)	0.075* (0.042)
Nov-Dec 2020	0.042 (0.032)	0.042 (0.032)	-0.058 (0.059)	-0.11 (0.100)	0.18*** (0.033)	0.14*** (0.050)
R-squared	0.097	0.14	0.17	0.12	0.18	0.10
Observations	11,128	11,128	3328	2080	2392	3328
Countries	107	107	32	20	23	32
Country FE	N	Y	Y	Y	Y	Y
Region	All	All	Asia	Africa	Americas	Europe

Replication of Table 2, without accounting for the initial prayer search shares.

Table A.16
Examination of pre-trends across continents.

Dependent variable: Growth rate in prayer search shares 2017–2019				
	(1)	(2)	(3)	(4)
Initial prayer	-0.052** (0.019)	-0.028*** (0.002)	-0.023*** (0.003)	-0.062*** (0.017)
Jan-Feb 2019	-0.043 (0.034)	-0.00048 (0.048)	-0.024 (0.023)	-0.028 (0.031)
Mar-Apr 2019	-0.013 (0.045)	-0.0025 (0.047)	-0.015 (0.036)	0.0079 (0.039)
May-Jun 2019	0.051 (0.042)	0.041 (0.074)	-0.046 (0.034)	0.069** (0.027)
Jul-Aug 2019	0.016 (0.046)	0.0032 (0.062)	-0.062 (0.045)	-0.067 (0.048)
Sep-Oct 2019	0.0014 (0.060)	0.015 (0.090)	-0.051 (0.044)	-0.036 (0.046)
Nov-Dec 2019	-0.11* (0.058)	-0.0040 (0.075)	-0.096* (0.049)	-0.058 (0.054)
R-squared	0.28	0.40	0.41	0.25
Observations	3328	2080	2392	3328
Countries	32	20	23	32
Country FE	Y	Y	Y	Y
Cntr trend	Y	Y	Y	Y
Region	Asia	Africa	Americas	Europe
Mean prayer	15.2	44.1	37.8	13.4

Replication of columns (3)–(6) in Table 2 for the period 2017–2019 instead of 2018–2020.

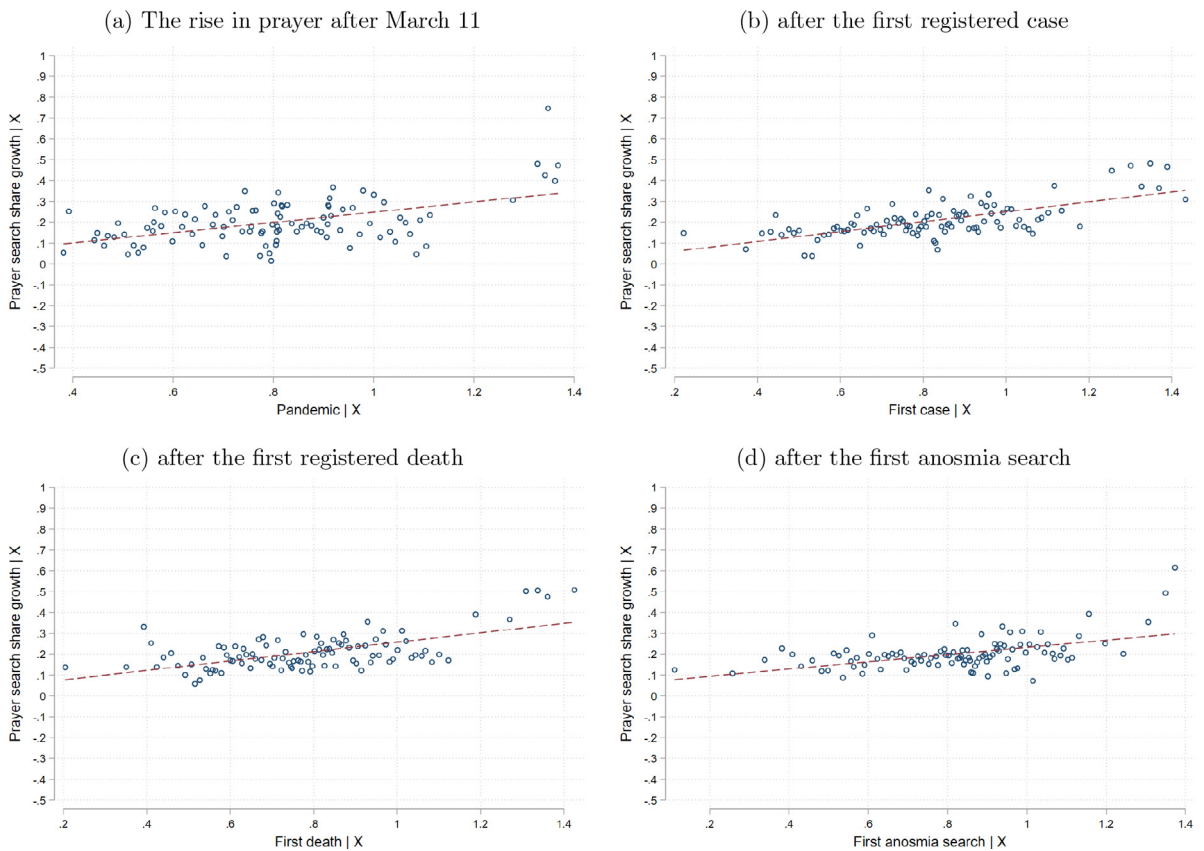


Fig. A.25. Binned added variables plots of the rise in prayer search shares after different dates. The binned added variables plot of regressions of the prayer search share on the pandemic dummy in Panel (a), the dummy equal to one after the first 10 cases were registered in Panel (b), after the first death is registered in Panel (c), and after the first Google search on “anosmia” in Panel (d). The regressions mirror those in columns (1)–(4) of Table 3. The observations are binned into 100 equally sized bins.

Table A.17
The rise in prayer search shares for different religiosity levels I.

Dep var: Prayer search growth	(1) Pray2019	(2) MomentPray	(3) EverPray	(4) WeekPray	(5) God	(6) VeryGod	(7) EverChurch	(8) WeekChurch	(9) EarthqRisk
Pandemic dummy	0.11* (0.055)	-0.16 (0.172)	-0.12 (0.123)	-0.10 (0.088)	-0.59* (0.345)	0.0044 (0.074)	-0.22 (0.180)	0.014 (0.052)	-0.33 (0.227)
Pandemic x Religiosity	0.0057*** (0.002)	0.50** (0.243)	0.38** (0.171)	0.50*** (0.155)	0.89** (0.381)	0.41*** (0.140)	0.57** (0.239)	0.64*** (0.143)	0.67** (0.272)
R-squared	0.37	0.31	0.36	0.37	0.33	0.33	0.33	0.33	0.34
Observations	5564	3588	2392	2392	4368	4368	4316	4316	3848
Countries	107	69	46	46	84	84	83	83	74
MeanDepVar	0.20	0.20	0.17	0.17	0.20	0.20	0.20	0.20	0.21
MinimumImpact	0.11	-0.014	0.029	-0.036	-0.072	0.042	-0.0073	0.031	-0.023
LowestDecile	0.13	0.052	0.057	0.0011	0.089	0.070	0.080	0.050	0.080

OLS estimates across countries × weeks during 2019–2020. All regressions include a constant; the 52 week lag of the prayer share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific year trend. The pandemic dummy is interacted with average google searches for prayer in 2019 (col 1), the share of the populations taking moments for prayer, meditation, or contemplation (col 2), ever prayed (col 3), pray weekly (col 4), answered that God is anything but important in their lives (col 5), answered that God is very important in their lives (col 6), ever went to church (col 7), or went to church weekly (col 8), and average earthquake risk (col 9). Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer search shares rose at most levels of religiosity and rose more for more religious countries.

Table A.18
The rise in prayer search shares for different religiosity levels II.

Dep var: Prayer search growth	(1) Moments	(2) Never	(3) Ever	(4) Yearly	(5) Weekly	(6) Daily	(7) Never	(8) Ever	(9) Yearly	(10) Weekly	(11) Daily
Pandemic dummy	-0.16 (0.172)	0.26*** (0.066)	-0.12 (0.123)	-0.14 (0.113)	-0.10 (0.088)	0.0016 (0.075)	0.35*** (0.071)	-0.22 (0.180)	-0.18 (0.128)	0.014 (0.052)	0.11** (0.046)
Pandemic x Pray	0.50** (0.243)	-0.38** (0.171)	0.38** (0.171)	0.45*** (0.159)	0.50*** (0.155)	0.41** (0.159)					
Pandemic x Church							-0.57** (0.239)	0.57** (0.239)	0.59*** (0.200)	0.64*** (0.143)	0.80*** (0.298)
R-squared	0.31	0.36	0.36	0.36	0.37	0.36	0.33	0.33	0.33	0.33	0.33
Observations	3588	2392	2392	2392	2392	2392	4316	4316	4316	4316	4316
Countries	69	46	46	46	46	46	83	83	83	83	83

OLS estimates across countries × weeks during 2019–2020. All regressions include a constant; the 52 week lag of the prayer share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific year trend. The pandemic dummy is interacted with the share of the populations who have taken moments for prayer, meditation, or contemplation (col 1), never prayed (col 2), ever prayed (col 3), pray yearly (col 4), pray weekly (col 5), pray daily (col 6), never went to church (col 7), ever went to church (col 8), go to church yearly (col 9), weekly (col 10), or daily (col 11). Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer search shares rose more for more religious countries, measured by different degrees of prayer and church going.

Table A.19
The rise in prayer search shares for different religiosity levels III.

Dep Var: Prayer search growth	(1) Very:10	(2) 9	(3) 8	(4) 7	(5) 6	(6) 5	(7) 4	(8) 3	(9) 2	(10) Not:1
Pandemic dummy	0.033 (0.066)	0.0044 (0.074)	-0.047 (0.090)	-0.097 (0.106)	-0.15 (0.125)	-0.25 (0.164)	-0.31* (0.189)	-0.41* (0.243)	-0.59* (0.345)	0.30*** (0.052)
Pandemic x Importance of God	0.41*** (0.143)	0.41*** (0.140)	0.44*** (0.148)	0.47*** (0.158)	0.51*** (0.173)	0.58*** (0.206)	0.64*** (0.229)	0.73** (0.280)	0.89** (0.381)	-0.89** (0.381)
R-squared	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Observations	4368	4368	4368	4368	4368	4368	4368	4368	4368	4368
Countries	84	84	84	84	84	84	84	84	84	84
CountryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MeanDepVar	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20

OLS estimates across countries × weeks during 2019–2020. All regressions include a constant; the 52 week lag of the prayer share; country fixed effects; religious holiday dummies equal to one during Ramadan, Easter, Pentecost, and Ash Wednesday and their 52 week lags; and a country-specific year trend. The pandemic dummy is interacted with the share of the populations who ranked the importance of God in their lives as 10 (on a scaled from 1 to 10), meaning very (col 1), 9 (col 2) to 0 (col 10). Robust standard errors, clustered at the country level, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. **Result:** Prayer intensity rose more in countries where larger shares of the population rank God as important.

Table A.20
The rise in prayer search shares across country characteristics.

Dependent variable: Growth in prayer search shares								
Panel A	(1) Security	(2) Public	(3) DemoPres	(4) RuleLaw	(5) InfMort	(6) Fraction	(7) HDI	(8) GDP
Pandemic dummy	0.40*** (0.088)	0.51*** (0.072)	0.027 (0.067)	0.37*** (0.082)	0.14*** (0.041)	0.12* (0.075)	0.76*** (0.131)	0.30*** (0.053)
Pandemic x Variable	-0.028* (0.015)	-0.046*** (0.012)	0.046*** (0.013)	-0.013* (0.007)	0.0071*** (0.002)	0.31** (0.155)	-0.73*** (0.181)	-0.0018 (0.002)
R-squared	0.36	0.37	0.37	0.36	0.37	0.37	0.37	0.36
Observations	5304	5304	5304	5408	5356	5356	5304	5408
Countries	102	102	102	104	103	103	102	104
Panel B								
Pandemic dummy	0.19 (0.153)	0.36** (0.171)	0.020 (0.067)	0.17 (0.128)	0.095* (0.056)	0.081 (0.074)	0.50** (0.225)	0.098 (0.091)
Pandemic x Variable	-0.012 (0.019)	-0.032 (0.020)	0.031* (0.018)	-0.0057 (0.008)	0.0049** (0.002)	0.12 (0.180)	-0.50** (0.250)	0.00029 (0.002)
Pandemic x Prayer 2019	0.0049** (0.002)	0.0029 (0.003)	0.0034 (0.002)	0.0054** (0.002)	0.0033 (0.002)	0.0050** (0.002)	0.0036 (0.002)	0.0060*** (0.002)
R-squared	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Observations	5304	5304	5304	5408	5356	5356	5304	5408
Countries	102	102	102	104	103	103	102	104
Panel C								
Pandemic dummy	0.40*** (0.121)	0.59*** (0.113)	0.020 (0.087)	0.33*** (0.110)	0.090* (0.052)	0.15 (0.099)	0.88*** (0.204)	0.28*** (0.073)
Pandemic x Variable	-0.029 (0.020)	-0.057*** (0.019)	0.051*** (0.019)	-0.010 (0.010)	0.014*** (0.003)	0.26 (0.229)	-0.88*** (0.273)	-0.0013 (0.002)
R-squared	0.33	0.34	0.34	0.33	0.34	0.34	0.34	0.33
Observations	3796	3796	3796	3848	3848	3796	3796	3848
Countries	73	73	73	74	74	73	73	74
Panel D								
Pandemic dummy	-0.26 (0.255)	-0.028 (0.427)	-0.087 (0.109)	-0.20 (0.213)	-0.063 (0.117)	-0.038 (0.110)	0.28 (0.414)	-0.13 (0.150)
Pandemic x Variable	0.022 (0.025)	-0.0058 (0.041)	0.0039 (0.032)	0.0099 (0.011)	0.0090** (0.004)	-0.17 (0.296)	-0.40 (0.410)	0.0014 (0.002)
Pandemic x Prayer 2019	0.020** (0.008)	0.016 (0.011)	0.016* (0.009)	0.019** (0.008)	0.011 (0.008)	0.018** (0.008)	0.013 (0.008)	0.018** (0.007)
R-squared	0.18	0.19	0.19	0.18	0.20	0.18	0.19	0.19
Observations	3796	3796	3796	3848	3848	3796	3796	3848
Countries	73	73	73	74	74	73	73	74
FirstStageF	12.8	9.10	11.0	13.4	14.5	17.4	13.0	16.9

The table replicates Table 6 for alternative country characteristics.

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