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**Research Report**

## Ramadan intensity and subsequent student achievement

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## **ECONtribute** **Policy Brief No. 027**

# **Ramadan intensity and subsequent student achievement**

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January 2022

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## Ramadan intensity and subsequent student achievement<sup>1</sup>

Erik Hornung, Guido Schwerdt, and Maurizio Strazzeri

January 22, 2022

*The observance of Ramadan has been widely associated with detrimental health effects as well as poor economic performance. Less attention has been given to the potential benefits generated by the social aspects associated with this religious practice. This column argues that Muslim students achieve higher scores in educational performance tests following a more intense Ramadan. This effect is explained by the formation of social capital and social identity among students sharing the intensive experience of this religious practice.*

Is the Muslim faith a major impediment for success in secular education? A simple cross-country comparison of educational achievements could lead to such conclusions. Countries with a Muslim-majority population achieved substantially lower test scores in math (439) and science (449) than, for example, Christian-majority countries (495/500) in the 2019 TIMSS (Trends in International Mathematics and Science Study) assessment of 8th graders. Similar educational gaps between Muslims and non-Muslims can be found even when they live in the same country under the same institutional environment. Muslims achieve 4.2 fewer years of schooling than non-Muslims in Germany, 3.2 fewer years in Spain, and 2.9 fewer years in France (Pew Research Center 2016). Whether underlying socio-economic conditions or religion itself explain these gaps is largely an empirical question.

Recent research has made substantial progress for our understanding of the historical origins of religious differences in educational performance. We gained a better understanding of the high human capital investments of Jews and Protestants (see Botticini and Eckstein 2005, 2007 and Becker and Woessmann 2009), and the detrimental effects of Catholicism and Islam on educational outcomes (see Squicciarini 2019, Chaudhary and Rubin 2011). After reviewing this literature, Becker et al. (2020) call for future research into the link between economics and religiosity.

Another literature has pointed out that the Islamic religious practice of Ramadan fasting is physiologically demanding and therefore exerts negative effects on educational performance (see Oosterbeek and van der Klaauw 2013). Ramadan also seems to be detrimental for individual health (see, e.g., Almond 2009; Majid 2015) and reduces aggregate output (Campante and Yanagizawa-Drott 2015). On the other hand, Campante and Yanagizawa-Drott (2015) show that a more intensive Ramadan increases subjective well-being, arguably via increased socialization. This is in line with Clingingsmith, Khwaja, and Kremer (2009) who analyze the religious practice of pilgrimage to Mekka, the Hajj, finding that it fosters tolerance and creates shared identity among participants.

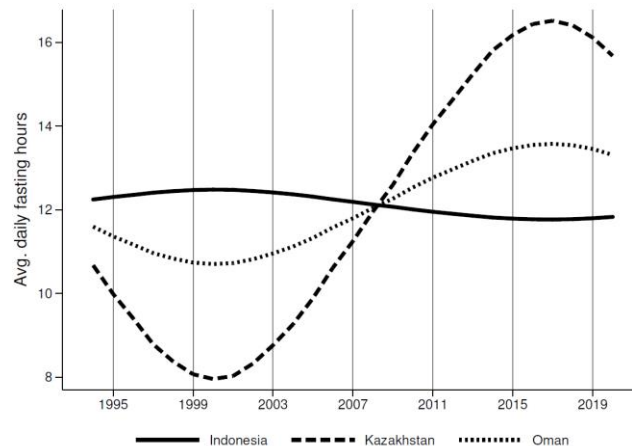
Such positive consequences that materialize beyond the month of Ramadan may be explained by a literature in sociology suggesting that religious participation has, for example, positive effects on educational performance because it increases social capital (Coleman and Hoffer 1987, Muller and Ellison 2001 and Glanville et al. 2008). It has been shown that religious individuals are more likely to

<sup>1</sup> This policy brief appeared as a policy column at [Vox.eu](https://www.vox.eu) on January 22, 2022

participate in religious activities and therefore have a larger number of social ties. Religiously active parents know friends of their children better and religiously active children have access to friends from higher socio-economic backgrounds. Thus, while educational outcomes are lower among Muslims in general, more religious Muslim may achieve better educational outcomes due to their higher social capital.

During the holy month of Ramadan, Muslims are required to fast from sunrise to sunset. Fasting, one of the five pillars of Islam is an obligatory element for more than a billion Muslim believers. During Ramadan, Muslim believers engage in a range of social, moral, and pious activities that have an enormous impact on social life in Muslim societies. The daily fast-breaking meals at sunset have an explicit social character. Festive meals are shared at home with family and friends or with the religious community after the evening prayers at the Mosque.

In a recent paper (Hornung et al. 2021), we analyze the impact of changes in Ramadan intensity on educational performance. In our empirical analysis, we exploit variation in Ramadan fasting hours across countries over time. Because Ramadan is the ninth month of the Islamic lunar calendar, that rotates over the solar calendar, it starts earlier each solar year and rotates over the seasons, resulting in variation of daily Ramadan fasting hours over time and across geographic location. Figure 1 illustrates that the length of fasting hours varies with a country's location relative to the equator and over time, where Ramadan is more intensive when it falls into the summer months in countries further away from the equator.



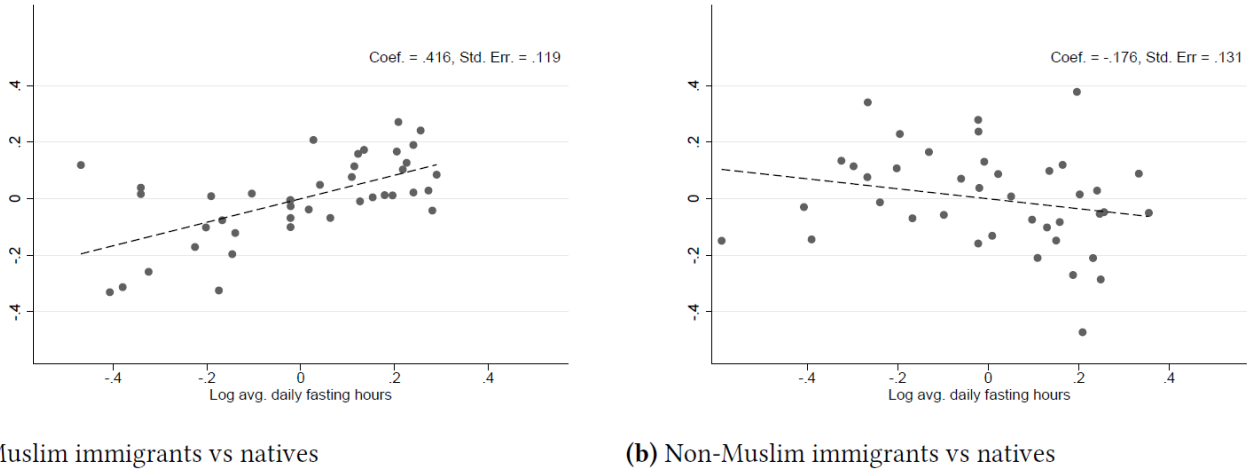
*Figure 1: Average daily fasting hours during Ramadan*

*Note: Average fasting hours during Ramadan of three selected countries. Fasting hours are determined by the time span between sunrise and sunset in each country's capital. Vertical lines illustrate test years of TIMSS.*

We study the effect of Ramadan intensity on educational performance in two ways. First across countries with varying shares of Muslim populations using the TIMSS dataset and secondly within European countries across students with different religious affiliations using the PISA dataset.<sup>2</sup> Both educational performance studies can be combined into pseudo panels reporting the test scores of adolescent students. To abstract from the detrimental short-term consequences of fasting during Ramadan, we focus on tests conducted after Ramadan.

2 TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment) are repeated international student achievement studies directed by the TIMSS & PIRLS International Study Center at Boston College and the OECD, respectively. For more information on TIMSS, see <https://www.iea.nl/studies/iea/timss>. For more information on PISA, see <https://www.oecd.org/PISA>.

Using TIMSS data (1995-2019), we find that an increase of Ramadan intensity by 1.25 hours increases both math and science test scores by around 11 % of a standard deviation. No such effects can be found in non-Muslim countries. Using PISA data (2003-2018) from eight major Western-European countries, we find that an increase of Ramadan fasting hours by 10% significantly reduces the gap in PISA test scores between Muslim and non-Muslim students by 2.5 to 3.0%. For the purpose of this analysis, we exploit within country-wave variation in religious affiliation that we approximate from information about the country of origin of students' parents. No such reduction in performance gaps in response to a more intensive Ramadan can be found between natives and immigrants from non-Muslim countries. These findings are illustrated in Figure 2.



*Figure 2: Performance gaps and Ramadan fasting hours*

*Note: Left (right) binned scatter plot shows country-year performance gaps in science scores between students whose parents are from Muslim countries (non-Muslim countries) and natives and logarithm of average fasting hours during Ramadan before test was taken. Both variables are adjusted by their country means.*

Overall, based on two independent data sets, our estimates reveal a positive reduced-form effect of more intensive Ramadan on subsequent educational performance.

So, what might explain these positive effects? In our paper, we broadly distinguish between mechanisms related to the formation of individual character skills and mechanisms related to the formation of social capital. First, religious activities could influence the individual skill set by affecting non-cognitive abilities or character skills that are associated with student performance (Heckman and Rubinstein 2001). If character skills exert positive externalities on human capital formation, we expect religious activities such as Ramadan fasting to be positively related to educational performance.

Secondly, the link between religious activities and educational performance might work through the formation of social capital and social identity. Coleman and Hoffer (1987) and Coleman (1988) suggest that religious activities promote the formation of social capital, which in turn, fosters the creation of human capital. Similarly, Akerlof and Kranton (2002) highlight the importance of the social environment of students in the context of schooling and predict that the creation of a more unified school community increases the skill formation of students.

To distinguish between these theories, we first establish that longer fasting hours during adolescence indeed increase religious participation, using information from the World Values Surveys.<sup>3</sup> Secondly, using PISA data, we show that longer fasting hours are associated with higher educational performance only for students in schools with a high share of Muslim students, indicating that our mechanism likely works through forming a social identity and through providing students with access to social capital rather than through the formation of individual character skills.

Although we ultimately cannot exclude other channels such as the presence of spillover effects, we tentatively interpret our estimates as evidence that the religious practice impacts educational performance by facilitating the formation of a common identity among students and providing access to social capital—and not by affecting their individual character skills. This finding casts a positive light on the relationship between Muslim religiosity and secular education and implies that it may be worthwhile to promote the social aspects of religiosity further.

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3 For more information on the World Values Surveys, see <https://www.worldvaluessurvey.org/wvs.jsp>.

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