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Religious responses to existential insecurity: Conflict intensity in the region of birth increases praying among refugees

Frank van Tubergen [a,b,*], Yuliya Kosyakova [c,d], Agnieszka Kanas [e]

[a] Department of Sociology, Utrecht University (UU), Utrecht, Netherlands
[b] Netherlands Interdisciplinary Demographic Institute (NIDI), KNAW/University of Groningen, The Hague, Netherlands
[c] Institute for Employment Research (IAB), Department of Migration and International Labour Studies, Nuremberg, Germany
[d] Otto-Friedrich University of Bamberg, Bamberg, Germany
[e] Department of Public Administration and Sociology, Erasmus University Rotterdam, Netherlands

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ABSTRACT

Do violent conflicts increase religiosity? This study draws on evidence from a large-scale survey among refugees from Afghanistan, Iraq, and Syria in Germany linked with data on time-varying conflict intensity in refugees' birth regions before the survey interview. The results show that the greater the number of conflict-induced fatalities in the period before the interview, the more often refugees pray. The relationship between conflict and praying holds equally across demographic subgroups. Evidence suggests that both short- and long-term cumulative fatalities in refugees' birth regions affect how often they pray. Additionally, the link between conflict and praying is stronger for refugees with family and relatives still living in their country of origin. Finally, we show that the conflicts that matter are those occurring within the refugees' specific region of birth rather than in other regions in the country. Implications for existential insecurity theory and cultural evolutionary theory are discussed.

1. Introduction

Do violent conflicts increase people's religiosity, and if so, why? Several studies found that individuals more exposed to violent conflicts where they live are more religious, even years after the conflict ended (Du and Chi, 2016; Henrich et al., 2019; Immerzeel and Van Tubergen, 2011; Keinan, 1994; Ruiter and Van Tubergen, 2009; Schuster et al., 2001). Existential insecurity theory (Malinowski, 1948; Norris and Inglehart, 2004) argues that religious beliefs and practices may provide a psychological mechanism for people to cope with existential insecurities caused by violent conflicts (Malinowski, 1948; Norris and Inglehart, 2004). Yet, compelling evidence for the *conflict-religiosity* hypothesis is limited due to the possibility of endogenous selection, i.e., unobserved characteristics associated with people's religiosity and exposure to violent conflicts (Cesur et al., 2020; Henrich et al., 2019; Shai, 2022; Zussman, 2014).

In addition, earlier work has paid little attention to conditions under which violent conflicts lead to increased adherence to religious norms and religious coping. In, what we propose to call a "weaker" version of existential insecurity theory, people turn to religion when they personally experience existential risks. According to this argument, so-called *egotropic threats* (Norris and Inglehart, 2004), such as the fear that one may soon die on the battlefield, explain the conflict-religiosity link. By contrast, a "stronger" version of insecurity theory argues that the experience of violent conflicts can increase people's religiosity, even when people personally face no

* Corresponding author. Department of Sociology, Utrecht University, Padualaan 14, 3584 CH, Utrecht, Netherlands.
E-mail address: f.vantubergen@uu.nl (F. van Tubergen).

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risk. This can happen when conflicts induce *sociotropic threats* (Norris and Inglehart, 2004) and people believe that their in-group members (i.e., family, friends, acquaintances, and other people within their community) are confronted with life-threatening risks.

In this study, we provide rigorous evidence for the conflict-religiosity hypothesis and the strong version of existential insecurity theory. We test the sociotropic threat mechanism and find that violent conflicts increase religiosity, even when people themselves are not in danger. We use an identification strategy that relies on a natural experiment (Gangl, 2010), allowing us to perform a strict test of the impact of sociotropic threat on religiosity. We rely on survey data among refugees from Afghanistan, Iraq, and Syria who arrived in Germany between 2013 and 2016. We study their frequency of praying as a measure of religiosity and link these individual-level data on praying to time-varying contextual sources of conflict intensity in the refugees' home countries. We thereby take advantage of the exogenous variation in conflict intensity in the period preceding the interview of refugees who originate from different countries and regions and the random assignment of the period and day of the interview.

2. Background, theory, and hypotheses

2.1. Empirical findings on the link between violent conflicts and religiosity

An early investigation on the deadly conflict-religiosity hypothesis was Keinan (1994). In this seminal work, data collected during the 1991 Gulf War were used to compare Israeli citizens who resided in areas that were either exposed (Tel Aviv and Ramat Gan) or not exposed (Jerusalem and Tiberias) to missile attacks. Results of the analyses showed that religiosity -indicated by magical thinking – was more prevalent among citizens who resided in the conflict areas. Several follow-up studies in Israel appeared to study the link between geographical variation in conflict intensity and religious behavior. Sosis and Handwerker (2011) compared Israeli women who, during the 2006 Lebanon War, remained in Tzfat (located in northern Israel and regularly attacked in the war) with Israeli women from the same place who resettled in safer areas. They found that the probability of reciting psalms did not differ between the two groups, and that reciting psalms reduced anxiety only among the women who remained in Tzfat.

Similar conclusions were drawn by Shai (2022), who relied on both cross-sectional and longitudinal data, and found that individuals who were (more) exposed to the 2006 Lebanon war prayed more often. A different design was used by Zussman (2014), who linked data from the Social Survey in Israel to fatalities from politically motivated violence associated with the Israeli-Palestinian and Arab-Israeli conflicts in the period 2002–2010. Results showed that higher intensity of violence in the vicinity of the survey participant's locality in the 30 days preceding the interview data lowered the likelihood to self-identify as secular.

Other studies have used cross-national data to test the conflict-religiosity hypothesis. Ruiter and Van Tubergen (2009), using World Values Survey data from 60 countries, observed that the intensity of war in their country when people were between 5 and 18 years old was positively associated with religiosity later in life. Likewise, Immerzeel and Van Tubergen (2011), drawing on data from the European Social Survey, found that respondents who have ever experienced war in their life were more religious. Du and Chi (2016), using World Value Survey data from 57 countries, found that country-level measures of existing wars/conflicts positively correlate with individual-level religiosity. Henrich et al. (2019), relying on survey data from individuals in three post-conflict societies-Uganda, Sierra Leone, and Tajikistan-reported that individuals with greater exposure to these wars were more likely to participate in religious groups, even years after the conflict. Country-level time series analyses of Echeverria Vicente et al. (2022) suggest that accumulated measures of armed conflict are associated with higher proportions of religious adherence.

2.2. Theoretical mechanisms

The existential insecurity theory (Malinowski, 1948; Norris and Inglehart, 2004) is a general framework for understanding religiosity. Its micro-level foundation states that people turn to religion to cope with existentially threatening events and conditions. Two key mechanisms are advanced, which can account for the positive effect of violent conflict on religiosity.

First, religions can provide support as a group, which is particularly important when people face life-threatening situations like war. Participation in group behavior and religious rituals can alleviate anxiety and stress (Ano and Vasconcelles, 2005; Berkessel et al., 2021; Harrison et al., 2001; Pargament, 2001; Schnabel and Schieman, 2022). When belonging to a religious group, people can count on help and protection from co-religionists (Durkheim, 1912; Immerzeel and Van Tubergen, 2011). This argument is also advanced by cultural evolutionary theory (Henrich et al., 2019), which posits that wars and other external threats cause people to adhere more tightly to religious beliefs and practices, and to social norms more generally, because norms foster ingroup cooperation and group survival (Boyd and Richerson, 2005; Henrich and Boyd, 2001; Norenzayan et al., 2016; Purzycki et al., 2016; Roos et al., 2015).

Second, religions also offer supernatural support, which people may need when they are faced with deadly conflicts. People may believe that they can negotiate actively with supernatural beings and turn to them for a favor, for example by praying to them (Stark and Finke, 2000). The belief in supernatural powers that control the world and the afterworld can provide reassurance that things will work out well in the end (Jonas and Fischer, 2006; Norenzayan and Hansen, 2006). People who are exposed to violent conflicts have greater existential worries and death anxiety. Existential insecurity theory, as well as terror management theory, argue that under these conditions, people turn to religion because religious beliefs of immortality (e.g., heaven, reincarnation) mitigate the fear of death (Du and Chi, 2016).

Faced with life-threatening situations, such as wars and other deadly conflicts, people may therefore turn to religion to seek group- and supernatural support. Importantly, however, the theory furthermore posits that conditions of existential insecurity operate at the personal level ('egotropic threats'), when people personally experience security threats, and at the societal level ('sociotropic threats'), when people believe that their social connections (i.e., family, friends, acquaintances, in-group members) are confronted with life-

threatening risks (Norris and Inglehart, 2004). Hence, the existential insecurity theory hypothesizes that both egotropic and sociotropic threats are drivers of religiosity. When people are confronted with a war in their country or exposed to high conflict intensity in their area of living, both personal and group-level threats arise, and people turn to religion for support.

2.3. Hypotheses

A limitation of existing empirical work is that the observed effects of violent conflicts on religiosity can be caused by both types of threat. Thus, when people are confronted with a war in their own country, not only their friends, family, and group members are personally at risk - so are people themselves. It, therefore, remains unclear which conditions give rise to the conflict-religiosity link. In what we propose to call the *weak version* of the existential security theory, the effect of deadly conflicts on religiosity only holds when people are personally at risk. In the *strong version* of this theory, a link between conflicts and religiosity is even found when people are not personally threatened – but their social connections are. In this study, we advance existential insecurity theory and study whether sociotropic threats are a sufficient cause to trigger increased religiosity under conditions of deadly conflicts.

To test the strong version of existential insecurity theory, we examine the religiosity of refugees from Afghanistan, Iraq, and Syria living in Germany. Because refugees who have just arrived have strong connections to friends and family who are still living in their country of origin (Löbel, 2020; Löbel and Jacobsen, 2021), the intensity of conflicts taking place over there influence their feelings of anxiety and stress about their social connections (Jaschke and Kosyakova, 2021). Importantly, conflict intensity varies over time, and refugees are therefore subject to time-varying changes in sociotropic threat. Previous research indicates that periods of more intense conflicts in refugees' countries of origin are negatively related to refugees' mental health and well-being and increase their feelings of helplessness and depression (Keita and Schewe, 2021; Sønderskov et al., 2021). Because existential threats in their country of origin do not personally threaten refugees living in Germany (i.e., these conflicts do not constitute egotropic threats), our research design allows us to assess the impact of sociotropic threats on religiosity and thereby provides a rigorous test of the strong version of existential insecurity theory.

To test this, we consider the cumulative conflict-induced fatalities in respondents' regions of birth shortly before the interview. We focus on refugees' region of birth because people are likely to have more family members, friends, and other social connections living in their region of origin than elsewhere. Hence, we hypothesize the following:

H. The higher the conflict intensity in refugees' region of birth in the period shortly preceding the survey interview, the higher their religiosity.

3. Materials and methods

3.1. Data

This study was approved by the Ethics Committee of the Faculty of Social and Behavioural Sciences of Utrecht University [22-0434]. We used longitudinal data from the IAB-BAMF-SOEP Survey of Refugees in Germany (version 1619 v1) (Bruecker et al., 2017; Liebig et al., 2021). The first wave of the survey took place in 2016, in the aftermath of the surge in the number of refugees coming into Europe in 2015. The anchorpersons in the survey were drawn from the Central Register of Foreigners, the national registry for all foreign citizens in Germany. The survey was based on the concept of household, and every adult in the targeted households was interviewed. The data collection was based on computer-assisted personal interviews (CAPIs), and questionnaires were administered in seven languages (i.e., Arabic, English, Farsi/Dari, German, Kurmanji, Pashto, and Urdu).

The data are representative of asylum-seekers and refugees arriving in Germany between 2013 and 2016 (Kühne et al., 2019) and include 8321 individuals who were surveyed at least once. However, for our analyses, we selected refugees from Afghanistan, Iraq, and Syria, as only for these origin countries were there enough respondents per birth region. Hence, the findings of the analyses presented here indicate the effect of conflict intensity among these three groups in our sample. We pooled four waves of refugees for the survey: wave 1 (fieldwork period June–December 2016), 2 (fieldwork period June 2017–March 2018), 3 (fieldwork period September 2018–February 2018), and 4 (fieldwork period August 2019–January 2020). Our analytical sample consisted of 4897 respondents and 7193 person-year observations (see Supplementary Appendix Table S1 for excluded cases).

3.2. Dependent variable

To capture religiosity, various measures have been used in previous works, most often (a) religious service attendance, (b) self-assessed religiosity, and (c) and praying (Bentzen, 2021; Molteni et al., 2021; Storm, 2017). We do not analyze religious service attendance because for immigrants, including refugees, finding a place of worship can be difficult since they have recently arrived in the host country. Indeed, their level of religious attendance is affected by their opportunity to live near a church or mosque (Van Tubergen, 2013). Respondents were also asked to self-assess their religiosity through the question "How religious are you?". However, this question was administered only in one specific wave (wave 2). Hence, the variation in our key dependent variable and sample size could be significantly reduced, creating problems of statistical power for our analyses.

To measure religiosity, we examine refugees' self-assessed frequency of praying, which strongly correlates with other measures of religiosity. In Supplementary Table S2, we present data on the relationship between the proportion of refugees who pray every day and three other measures of religiosity, namely: (1) "How religious are you?" and (2) "How important is religion for your well-being?", and

(3) "How often do you go to church, attend religious events?." In 2017 and 2019, the IAB-BAMF-SOEP Survey of Refugees asked all respondents about their praying habits, and in 2018 the survey asked first-time respondents. Respondents were asked the question: "Approximately how often do you pray?". Following earlier studies in this field (Hout and Greeley, 1998; Molteni, 2020; Molteni and Van Tubergen, 2022), we recoded the original scale into the *probability of daily praying* ("Never" = 0, "Less often" = 5/365, "Monthly" = 12/365, "Weekly" = 52/365, and "Daily" = 1; See Supplementary Table S3). It should be emphasized that this variable does not capture the full range of daily praying in detail. Supplementary Appendix Fig. S1 depicts the variation in the probability of daily praying during the observation period in the analytical sample.

3.3. Independent variable

To measure cumulative fatalities, we matched the IAB-BAMF-SOEP Survey of Refugees with contextual time-varying data on the intensity of conflicts in the region of birth (see Supplementary Table S4 for the 10 most common regions per country of origin). To measure the intensity of conflicts in the birth region, we used data from the Armed Conflict Location and Event Data Project (ACLED) (Raleigh et al., 2010). The ACLED database contains information on the exact dates, locations, and a number of fatalities for various types of political violence and conflicts (battles, explosions, remote violence, riots, and violence against civilians). For each birth-regions-date observation, we calculated the number of people who were killed as a result of these conflicts.

Theoretically, one could expect that events that occurred very recently are more impactful and stressful than events that happened long ago. However, considering a short time span (e.g., with a one-day or two-day lag) would lead to many responses indicating zero fatalities. Therefore, our main analyses are based on the cumulative fatalities in the birth region one week before the interview (*t-1w*). In addition, we present the results across different temporal frames, namely, two days (*t-2d*), two weeks (*t-2w*), three weeks (*t-3w*), four weeks (*t-4w*), and eight weeks (*t-8w*) before the interview. We standardized these measures to have a mean of zero and a standard deviation of one.

3.4. Empirical strategy

To study how the intensity of conflict in the region of birth influences how often refugees pray, we estimated the following model:

$$Y_{irst} = \alpha_0 + \alpha_1 std(Cum.Fatalities_{ir(s\ \ 1w)}) + \alpha_2 X_i + \alpha_3 X_{it} + \lambda_t + \lambda_f + \lambda_c + \varepsilon_{irst}, \quad (1)$$

where Y_{irst} denotes the praying variable of respondent i from the region of birth r on the date of the interview s in survey year t. $Cum.Fatalities_{r(s\ \ 1w)}$ denotes the standardized cumulative fatalities in the birth region one week (w) before the interview date. Moreover, the vector X_i denotes time-invariant individual-level characteristics, and the vector X_{it} denotes time-variant individual-level characteristics in year t. λ_t are fixed effects for the year of the interview t. λ_f are fixed effects for the initial federal state f. λ_c are fixed effects for the country of birth c. ε_{irst} is the error term.

We applied cluster correction at the person level (Abadie et al., 2017), as standard errors are clustered within individuals (i.e., some refugees were surveyed two or three times). Note that the inspection of findings reveals that clustering at the household level does not change the results, and therefore we keep the models simple and only cluster at the person level. The analyses do not adjust for sample weights, because the aim is to estimate the average 'treatment' effect in our sample (the three refugee groups) instead of the average treatment effect for the entire population of refugees in Germany. In addition, and following the guidelines taken from Bollen et al. (2016) and Solon et al. (2015), additional checks reveal that the weighted regression results in imprecise estimates and that unweighted regression is preferred (See Supplementary Appendix Section 2 for more information).

3.5. Descriptive statistics

Table 1 presents information about the refugee groups in the sample. Our data span 4897 refugees from Afghanistan, Iraq, and Syria. At the time of the interview, these refugees had stayed slightly less than three years, on average, in Germany. Among refugees

Table 1
Descriptive information on refugee groups in the sample.

Country of origin	Afghanistan	Iraq	Syria
Period of data collection	2017(6)- 2020 (1)	2017(6)- 2020 (1)	2017(6)- 2020 (1)
Sample size	730	830	3337
Number of birth regions	32	18	14
Cumulative fatalities in birth region 1 week before the interview (mean and SD)	8.75 (16.94)	8.53 (21.28)	14.34 (25.88)
Female participants	37%	42%	41%
Age (mean and range)	34 (18–78)	35 (17–92)	36 (17–97)
Years of stay in Germany (mean and range)	2.9 (0–6)	2.7 (0–6)	2.9 (0–6)
Religion	Muslim 86% Christian 4%	Muslim 88% Christian 8%	Muslim 90% Christian 5%
Praying daily (mean)	0.65	0.42	0.54

Note: unweighted data. *Data source*: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

from each of the three origin countries, the majority of the respondents are Muslim (86–90%) and men (58–63%). On average, 42% of the Iraqi refugees in our sample pray every day, whereas this is 54% among Syrian refugees and 65% among Afghan refugees. See the Supplementary Appendix for further details about the data and measures (Fig. S1, Tables S1–S6).

4. Results

4.1. Main effect of fatalities in the region of birth

Table 2 presents the results of linear regression models, which estimate the effect of conflict-induced fatalities in refugees' region of birth on their frequency of praying in percentage points, i.e., coefficients are multiplied by 100 (See Supplementary Table S7 for full models). The findings show that higher levels of cumulative fatalities in the region of birth in the week prior to the interview result in a higher probability of daily praying among refugees in Germany (Model 1). The estimates are statistically significant ($p < 0.01$, two-sided test). This effect remains after we added fixed effects for the survey year, the German federal state where the refugee resided at the time of the survey, and the refugees' country of birth (Model 2).

In Model 3, we added individual-level controls: length of stay in Germany, gender, having a partner, having children below the age of 16 in the household, age, religious affiliation (differentiating between "Christian," "Muslim-Shiite," "Muslim-Sunni," "Muslim-other," "Yezidi," and "other") and education. Even after we include these controls at the individual level, the effect of cumulative fatalities on praying frequency remains (Model 3). In terms of the size of the effect, Model 3 reveals that with an increase of one standard deviation in cumulative fatalities one week before the interview in the region of birth (~50 fatalities, see Supplementary Table S5), the probability of daily praying increases by 1.5 percentage points.

Does the effect of violent conflicts in refugees' birth region depend on the time lag? Table 3 shows the results of models that use different time lags for cumulative fatalities in the region of birth, reaching up to eight weeks before the interview (See Supplementary Table S8 for full models). All models report a statistically significant effect ($p < 0.01$, two-sided test). When combined with the results of Table 2, the evidence suggests that both short- and long-term cumulative fatalities in refugees' region of birth affect how often refugees pray. Although the results in Table 3 suggest that the effect of cumulative fatalities in refugees' region of birth intensifies over time, formal statistical tests show that the differences in the effects across models are not statistically different from zero (Model 4.1 versus Model 3: $\mathbf{X}^2 = 0.04$; $p = 0.834$; Model 4.2 versus Model 3: $\mathbf{X}^2 = 0.12$; $p = 0.728$; Model 4.3 versus Model 3: $\mathbf{X}^2 = 0.00$; $p = 0.990$; Model 4.4 versus Model 3: $\mathbf{X}^2 = 0.03$; $p = 0.863$; Model 4.5 versus Model 3: $\mathbf{X}^2 = 0.54$; $p = 0.461$).

4.2. Analyses per demographic subgroup

It is possible that the effect of fatalities in the birth region on praying intensity varies across demographic subpopulations. To examine effect heterogeneity, we explored whether the influence of fatalities in the region of birth depends on key demographic characteristics, namely, gender, age, education level, and length of stay in Germany. For these purposes, we used the benchmark model (Model 3 in Table 2) and included interaction effects between cumulative fatalities one week before the interview in the refugees' respective regions of birth and these demographic variables. Full models are reported in Supplementary Table S9 for gender (Model 5.1), age (Model 5.2), educational attainment (Model 5.3), and years since arrival (Model 5.4). For each interaction effect, we calculated average marginal effects of fatalities at different levels of demographic variables. These results are visualized in Fig. 1. Presented are average marginal effects of fatalities in the birth region on praying for men and women, refugees aged between 17 and 25, 26–35, 36–45, 46–55, and above 55 years, refugees with primary, low secondary, upper secondary, and tertiary education, and refugees residing in Germany less than two years, 2–3 years, and three years and more.

It appears that the effect of cumulative fatalities in the region of birth (1-week lag) does not statistically significantly (i.e., $p < 0.05$) vary by gender, age, education level, or duration of stay. Even when using linear specifications of education (i.e., years of schooling -results not shown here), the interaction with education appears not significant at conventional levels. Thus, in Germany, fatalities in the regions in which refugees were born have the same impact on how often they pray whether they are women or men, whether they are young or old, whether they received primary, secondary, or tertiary education, and whether they have been in Germany less than 2

Table 2
Linear regression of the probability of daily praying among refugees, in percentage points.

	Model 1	Model 2	Model 3
	Coef. (SE)	Coef. (SE)	Coef. (SE)
Standardized cumulative fatalities in birth region (t-1w)	1.86***	1.40*	1.51**
	(0.55)	(0.57)	(0.54)
Survey year FE	NO	YES	YES
Federal state FE	NO	YES	YES
Country of birth FE	NO	YES	YES
Individual-level controls	NO	NO	YES
Observations	7193	7193	7193
Degrees of freedom	1	20	37

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-sided tests). FE = Fixed effects. Full models are presented in Supplementary Table S7.
Data source: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

Table 3
Linear regression of the probability of daily praying, in percentage points: different time lags for cumulative fatalities in the region of birth.

	Standardized cumulative fatalities in the region of birth: Time lag before the interview	Coef. (SE)
Model 4.1	Two days lag (t-2d)	1.40**
		(0.50)
Model 4.2	Two weeks lag (t-2w)	1.40*
		(0.57)
Model 4.3	Three weeks lag (t-3w)	1.51**
		(0.58)
Model 4.4	Four weeks lag (t-4w)	1.58**
		(0.59)
Model 4.5	Eight weeks lag (t-8w)	1.88**
		(0.59)

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-sided tests). All models control for the same variables as in Model 3 in Table 2. Full models are presented in Supplementary Table S7.
Data source: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

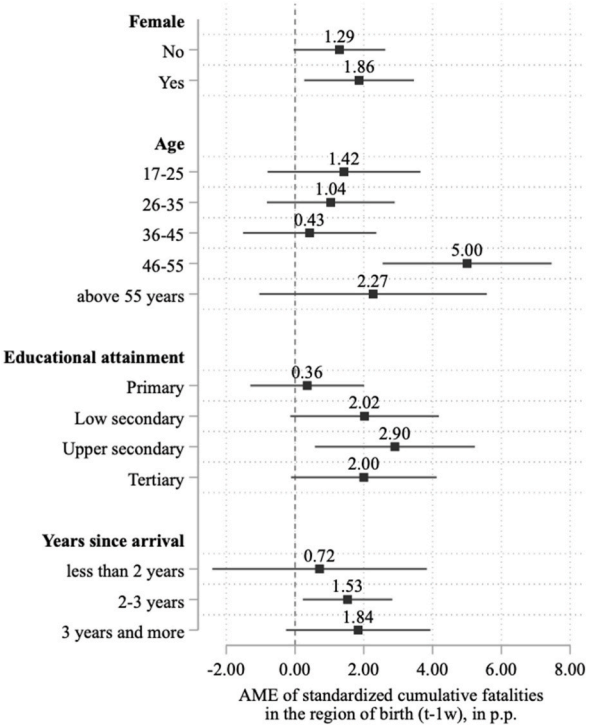

Fig. 1. Average marginal effects of cumulative fatalities in the region of birth one week before the interview on the probability of daily praying among refugees, in percentage points and by sociodemographic characteristics (with 95% CIs).
Notes: Results from linear regressions, Models 5.1–5.4, in Table S9. For each interaction effect, we calculated average marginal effects of fatalities at different levels of demographic variables. All models control for the same variables as Model 3 in Table 2.
Data source: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

years or more than 3 years. Hence, the results of the main models are not driven by a subset of refugees but pertain to different demographic groups.

4.3. Robustness checks

We performed several robustness checks. First, we examined whether conclusions change when using different specifications of praying. We replicated our main models (Table 2), but instead of estimating linear regression models of the probability of daily praying, we estimated (1) a binary logit model of 0/1 daily prayer, (2) a linear probability model of 0/1 daily prayer, (3) an OLS model

of the original measure of praying ("Never" = 1, "Less often" = 2 "Monthly" = 3, "Weekly" = 4 and "Daily" = 5), and (4) an ordered logit model of the original measure of praying. The results of these additional analyses are in line with our main conclusions. Specifically, all models find a statistically significant effect ($p < 0.05$, one-sided). We reported the details of the full models in Supplementary Table S10.

Second, we considered alternative measures of religiosity. Earlier studies have shown strong correlations between frequency of praying and other measures of religiosity (Berkessel et al., 2021; Voas and Crockett, 2005). Nevertheless, it could be argued that praying is a religious practice that is more often used as a coping mechanism. We therefore replicated our main models (Table 2) for other measures of religiosity: (1) self-assessed religiosity ("Not at all" = 1 to "Very much" = 4), (2) self-assessed importance of religion for own well-being ("Not at all" = 1 to "Very much" = 4), and (3) daily attendance of church or religious events ("Never" = 0, "seldom" = 5/365, "at least monthly" = 12/365, "at least weekly" = 52/365 and "Daily" = 1). In line with our earlier conclusions, results show a statistically significant positive effect of cumulative fatalities in the region of birth on both the importance of religion for own well-being ($p < 0.01$, two-sided test), and daily church attendance ($p < 0.01$, two-sided test). The effect of conflict intensity on self-assessed religiosity does not reach conventional levels of statistical significance ($p = 0.07$, one-sided test). This could be a result of the drastically reduced sample size as this question – unlike the other questions on religiosity – was only surveyed in a single wave. In addition, attitudinal measures of religiosity might be less subject to change (especially on a four-point scale). We reported the results from these additional analyses in Supplementary Table S11.

Third, we estimated models in which we included additional characteristics for origin countries and birth regions. Since birth regions vary in population size, the absolute measure of cumulative fatalities may be subject to different "salience" in smaller and larger populations. Therefore, we controlled for population size in refugees' birth regions based on national counts. We used data from the 2011 census in Afghanistan and Syria and the 2009 census in Iraq (Brinkhoff, 2022). In addition, we considered the religiosity of the populations in the birth regions to capture possible selectivity related to the birth region and praying frequency. Specifically, we relied on individual-level data from the 2008–2016 Gallup World Polls, an annual representative survey covering over 120 countries (Gallup, 2022). Gallup World Polls asked respondents the following question: "Is religion an important part of your daily life?" To construct macro-level measures of religiosity for each birth region, we took the weighted mean of individuals who responded that religion was an important part of their daily life (averaged across survey years 2008–2016) and aggregated it across regions of birth for Afghanistan, Iraq, and Syria. Results show that neither population size nor average religiosity in refugees' region of birth is related to the frequency of prayer among refugees in Germany. The results for cumulative fatalities in the birth region remain the same as in our main models. We report the findings from these robustness analyses in Supplementary Table S12.

Fourth, instead of applying cluster correction at the person level (to correct for repeated observations among some respondents), we estimated individual-level random and fixed-effects panel regression models (See Supplementary Table S13). The individual-level random effects model utilizes both *between- and within-person* variation, whereas the individual-level fixed-effect model relies only on *within-person* variation. Hence, in the fixed-effects specification, all time-constant individual differences are dropped from the equation, and any bias associated with time-constant individual differences is taken into account. The findings from both the individual-level random and fixed effects models confirm the conclusions of the main models. The Durbin-Wu-Hausmann test, which detects endogenous regressors in a regression model, reveals that the fixed effects specification is not superior to the random effects specification ($\mathbf{X}^2 = 27.38$; $p = 0.443$). This suggests that the independent variables in our regression models are exogenous to our outcome variable.

Together, these additional analyses are in line with the conflict-religiosity hypothesis and sociotropic threat mechanism and suggest that conflict intensity in the birth region influences praying frequency.

4.4. Additional tests of the sociotropic threat mechanism

We tested the sociotropic threat mechanism in two additional ways. First, if the mechanism linking conflict intensity to religiosity is real, then we expect that the effect of conflict on the frequency of praying should be particularly pronounced for refugees who maintain more social connections with their country of origin. Studies have shown that some refugees are tightly connected to their origin country, whereas others are not (Löbel, 2020; Löbel and Jacobsen, 2021).

We, therefore, considered the number of close connections refugees have with those living in their country of origin. We constructed a measure of close connections at the time of the survey based on refugees' reported information about the presence of their (1) partner, (2) children (up to eight), (3) father, (4) mother, (5) siblings, and (6) other "close relatives" in their country of origin. We took the sum of the presence of these six types of close ties. The survey, however, does not contain information about the presence of friends or acquaintances in the countries of origin. Additionally, it should be emphasized that this measure is based on countries of origin rather than regions. However, we assumed that many of the refugees' close ties live in their region of birth.

Using the benchmark model (Model 3 in Table 2), we included interaction effects between cumulative fatalities one week before the interview in the refugees' respective regions of birth and the measure of their close connections with their country of origin. Full models are reported in Supplementary Table S14. The analyses show that there is a statistically significant interaction effect ($p < 0.05$, two-sided test), i.e., the greater the number of family members or relatives remaining in the country of origin is, the stronger the effect of conflict intensity in the region of birth on the probability of daily praying (Supplementary Table S14, Model 10.2). Upon closer inspection, it appears that what matters is whether refugees have any family or relatives at all in their country of origin, since the number of connections has no effect (Supplementary Table S14, Model 10.4). These results are illustrated in Fig. 2, expressed as average marginal effects of fatalities at different levels of social connections in refugees' country of origin.

We also tested the sociotropic threat hypothesis by comparing the intensity of conflicts in refugees' region of birth with the

intensity of conflicts occurring in other regions within their country of origin. We assumed that conflicts in refugees' region of origin, where they presumably have more social connections, have a greater effect than conflicts occurring elsewhere in their country of origin. Therefore, it was expected that fatalities in the region of birth are more strongly related to praying than fatalities occurring in the rest of the country.

To test this conjecture, we used our benchmark model (Model 3 in Table 2) and included an additional variable capturing cumulative fatalities one week before the interview in *other regions* in the origin country. Table 4 presents the results (See Supplementary Table S15 for full models). In line with our expectation, the effect of cumulative fatalities in refugees' regions of birth on praying probability is still statistically significant ($p < 0.01$, two-sided test). In contrast, conflict intensity elsewhere in the refugees' origin country has no effect. Subsequently, we estimated models with different time lags and again found that conflict intensity in refugees' regions of birth increases the probability of daily praying, whereas we did not find such an effect for conflict intensity in other regions.

5. Discussion

In conclusion, our study among recent refugees from Afghanistan, Iraq and Syria who live in Germany suggests that time-varying changes in the intensity of conflicts in their region of birth are positively related to their religiosity. Specifically, the higher the number of cumulative conflict-induced fatalities in the period before the refugees were interviewed, the more often these refugees indicated that they prayed. Evidence suggests that both short- and long-term cumulative fatalities in the refugees' regions of origin affect how often they pray. The relationship between conflict and praying frequency holds equally across demographic subgroups, as we do not find significant differences by gender, age, length of stay, and education level.

What are the broader implications of this study? First, our findings directly speak to research on the hypothesized link between exposure to war-related conflicts and religiosity (Cesur et al., 2020; Du and Chi, 2016; Henrich et al., 2019; Immerzeel and Van Tubergen, 2011; Keinan, 1994; Ruiter and Van Tubergen, 2009; Schuster et al., 2001; Shai, 2022; Sosis and Handwerker, 2011; Zussman, 2014). Although earlier work provided empirical support for the conflict-religiosity hypothesis, concerns about bias from selection and omitted variables remained. Our data, which come from a natural experiment (Gangl, 2010), provided a rigorous test of this hypothesis by taking advantage of the random assignment of the date at which refugees were interviewed, and the exogenous time-varying variation in conflict intensity in refugees' birth region. Furthermore, we found that the results are robust to different measures of religiosity, model specifications, and when applying individual-level fixed-effects models, which compare the relationship between conflict intensity and praying *within* persons.

Second, we provide evidence to suggest that the conflict-religiosity relationship can hold, even when people personally face no danger. Violent conflicts can increase people's religiosity when such conflicts induce sociotropic threats, i.e., when people believe their family, friends, acquaintances, or other in-group members are exposed to existential risks. We were able to provide a strong test of the impact of sociotropic threats, as refugees were not personally threatened at the time of the interviews. In line with this sociotropic

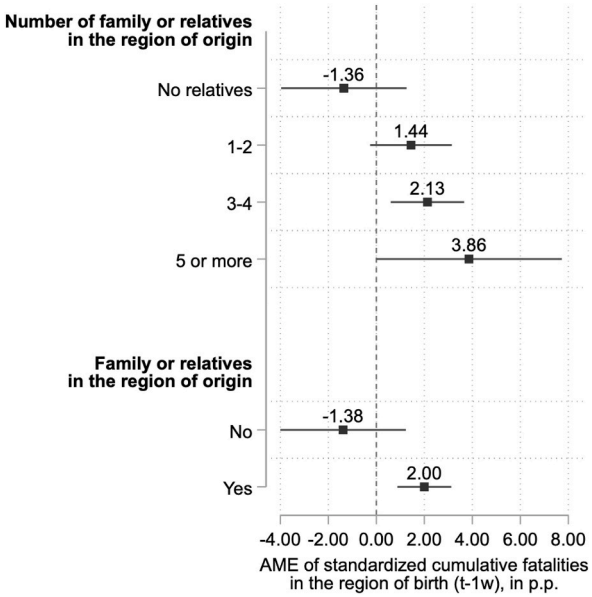

Fig. 2. Average marginal effects of cumulative fatalities in the region of birth one week before the interview on the probability of refugees' daily prayer, in percentage points, by the number of families and relatives living in the origin country

Notes: Results from linear regression, Models 10.2 and 10.4, in Table S14. For each interaction effect, we calculated average marginal effects of fatalities at different levels of refugees' close connections with their country of origin. All models control for the same variables as Model 3 in Table 2.

Data source: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

Table 4
Linear regression of the probability of daily praying, in percentage points: different time lags and regions of cumulative fatalities.

	Standardized cumulative fatalities: Region and time lag before the interview	Coef. (SE)
Model 11.1	Region of birth, one week lag (t-1w)	1.49**
		(0.54)
	Other regions, one week lag (t-1w)	0.76
		(0.60)
Model 11.2	Region of birth, two days lag (t-2d)	1.40**
		(0.50)
	Other regions, two days lag (t-2d)	0.05
		(0.57)
Model 11.3	Region of birth, two weeks lag (t-2w)	1.34*
		(0.57)
	Other regions, two weeks lag (t-2w)	1.70**
		(0.61)
Model 11.4	Region of birth, three weeks lag (t-3w)	1.42*
		(0.58)
	Other regions, three weeks lag (t-3w)	2.18***
		(0.62)
Model 11.5	Region of birth, four weeks lag (t-4w)	1.48*
		(0.59)
	Other regions, four weeks lag (t-4w)	1.77**
		(0.62)
Model 11.6	Region of birth, eight weeks lag (t-8w)	1.81**
		(0.60)
	Other regions, eight weeks lag (t-8w)	0.90
		(0.63)

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-sided tests). All models control for the same variables as Model 3 in Table 2. Full models are presented in Supplementary Table S15.
Data source: IAB-BAMF-SOEP Survey of Refugees, https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019, linked to the data from the ACLED.

threat mechanism, we find that the link between conflict and praying is particularly strong for refugees who maintain personal connections with their origin country and are, therefore, more affected by the conflict there. Additionally, our results exhibit that conflict intensity that occurs within refugees' regions of birth increases praying frequency rather than conflicts occurring in other regions within the birth country. Presumably, most of the refugees' personal connections still live in their birth region, which makes events unfolding there more stressful for them.

These findings have important implications for existential insecurity theory (Malinowski, 1948; Norris and Inglehart, 2004) and related mechanisms advanced by cultural evolutionary theory (Boyd and Richerson, 2005; Henrich and Boyd, 2001; Norenzayan et al., 2016; Purzycki et al., 2016; Roos et al., 2015) and terror management theory (Jonas and Fischer, 2006). Studies in this field have examined how country- and regional-level contexts that are related to existential threats can be drivers of people's religiosity, such as exposure to poverty and insecure economic conditions (Ager and Ciccone, 2017; Barber, 2011; Chen, 2010; Herzer and Strulik, 2017; Höllinger and Muckenhuber, 2019; Immerzeel and Van Tubergen, 2011; Molteni, 2020; Norris and Inglehart, 2004; Ruiter and Van Tubergen, 2009; Solt et al., 2011; Storm, 2017; Van Ingen and Moor, 2015), earthquakes (Belloc et al., 2016; Bentzen, 2019; Sibley and Bulbulia, 2012), and pandemics (Bentzen, 2021; Molteni et al., 2021).

A limitation of earlier work is that observed patterns can be caused by both sociotropic and egotropic threats. Country- and regional-level characteristics that serve as proxies for existential threats, such as war, poverty, earthquakes, and pandemics, capture not only sociotropic threats but also egotropic risks. Multilevel modeling, which includes individual and contextual variables, does not provide a solution to this identification problem, as an existential threat to one's social connections and community (sociotropic threats) can impose personal risks in the future (egotropic threats). When poverty hits one's country or community, even those not currently living in poverty may fear they soon will. People exposed to war and conflicts where they live can turn to religion as they are personally at risk but also because they perceive their wider social network to be threatened.

The findings of our study suggest that sociotropic threats are a sufficient condition to trigger religious coping. This has theoretical implications because we thereby provide evidence against a "weaker" version of existential insecurity theory, which states that only egotropic threats are associated with religiosity. Instead, we find support for a stronger version of existential insecurity theory, which posits that existential threats to one's in-group are a sufficient cause for religious coping. We established this link for refugees who are deeply affected by war-related conflicts that occur in their birth region. Further research is encouraged to examine whether sociotropic threats can also explain the impact of exposure to poverty, earthquakes, and pandemics on religiosity.

Third, the findings of this study have implications for research and policy on the integration and well-being of refugees. Specifically, our study shows that not only are conditions in the receiving country and the characteristics of refugees important but that events unfolding in the region of origin can also shape their well-being and incorporation (Keita and Schewe, 2021; Sønderskov et al., 2021). Political violence and conflict can spread fear, insecurity, and uncertainty even among those not directly affected by the

violence. From a policy perspective, our results imply that policymakers should pay attention to the situation in the origin countries when designing tools to support refugees' accommodation and well-being.

Since religion offers a mechanism to cope with emotional distress caused by the conditions in origin countries, policies facilitating access to religious communities or other support groups and services may help refugees who have recently arrived adapt to the new context. As religion offers a mechanism to cope with emotional distress, it may also facilitate refugees' language investments, the development of interethnic ties, and incorporation into the receiving context. These insights have become more pressing as the number of military conflicts in the world (e.g., the Russian aggressive invasion against Ukraine, the Syrian war) and the number of refugees has peaked in the past few years (Pettersson et al., 2021; UNHCR, 2022).

Data availability

The data on conflict intensity is from the Armed Conflict Location and Event Data Project (ACLED) (Raleigh et al., 2010). To access the data, researchers are required to register through the ACLED Access Portal (https://developer.acleddata.com/). The individual-level data on refugees comes from the 2016–2019 IAB-BAMF-SOEP Survey of Refugees. The survey is conducted jointly by the Institute for Employment Research (IAB), the research data center of the Federal German Office for Migration and Refugees (BAMF), and the German Socio-Economic Panel (SOEP) at the German Institute for Economic Research (DIW). External researchers can apply for access to these data by submitting a user-contract application to the Research Data Center (FDZ) of the German Federal Employment Agency (BA) at the IAB (https://fdz.iab.de/en/pd_hd/iab-bamf-soep-survey-of-refugees-version-1619-v1/) or SOEP Research Data Center (https://www.diw.de/en/diw_01.c.601584.en/data_access.html).

This study uses the factually anonymous data of waves 2016–2019 of the IAB-BAMF-SOEP Survey of Refugees. The survey is conducted jointly by the Institute for Employment Research (IAB), the research data center of the Federal German Office for Migration and Refugees (BAMF), and the German Socio-Economic Panel (SOEP) at the German Institute for Economic Research (DIW). External researchers may apply for access to these data by submitting a user-contract application to the SOEP Research Data Center (https://www.diw.de/en/diw_02.c.222836.en/data_access_and_order.html). https://doi.org/10.5684/soep.iab-bamf-soep-mig.2019.

Code availability

The computer codes for data preparation and analyses are available at https://osf.io/cp6vk/.

Ethical approval

This study was approved by the Ethics Committee of the Faculty of Social and Behavioural Sciences of Utrecht University [22-0434]. All methods were carried out in accordance with relevant guidelines and regulations. Asylum seekers and refugees are a particularly vulnerable target group due to their experiences of war, flight, expulsion, and their legal status, and who require special protection and for whom there is a corresponding special responsibility. Therefore, a code of ethics has been developed, which includes the following measures: (1) Consent was obtained by providing all participants with a declaration of data protection indicating that participation was voluntary and identities would be kept confidential; (2) Respondents have been informed that their participation or non-participation will not affect a possible asylum procedure; (3) Sensitive questions that can provoke re-traumatization have been avoided.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssresearch.2023.102895.

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Frank van Tubergen, is a Professor of Sociology at Utrecht University, and Theme Leader at the Netherlands Interdisciplinary Demographic Institute, The Hague. His research interests include migration and integration, religion, and big data. He is a fellow of the European Academy of Sociology and the author of *Introduction to Sociology* (Routledge, 2020).

Yuliya Kosyakova, is a Head of Migration and International Labour Studies research department at the Institute for Employment Research, and an Associate Professor of the Chair for Migration Research at the Otto-Friedrich University of Bamberg. Her current research revolves around the themes of labor markets, (refugee) migration and integration, gender, and the life course.

Agnieszka Kanas is an Assistant Professor of Public Policy and Politics at the Erasmus University Rotterdam. Her research interests are stratification and social inequality, immigrants' economic disadvantage and integration, public policy, and intergroup prejudice and discrimination.