Religious women receive more allomaternal support from non-partner kin in two low-fertility countries

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Abstract

In low fertility settings, religious people tend to have larger families than non-religious people. One way religious individuals may achieve larger relative family sizes is through support from their families. In this paper, we investigate the relationships between religiosity, kin contact, allomaternal investment from relatives, and fertility in two high income low fertility settings: the United Kingdom and the United States. Data for this pre-registered research come from an online survey of 609 women living in the US and 919 women living in the UK, recruited through Prolific, who answered questions about their religious practices, childbirth histories, social networks, and allomaternal networks. We find that, compared with less religious peers, more religious women: 1) have more geographically diffuse kin networks (particularly in the UK) but have social networks that are equally kin-dense; 2) receive more allomaternal support from kin beyond their partner, particularly help with household tasks, though the countries differ in the exhibited relationship between religiosity and partner support; and 3) have higher fertility in both countries. We do not find strong evidence for a mediating role of allomaternal support on the relationship between religiosity and fertility. Our study highlights important variation in the relationship between religion and fertility across two high income low fertility countries and raises new questions about the role that religion plays in allomaternal support networks in these settings.

Keywords

allomothering; kin networks; life history theory; religion; biocultural reproduction

1. Introduction

Across industrialized societies, religious individuals exhibit higher fertility than their secular peers. The higher fertility of religious people has been associated with various indicators of religiosity, including attendance at religious services (Adsera 2006; Philipov and Berghammer 2007; Frejka and Westoff 2008; Berghammer 2012; Peri-Rotem 2016; Shaver et al. 2019; Shaver et al. 2020), self-reported importance of religion (Frejka and Westoff 2008; Baudin 2015), or even simply declaring a religious affiliation (Philipov and Berghammer 2007; Frejka and Westoff 2008; Peri-Rotem 2016; Shaver et al. 2019). While the magnitude of fertility differences between religious and less religious individuals varies spatially, temporally, and across denominations (Schooenheim and Hülsken 2011; Peri-Rotem 2016), the effect has been consistently noted in industrialized nations, particularly in the US and the UK (Goldscheider 2006; Rowthorn 2011).

Evolutionary researchers hypothesize that larger family sizes may lead to lower socioeconomic and educational outcomes for individual children raised in these families. This is because parents have finite energetic resources, theoretically resulting in lower parental investment per child in larger families (Lawson and Mace 2009; 2011), or in other words in a tradeoff between the quality and the quantity of offspring (Walker et al. 2007). This “resource dilution” effect has been used to explain findings that children from larger families may be slightly physically smaller (Hagen et al. 2006; Öberg 2015), have shorter lifespans (Lynch 2016), and lower education attainment (Downey 1995) for example, though such trade-offs are not ubiquitous across empirical analyses (Lawson and Borgerhoff Mulder 2011; Lawson and Mace 2011). The “quantity-quality” trade-off may be particularly strong in high-income, low-fertility settings where parents perceive high parental investments are necessary for child success (Hill and Kaplan, 1999; Walker et al. 2007; Lawson et al. 2016; Lynch 2016).

Despite these expected quantity-quality tradeoffs, children who grow up in religious families do not seem to suffer the negative consequences of a larger family size. Rather, the opposite pattern emerges: with some exceptions (e.g. Bartkowski et al. 2019, Darnell and Sherkat 1997, Sherkat 2010, Sherkat 2011), children raised in religious families experience benefits associated with their higher religiosity. Measures of religiosity of both parents and children are positively related to child and adolescent wellbeing across a range of indicators including better academic performance (Abar et al. 2009; Muller and Ellison 2001); better social skills, self-control, and cognitive performance (Bartkowski et al. 2008); fewer risk-taking behaviors (Abar et al. 2009; Yonker et al. 2012); lower likelihood of use and abuse of licit and

illicit substances (Cotton et al. 2006; Fletcher and Kumar 2014); lower risk of mental illnesses such as depression (Cotton et al. 2006; Miller and Gur 2002; Wright et al 1993; Yonker et al. 2012); and higher self-esteem (Yonker et al. 2012). Although these results suggest important benefits of religiosity for child outcomes, studies rarely control for the independent effect of family size which is related to both religiosity and child outcomes. Nonetheless, the many studies which indicate that religiosity has a positive effect on a range of outcomes for children and young adults is puzzling given the typically higher fertility of such families.

The finding that children from more religious families in high-income countries do not appear to experience negative effects of large family size has been referred to as the *paradox of religious fertility.* This paradox may be explained by the *religious alloparenting hypothesis,* which proposes that higher levels of co-operation within religious communities, may offset the costs associated with larger family sizes. The type of co-operation proposed to be at work is allomaternal investment, meaning investments (time, energy, or other resources) provided directly to a child who is not the allomother's, or indirectly to that child through other support to the mother (Shaver 2017). Participation in religious ritual is associated with higher trust and co-operation between co-religionists (Power 2017; Purzycki and Arakchaa 2013; Sosis and Ruffle 2003) and in some settings, engaging in costly religious practices predicts a higher likelihood that someone will be trusted with childcare (Purzycki and Arakchaa 2013). Separately, allomaternal support has been linked to improved health of children and higher fertility for mothers (e.g. Sear et al. 2002; Sear and Coall 2011; Sear and Mace 2008; Sear and Mace 2009; Kramer and Veile 2018), though there is variation in this effect (e.g. Sadruddin et al. 2019). It is possible, then, that higher levels of allomaternal support among religious people might mitigate the detrimental impacts of large family sizes on child outcomes. Indeed, secondary analyses by Shaver and colleagues demonstrated support for this hypothesis. Shaver et al. (2019) found in a New Zealand sample that greater religiosity predicts a higher likelihood that an adult without young children will engage in allomothering. In the UK, Shaver et al. (2020) found church attendance to be positively associated with increased social network support and practical support from co-religionists, and support from co-religionists to be associated with higher maternal fertility and improved cognitive outcomes for children. Thus, in high-income settings, these trends suggest that religious women may be able to mobilize more support from their social networks, which may mitigate quantity-quality tradeoffs relative to non-religious mothers who may have fewer social resources.

In this analysis, we examine a portion of this pathway and evaluate the relationship between religiosity, orientation towards and allomaternal support from kin, and fertility. We

focus specifically on kin of the focal child in this analysis, and choose to do so for three reasons. First, cross-culturally, allomaternal support tends to come from kin, and particularly from close kin such as the child's father, siblings, grandparents, and/or aunts (Ivey 2000; Crittenden and Marlowe 2008; Meehan et al. 2014; Kramer 2019). All else being equal, kin have a vested interest (i.e. indirect fitness gains) in ensuring that genetically related individuals survive to reproduce (Hamilton 1964), thereby increasing the likelihood that kin will provide allomaternal support. In industrialized and post-industrialized settings, increased mobility generally results in kin networks that are more geographically dispersed (Zelinksy 1971; Newson et al. 2005; Colleran 2020), and mothers may therefore rely more on non-kin for support than in pre-industrial settings (Newson et al. 2005; Sear and Coall 2011). However, analyses of allomaternal networks in the US and UK in the dataset used here demonstrate that the bulk of allomaternal support received by young children comes from women's partners (often her children's father) and maternal kin, and that non-kin contribute relatively small amounts of non-professional care, i.e. care not provided from paid or institutional sources (Spake et al. 2021).

Second, the presence of close kin has often been associated with women's fertility and child outcomes. Particularly in low-income settings, the presence of certain types of kin (though who this person is varies considerably across contexts) has been associated with higher fertility, earlier ages of first birth, and shorter interbirth intervals (Mattison et al. 2014; Allal et al. 2004; Lahdepera 2004; Scelza 2010; Snopkowski and Sear 2013; Sear et al. 2003). There are several mechanisms which could explain a positive relationship between the presence of kin and fertility: kin may provide essential support which reduces the costs (real or perceived) of beginning or continuing reproduction (Sear and Coall, 2011; Snopkowski and Sear 2015; Turke 1989; McAllister et al. 2016); people from large families, and thus those with many kin around, may desire larger families due to inherited (socially or genetically) family orientation (Beaujouan and Solaz 2019); or family members may provide pressure to have a large family through pro-natal information or advice (Newson 2005; Mathews and Sear 2013).

Third, religious individuals may be more family oriented than their non-religious peers across the life course. Parents who are more religious have higher quality relationships with their children than less religious parents (Pearce and Axinn 1998; Smith and Kim 2003; Regnerus and Burdette 2006). Religious fathers and grandparents tend to spend more time with their children, and are more likely to provide assistance to children and grandchildren than are less religious fathers (Bartkowski and Xu 2000; King and Elder 1999; King 2003; Lynn et al. 2016). Around the world, countries that are more religious tend to have higher rates of contact between kin (Murphy 2008), particularly face-to-face contact but also other forms of contact

such as phone calls, e-mails, or postal mail (Kalmijn and DeVries 2009). Therefore, evidence suggests a pathway between kin orientation, support to mothers, and fertility that religious individuals may be especially exposed to due to their higher level of kin orientation.

Given the possible pathways between religiosity and kin orientation and support, and kin contact and support and fertility, we hypothesize that religious women may be more kin oriented, which may lead to greater receipt of support, and through increased support, to higher fertility. To evaluate this hypothesis, we conducted an online survey of women in the UK and the US, in which we asked about religiosity, fertility, and allomaternal support. The project procedures, predictions, and statistical approach were pre-registered prior to data collection on the Open Science Framework (OSF), available at https://osf.io/2gnzt/?view_only=8faa8ce77ba847e4a057fc4fb1e110b8, save the last *post hoc* prediction of this paper (see section 2.2 for methodological deviations from the pre-registration). Here, we examine a subset of these predictions. Specifically we predicted that:

1. Religiosity will be positively associated with (a) kin-density of social networks and (b) residential proximity to kin
2. Religiosity will be positively associated with allomaternal investments in the form of (a) household help to women and (b) care to children
3. Religiosity will be positively correlated with fertility
4. Women who receive more allocare from kin will have higher fertility
5. The amount of allomaternal investment received from kin will mediate the relationship between religiosity and fertility

2. Materials and methods

2.1. Survey and participants

Data for this study are from an online survey of mothers conducted in August 2020. Respondents were recruited through Prolific, an online platform connecting researchers with participants. Participants were targeted based on the following characteristics: women residing in either the UK or the US, and who had at least one child born in 2016 or after (under 5 years of age at the time of survey). We opened 1000 spots in each country, evenly split between

women who identified a religious affiliation and those who identified as unaffiliated, or declared themselves atheists or agnostics. The Prolific platform was selected because it achieves more diverse participant pools and yields higher data quality compared to its competitors due to its ease of use and clear rules for compensation of participants (Peer et al. 2017; Palan and Schitter 2018).

Mothers were asked about their demographics, reproductive histories, religious practices, and residential proximity to kin. They were then asked about their close social networks: mothers were asked to identify up to five women they were close to and with whom they could talk with about personal matters (adapted from Colleran 2020; Mathews and Sear 2017). These individuals could be relatives or not, but could not co-reside with the mother. They provided demographic information for each contact, listed their relationship to herself, and indicated how often she saw or talked to each. Lastly, mothers were asked to list up to 10 individuals who provided them help with taking care of a focal child (direct allomaternal support), defined as their eldest child under the age of 5 years, or who helped them perform household tasks (indirect allomaternal support). The eldest child under the age of 5 years was selected as the focal child for two reasons: 1) the survey software was unable to randomly sample one of the woman's children based on our eligibility criteria; and 2) this was a clear instruction that could both be given to respondents and easily checked for compliance in the dataset. Allomothers were defined as anyone providing help, including the child's biological father and/or the mother's current partner, but excluding any paid or state-provided help such as nannies, teachers, or care-aids. Mothers were asked to provide demographic information for allomothers, list their relationships to her focal child, and report how often they performed a series of specific tasks. In all cases, we asked the mothers to describe a typical month prior to the onset of the COVID-19 pandemic, five or six months prior to the survey, in order to minimize the impact of closures and restrictions on our results. Mothers were compensated 1.25 GBP, or roughly 1.63 USD, the Prolific-suggested rate for a survey averaging 10 minutes of participation time. We excluded responses where the mother indicated that her first birth had occurred before she was 15 years old out of concern that these were errors (n = 4), where the participant failed the attention-check question (n = 159), and responses that showed low effort, for example not completing demographic questions (n = 6). After exclusions, the final sample available for analysis consisted of 1528 women: 919 from the UK (405 indicating a religious affiliation and 514 unaffiliated) and 609 from the US (395 indicating a religious affiliation and 214 unaffiliated). The survey and sampling strategies were approved by the UNIVERSITY REDACTED Human Ethics Committee (reference number: D20/242).

2.2. Data analyses

2.2.1. Outcome variables

To evaluate our predictions, we measured the following outcomes: contact with, and access to, kin (P1); receipt of allomaternal support from kin (P2); and fertility (P3, P4, and P5). Contact with and access to kin (outcome for P1) was operationalized in two ways: 1) mothers' residential proximity to kin and 2) the kin-density of her social network. Residential proximity to kin was defined as a count of the number of different types of kin (e.g. her sister, her partner's mother, etc.) residing within one hour's travel time from the mother's home. This variable does not capture the number of kin available to the mother, but rather measures the general geographic dispersion of the woman's kin network. The kin-density of social networks was defined as a count of the number of kin named to the mother's close social network. For both variables, and all other questions in the survey, we let the woman indicate whom she considered to be kin or not. Therefore, kin could be biological, affinal, or step-kin, which is consistent with changing kinship norms in contemporary Western societies (Furstenberg et al. 2020).

Receipt of allomaternal support from kin (outcome for P2) was assessed with measures calculated from mothers' help networks, in which mother could name up to 10 helpers. For each person named, the mother reported how often (daily, weekly, monthly, less than monthly, or never) the person helped with five childcare tasks (changing/washing, feeding, playing, supervising, and unspecified other tasks), and six household tasks (grocery shopping, cleaning the home, preparing meals, washing clothing, running errands, unspecified other tasks). The list of tasks was adapted from the Avon Longitudinal Study of Parents and Children (Golding et al. 2001; Lawson and Mace 2009). In this analysis, we considered partners as kin allomothers, although we did run follow-up analyses separating out allomaternal support provided by partners from that provided by non-partner kin.

For each type of allomothering (childcare and household help), we calculated two measures: 1) the number of kin allomothers providing support, including fathers and current partners, and 2) the amount of help provided by kin. This yielded a total of four measures: 1) number of kin providing childcare, 2) number of kin providing household help, 3) amount of childcare provided by kin, 4) amount of household help provided by kin. For the number of kin

allomothers providing support variables, allomothers were counted if they were reported to provide at least one task of either type (childcare or household help) more often than “never.”

For the amount of help received variables, we converted the reported frequency of each task performed to an estimate of the number of days per month each task was provided. We estimated that daily help with a task would be provided almost every day (score of 28 days per month); that weekly help could be provided as much as twice a week as it occurred at least weekly but not as often as daily (score of 8 days per month); that monthly help could be provided up to twice a month as it occurred at least monthly but not so much as weekly (score of 2 days per month); and that less than monthly or never would not be provided regularly (score of 0 days per month). The number of tasks performed monthly were summed for each allomother across childcare support and household help. Lastly, these allomother-level scores were summed for each mother, so that each mother received two scores: one for the amount of childcare help received and one for the amount of household help received. These scores are roughly analogous to scoring the help frequency on a scale from 1 to 5, then summing the scores across helpers, which is a strategy that has been used in other similar analyses (Lawson and Mace 2009). The help scores express the estimated number of tasks a mother receives help with on a monthly basis, which aids in comparing between mothers who have small but highly involved help networks with those who have larger but less involved help networks. The scores are counts, have ranges from zero to several hundred (see Table 1), and are right skewed.

In a previous analysis of the allomothering data, we tested two alternative operationalization strategies for constructing the help scores (Spake et al. 2021): 1) using the same estimated number of days a month strategy, but calculated using only the reported frequency of supervision allomothering task, as other allomothering tasks could be correlated with providing supervision; and 2) categorizing tasks as either occurring daily (1) or not (0), and then summing these binary measures across all allomothering tasks. We found that the results presented in that analysis were robust to the method of operationalizing allomothering (see Spake et al. 2021). As the method of operationalization did not impact results, in this analysis we do not present alternative operationalization strategies. Instead, we present the method of operationalization outlined in the previous paragraph in this analysis.

Lastly, we chose to use an age-adjusted measure of fertility (outcome for P3, P4, and P5) because survey respondents were still of reproductive age. Age-adjusted fertility was calculated as the residual of a linear regression of number of births on maternal age (per Schaffnit et al. 2019). As there was evidence that women in our US sample had both more

children and earlier reproductive schedules than women in our UK sample, age-adjusted fertility was calculated for the countries separately.

2.2.3. Predictor variables and covariates

Religiosity, our main predictor variable, was collected using four measures of religious behavior: frequency of attendance at religious services (never, occasionally, monthly, weekly), frequency of prayer outside of services (never, occasionally, weekly, daily), self-reported importance of religion (not important, somewhat important, very important), and number of hours weekly spent participating in religious activities outside of religious services (e.g. charity work, schooling, other events). Unaffiliated mothers were allowed to report on their prayer habits and some did report praying more than never, but responses for other questions were set to the minimum category. We had initially intended to enter all religiosity variables into our regression analyses to examine the impact of different aspects of religiosity on our outcomes of interest. However, checking for multicollinearity of these key indicators using variance inflation factors (VIFs, using the *car* package in R and linear regressions (R Core Team 2020; Fox and Wiesberg 2019)) indicated that frequency of ritual (VIF = 2.5), frequency of prayer (VIF = 4.4), and importance of religion (VIF = 5.0) may be multicollinear. Although there is some debate as to the threshold at which VIFs become unacceptable (acceptable values alternatively given as 2.5, 4, or 5, e.g., see Pardoe 2012, Johnston et al. 2018), multiple variables met or exceeded these thresholds. We opted to reduce these four variables into a single score using polychoric factor analysis. All measures where highly correlated to each other ($r > 0.85$), and a single factor was sufficient to summarize the information (one factor with eigenvalue > 1). Loadings for the variables were all above 0.9, and internal consistency between items was excellent (Cronbach's alpha = 0.96). We extracted the single factor score and refer to it as the mother's religiosity score.

In our final set of analyses, we used the amount of help received to predict age-adjusted fertility. For this predictor, we used the derived amount of help variables as described above. However, the range of this variable was quite large (range: 0-612 for amount of childcare help received). In order to improve interpretability for these coefficients, help amounts were standardized (centered and scaled) prior to being used as predictors. This modeling strategy means that the coefficients for help received in these models express the relationship between age-adjusted fertility and an increase of one standard deviation of help, rather than between age-adjusted fertility and an additional task of help received.

We included a series of sociodemographic covariates in all models: mother's age, education, ethnicity, nativity, presence of a partner, household income quintile (1 = lowest, 5 = highest), relative size of residential location, and the number of people in mother's close social network (0 to 5 women) with whom mothers reported daily contact as a measure of sociality. In the models for help received, we also controlled for a series of variables that could affect how much help the mother received: the age of the focal child, the number of weekly hours the child spent in paid care, and the number of children living in the mother's household. For these models, we also controlled for the geographic proximity of the kin network as the availability of kin likely influences the receipt of practical help. Education was recorded as the highest level of education achieved from primary school through a doctoral degree, and was treated as a continuous scale. Ethnicity was self-identified by mothers, then binarized into white versus non-white due to small sample sizes for all minority groups. Nativity was also introduced as a binary variable, with the levels corresponding to whether or not the mother was born in the country of residence (UK or US). We coded the presence of the mother's partner (not necessarily the focal child's father) using a binary variable. Household income quintile was calculated relative to external US or UK data to aid comparison between the countries. Household income was self-reported by participants and then categorized into income quintiles using US (US Census Bureau 2019) and UK (Office for National Statistics 2019) specific 2018 mean income for quintile as cut-off points. Relative size of residential location was identified by participants as matching most closely to a village, town, or city.

2.2.4. Analyses

To test predictions 1-4, data were modeled using multivariate Bayesian models using the *brms* package (Bürkner 2017) and visualized using *sjPlot* (Lüdecke 2022) and *bayesplot* (Gabry et al. 2019) in R (R Core Team 2020). UK and US data were modeled separately as exploratory analyses suggested different relationships between the predictors and outcomes between the countries, and random slope models did not always converge well. Models were built with Poisson distributions for kin proximity and kin-density of social networks (P1); Poisson distributions for number of kin providing allomaternal support and amount of help received (P2); and a Gaussian distribution was used for age-adjusted fertility (P3-5). In all models testing a prediction related to religiosity (i.e., all except prediction 4), we introduced a random intercept corresponding to the denomination to which the woman was affiliated. Full model specifications for each of the predictions are available in the supplementary materials, and the data and code

used in the analyses are available on the project OSF page: https://osf.io/rg235/?view_only=0a12714822fd4d4f990bc67b07ff370f.

To test prediction 5, ("The amount of allomaternal investment received from kin will mediate the relationship between religiosity and fertility"), we used mediation analysis. Mediation analysis allows researchers to examine whether a pathway may exist between two variables through a third. Mediation analysis to test the prediction 5 was performed with *brms*-built models and assessed with the *mediation()* function from the *bayestestR* package (Makowski et al. 2019). We conceptualized allomaternal investment as the mediator, with age-adjusted fertility as the outcome, and religiosity score as the main predictor. For each mediation model, we built two independent models which were then combined: one predicting the outcome (age-adjusted fertility) as a function of the main predictor (religiosity score) and the mediator (allomaternal support), and the second predicting the mediator as a function of the main predictor (Kurz 2019). These models adjusted for the same set of sociodemographic covariates and the denomination random intercept as the model predicting the amount of allomaternal support received (P2). These models were built separately for the US and the UK, and repeated across the two measures of allomaternal support (childcare and household help).

3. Results

Descriptive statistics for the variables included in the models are presented in Table 1. Overall, fertility was higher in the US as compared to the UK. The US women included in the sample had earlier ages at first birth and had higher age-adjusted fertility than their UK counterparts (not shown). In both countries, the lowest religiosity scores were found among unaffiliated women, although some affiliated women also received low scores, and some unaffiliated women did not receive the minimum scores. When unaffiliated women did not receive the minimum score, this indicates that despite not adhering to a particular faith, they participate in some religious activities (e.g. prayer). Within participants who declared a religious affiliation, US participants had a higher mean religiosity score than participants from the UK (Figure 1a). Generally, there were no major differences in the distribution of religiosity scores between the three most common religious affiliations in either the UK or the US (Figure 1b), although in the UK, Protestants were the most likely to have low religiosity scores, while in the US, Catholics were the group with lowest religiosity scores.

Table 1. Descriptive statistics for the main predictor, outcome, and sociodemographic variables for unaffiliated mothers (No) and mothers declaring a religious affiliation (Yes) in each country.

	UK		US	
	No (N=514)	**Yes (N=405)**	**No (N=214)**	**Yes (N=395)**
Age				
Mean (SD)	33.0 (5.30)	33.5 (5.22)	31.3 (5.28)	31.4 (5.22)
Mother has a partner				
No	44 (8.6%)	38 (9.4%)	29 (13.6%)	49 (12.4%)
Yes	470 (91.4%)	367 (90.6%)	185 (86.4%)	346 (87.6%)
Household income quintile				
1 (lowest)	27 (5.3%)	28 (6.9%)	15 (7.0%)	26 (6.6%)
2	97 (18.9%)	71 (17.5%)	46 (21.5%)	82 (20.8%)
3	133 (25.9%)	100 (24.7%)	77 (36.0%)	117 (29.6%)
4	216 (42.0%)	172 (42.5%)	37 (17.3%)	91 (23.0%)
5 (highest)	41 (8.0%)	34 (8.4%)	39 (18.2%)	79 (20.0%)
Mother's ethnicity				
White	487 (94.7%)	325 (80.2%)	165 (77.1%)	282 (71.4%)
Other or mixed	27 (5.3%)	80 (19.8%)	49 (22.9%)	113 (28.6%)
Mother born in country of residence				
No	37 (7.2%)	89 (22.0%)	8 (3.7%)	24 (6.1%)
Yes	477 (92.8%)	316 (78.0%)	206 (96.3%)	371 (93.9%)
Mother's educational attainment				
Secondary or less	58 (11.3%)	36 (8.9%)	73 (34.1%)	66 (16.8%)
Junior College	170 (33.1%)	102 (25.2%)	47 (22.0%)	48 (12.2%)
Undergraduate	197 (38.3%)	178 (44.0%)	64 (29.9%)	189 (47.8%)
Postgraduate	89 (17.3%)	89 (22.0%)	30 (14.0%)	92 (23.3%)
Size of place of residence				
City	141 (27.4%)	121 (29.9%)	110 (51.4%)	244 (61.8%)
Town	254 (49.4%)	192 (47.4%)	82 (38.3%)	131 (33.2%)
Village	119 (23.2%)	92 (22.7%)	22 (10.3%)	20 (5.1%)
Number of people in network contacted daily				
Mean (SD)	1.37 (1.20)	1.39 (1.16)	1.16 (1.13)	1.27 (1.05)
Religiosity score				

	UK		US	
	No (N=514)	**Yes (N=405)**	**No (N=214)**	**Yes (N=395)**
Mean (SD)	-0.795 (0.0740)	0.305 (0.964)	-0.746 (0.148)	1.13 (0.917)
Number of kin categories residing nearby				
Mean (SD)	5.75 (3.73)	4.97 (4.01)	4.64 (3.70)	4.18 (3.65)
Number of kin in close social network				
Mean (SD)	1.47 (1.13)	1.40 (1.18)	1.28 (1.04)	1.44 (1.16)
Number of kin providing allomothering				
Mean (SD)	1.78 (1.32)	1.81 (1.53)	1.54 (1.23)	1.45 (1.13)
Amount of allomothering from kin				
Median [Min, Max]	140 [0, 472]	140 [0, 602]	140 [0, 460]	120 [0, 612]
Number of kin providing household help				
Mean (SD)	1.43 (1.04)	1.41 (1.23)	1.28 (1.02)	1.23 (0.953)
Amount of household help from kin				
Median [Min, Max]	48.0 [0, 484]	48.0 [0, 416]	39.0 [0, 270]	40.0 [0, 584]
Number of children born to the mother				
Mean (SD)	1.61 (0.785)	1.75 (0.958)	1.84 (1.03)	1.82 (0.944)
Age of the focal child				
Mean (SD)	2.64 (1.30)	2.76 (1.25)	2.58 (1.32)	2.89 (1.29)
Number of hours of paid care weekly				
Mean (SD)	11.2 (12.5)	12.2 (13.0)	10.7 (15.9)	9.50 (13.7)
Number of children in the mother's home				
Mean (SD)	1.62 (0.794)	1.73 (0.853)	1.73 (0.882)	1.80 (0.934)

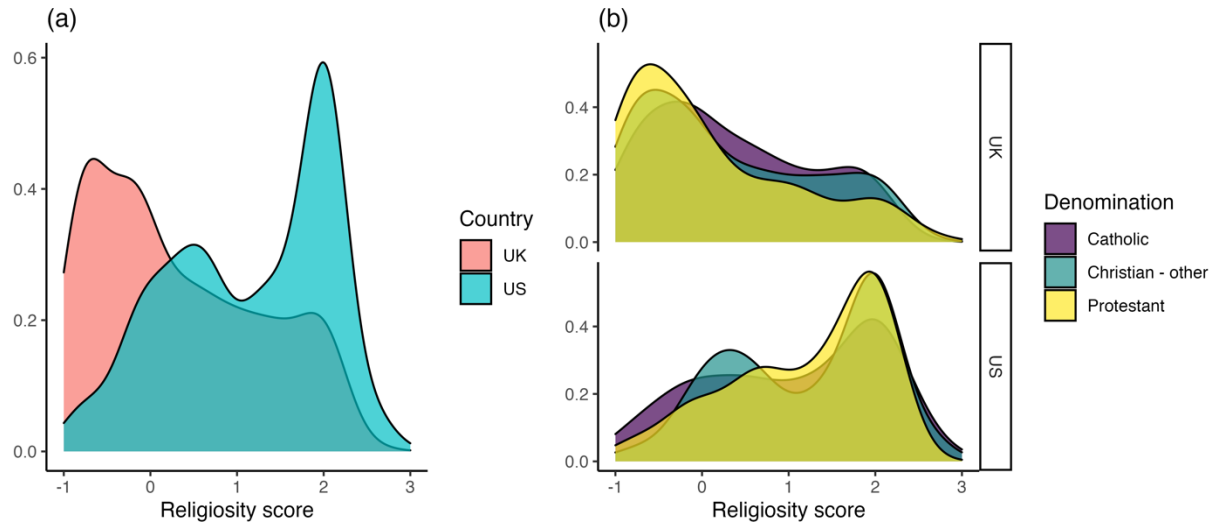

Figure 1. Distribution of religiosity scores across the study countries: a) comparison of religiosity score of affiliated women in the US and UK; b) comparison of religiosity score across the three largest denomination groups in the US and the UK.

Women in the UK reported an average of 1.92 (range = 0-10) people providing them with childcare help, while the corresponding figure in the US was 1.66 (range = 0-9). A considerable proportion of women reported receiving no help with childcare from unpaid sources (11.5% of UK women and 10.7% of US women). For women who did receive help with childcare, the vast majority of helpers were kin (95.3% in the UK and 90.9% in the US), and kin also provided nearly all of the unpaid care received by children (97.1% in the UK and 93.6% in the US).

3.1. Prediction 1 (not supported): Religiosity will be positively associated with (a) kin-density of social networks and (b) residential proximity to kin

A mother's religiosity score was not related to the number of kin named in her close social network either in the UK (Incidence Rate Ratio (IRR) [95% credibility interval (95%CI)] = 1.05 [0.97, 1.14]) or in the US (IRR [95% CI] = 1.06 [0.98, 1.13], see Supplementary Table S3). To explore this finding, we ran additional models to check whether this result could be due to differences in mothers' overall social network size. This analysis demonstrated that a mother's religiosity score was also not related to the number of close social network contacts in either the UK (IRR [95% CI] = 0.97 [0.92, 1.03]) or the US (IRR [95% CI] = 1.01 [0.96, 1.06], Supplementary Table S4).

Religiosity, however, was negatively associated with the geographic concentration of the mother's kin network in the UK (IRR [95% CI] = 0.89 [0.84, 0.93]). Among UK mothers, with all other variables set to the mean or baseline category, the model predicted that the individuals with the highest religiosity scores would reside within close proximity of 2.21 *fewer* kin categories relative to those with the lowest religiosity scores (Figure 2a). The relationship was in the same direction in the US, although the effect was small and uncertain as the credibility interval overlapped with zero (IRR [95% CI] = 0.97 [0.92, 1.02]). In the US, the model predicted a difference of 0.48 fewer kin categories living in close proximity for women with the highest religiosity scores relative to those with the lowest religiosity scores. The smaller association between religiosity and geographic concentration of kin in the US may be driven by the overall lower average kin proximity in the US (mean = 4.34, standard deviation = 3.67) compared to the UK (mean = 5.41, standard deviation = 3.87).

A portion of our sample reported that they were born outside of the country in which they currently resided. These women's migration make them more likely to have more geographically diffuse kin networks. To check whether these women drove the inverse association between religiosity and geographic concentration of kin, we ran the models again using only women who were born in the country of residence. The coefficients for religiosity score did not substantially change in the resulting models (UK: IRR [95% CI] = 0.90 [0.85, 0.95]; US: IRR [95% CI] = 0.96 [0.91, 1.01]), indicating that the relationship between religiosity and geographically diffuse kin networks is not caused by immigrant women in our sample.

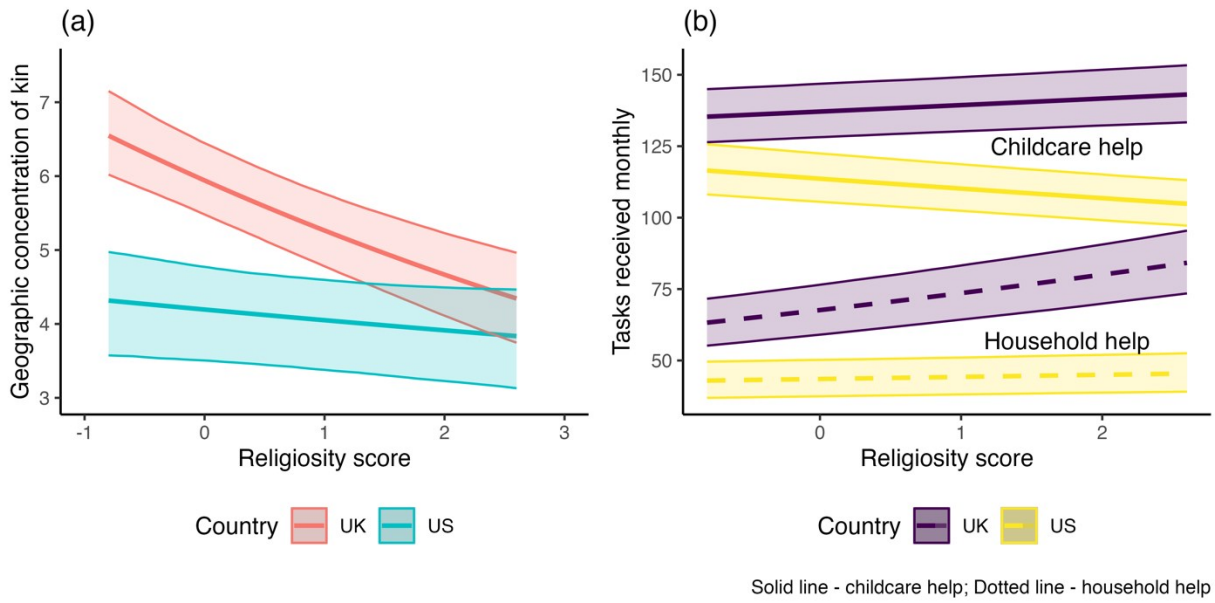

Figure 2. Model predictions and 95% prediction interval for the relationship between religiosity score and: a) number of kin categories residing nearby, and b) the number of tasks received monthly for childcare help (solid line) and household help (dotted line). All other predictor variables held at the mean or baseline.

3.2. Prediction 2 (partially supported): Religiosity is positively associated with the number of kin providing (a) household help to women and (b) care to children

A mother's religiosity score exhibited no relationship with either number of kin providing childcare to the focal child (IRR [95% CI] = 0.99 [0.92, 1.07]) or the number of kin providing household support to the mother (IRR [95% CI] = 1.04 [0.96, 1.13]) in the UK. Similar results were found in the US: there were no associations between a mother's religiosity score and the number of kin providing either childcare (IRR [95% CI] = 1.01 [0.94, 1.09]) or household help (IRR [95% CI] = 1.02 [0.94, 1.10]). Full results for these models are presented in Supplementary Tables S5-S8. However, this analysis only considered the number of helpers, and not necessarily the overall amount of help received. Although it was not pre-registered, we then explored whether religiosity was related to the amount of help received by mothers.

Models exploring the relationship between religiosity and amount of support received suggested that, for UK mothers, religiosity was positively associated with the amount of both childcare (IRR

[95% CI] = 1.03 [1.02, 1.04]) and household help provided by kin (IRR [95% CI] = 1.10 [1.08, 1.11]). These UK models were run without the ethnicity predictor because its inclusion caused the models to fail to converge properly, likely due to small sample sizes for non-white individuals. For US mothers, religiosity score was negatively correlated with the amount of childcare help received from kin (IRR [95% CI] = 0.97 [0.96, 0.98]), while it was positively associated with household help from that same group (IRR [95% CI] = 1.02 [1.00, 1.03]).

The models suggest that relative to the least religious mothers, the most religious mothers in the UK receive an average of 8 additional childcare tasks and 21 additional household tasks every month from kin allomothers (Figure 2b). The corresponding figures for the US are 12 fewer childcare tasks, and 3 additional household tasks for the most religious mothers compared to their least religious counterparts.

Follow-up analyses demonstrated that in both the US and in the UK, the positive association between religiosity and household help was primarily due to increased contributions from non-partner kin (Figure 3, see also Supplementary Tables S9-S12). These models included both partnered and non-partnered women, which leads to large coefficient estimates for the effect of partnership on the receipt of partner childcare and household help (Supplementary Tables S10 and S12). We chose to run these follow-up analyses on the entire sample to maximize sample size. To check whether results were sensitive to the inclusion of both unpartnered and partnered women in the follow up analysis, we re-ran the models for childcare help. We restricted the sample to partnered women only and removed the control variable for partnership status. This sensitivity analysis suggested that the posterior distribution for the coefficients for religiosity score did not substantially change, suggesting that including all women in the analysis and controlling for partnership status is an appropriate strategy (Supplementary Figure S1).

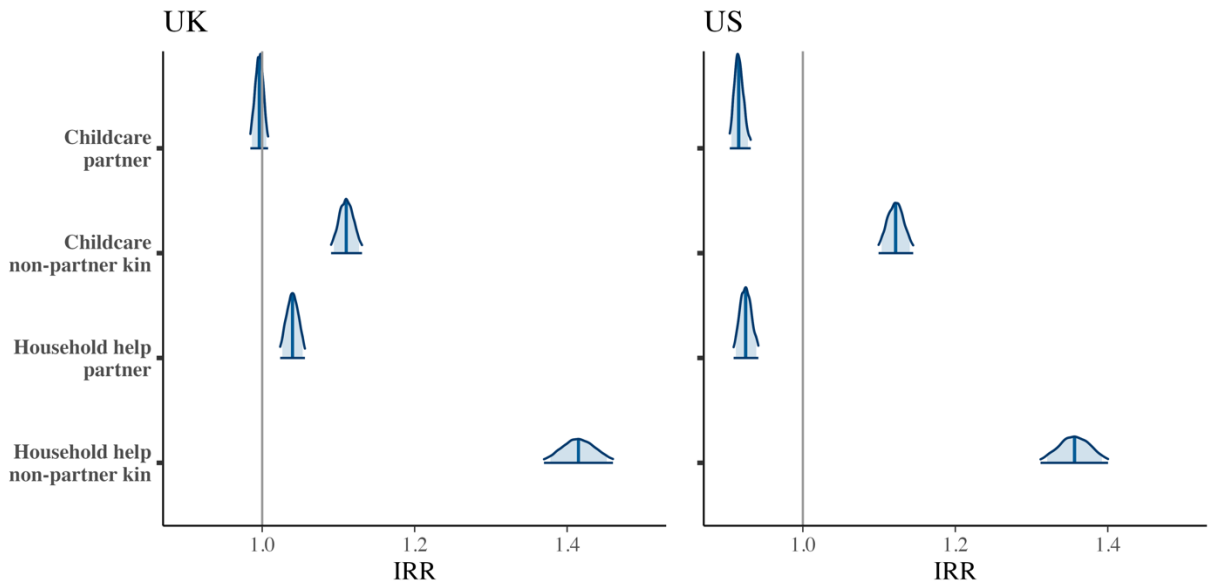

Figure 3. Posterior distributions of incidence rate ratios (IRR) for religiosity score, across models predicting childcare and household help provided by partners and non-partner kin in the UK and in the US separately. Blue shading indicates the 89% credibility interval and the full distribution represents the 95% credibility interval.

The relationship between a mother's religiosity and the help she receives depended on the type of help, the relationship of the helper to the mother, and her country of residence. Across both countries, the association between religiosity and non-partner kin support for both childcare and household help was always positive (Figure 3). Religiosity and household help from partners, however, exhibited a different relationship in each country: in the UK, greater religiosity was associated with receiving more household help from the partner, while in the US religiosity was inversely associated with to received from partners. Therefore, in the US, the negative association between religiosity and overall amount childcare help was explained by the decrease in contribution of partners.

Of the non-partner kin providing support to mothers, the most common is the child's maternal grandmother (36.7% of non-partner kin helpers in the UK, and 30.7% of non-partner kin helpers in the US), followed closely by the paternal grandmother in both countries (Table 2). However, the prevalence of grandmothers as a helper obscures the importance of another highly involved helper: children's sisters. Though children's sisters are less commonly named as allomothers, when they are, they provide the highest amount of support to mothers in both the UK and the

US, both in terms of childcare support and household help (Table 2). Considering that more highly religious women also tend to have more children, they are more likely to have this help available to them within their households. Visualization of the data does suggest that more religious women receive more help from their daughters than do less religious women (Figure 4). However, because of small sample sizes (2-6% of non-partner kin allomothers, or 20-30 such allomothers per country), we are unable to capture enough variation to make a strong statistical exploration of the potential relationship between religiosity and level of support by a child's older daughter.

Table 2. Comparison of the role of key allomothers (maternal grandmothers, paternal grandmothers, and female siblings) in the UK and the US in terms of their common-ness (percentage of non-partner kin allomothers) and the amount of childcare and household help they contribute (average score). Scores represent the estimated number of times the allomother helped with 5 childcare and 6 household tasks across the span of a month.

	Percentage of all non-partner kin allomothers	Average childcare score	Average household help score
UK			
Maternal grandmother	36.69%	38.68	12.43
Paternal grandmother	16.63%	29.51	3.33
Child's female sibling	2.39%	66.95	35.65
US			
Maternal grandmother	30.63%	45.81	21.16
Paternal grandmother	15.63%	41.87	11.39
Child's female sibling	5.63%	76.22	32.81

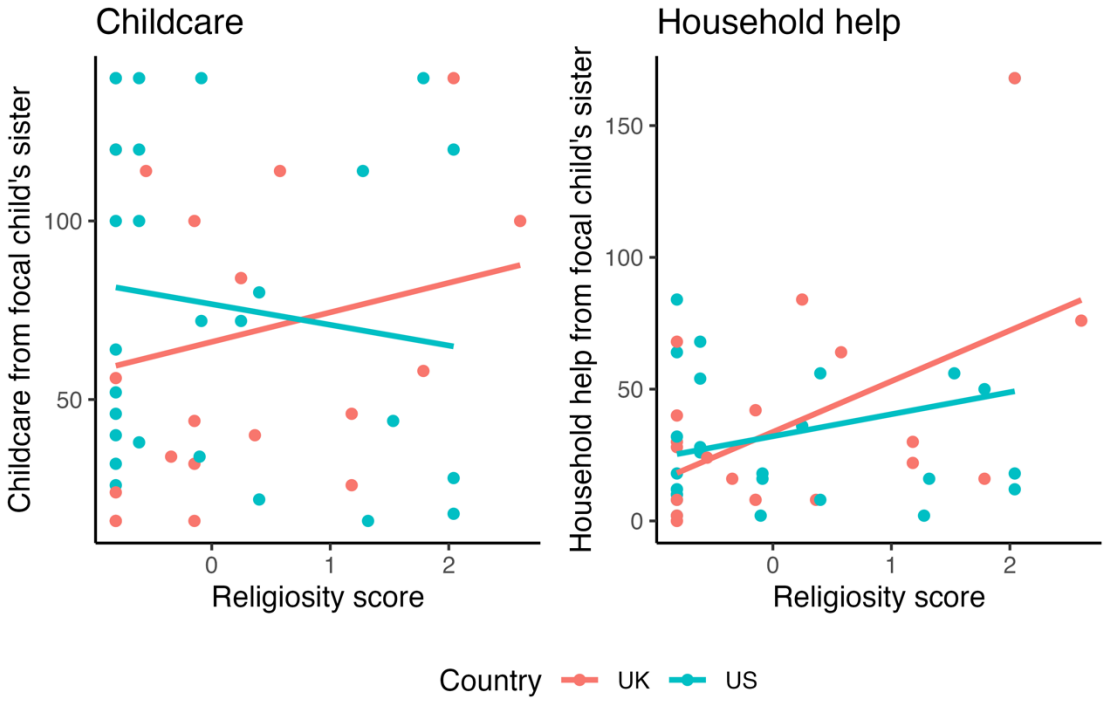

Figure 4. Relationship between mother's religiosity score and childcare (left) and household help (right) contributions by the focal child's female siblings.

3.3. **Prediction 3 (supported):** Religiosity is positively correlated with fertility

A mother's religiosity score was positively associated with age-adjusted fertility in both the UK (Beta [95% CI] = 0.17 [0.09, 0.25], Supplementary Table S14) and in the US (Beta [95% CI] = 0.14 [0.04, 0.22], Supplementary Table S14). The relationship between religiosity and fertility was greater in the UK relative to the US, as evidenced by a greater difference in age-adjusted fertility between the minimum and maximum religiosity scores in the UK than in the US (Figure 5). This could be because fertility was in general higher in the US than in the UK (Table 1), leaving less room for religiosity to impact fertility. We fit random effects but not random slopes for religious denomination in our models, meaning that our models fit the same relationship between religiosity score and age-adjusted fertility across all denominations. However, for some denominations there was an inverse bivariate relationship between religiosity and age-adjusted fertility (see Supplementary Figure S2). This tended only to be the case for denominations represented by smaller sample sizes, and the bivariate relationships do not account for sociodemographics accounted for in the multivariate models.

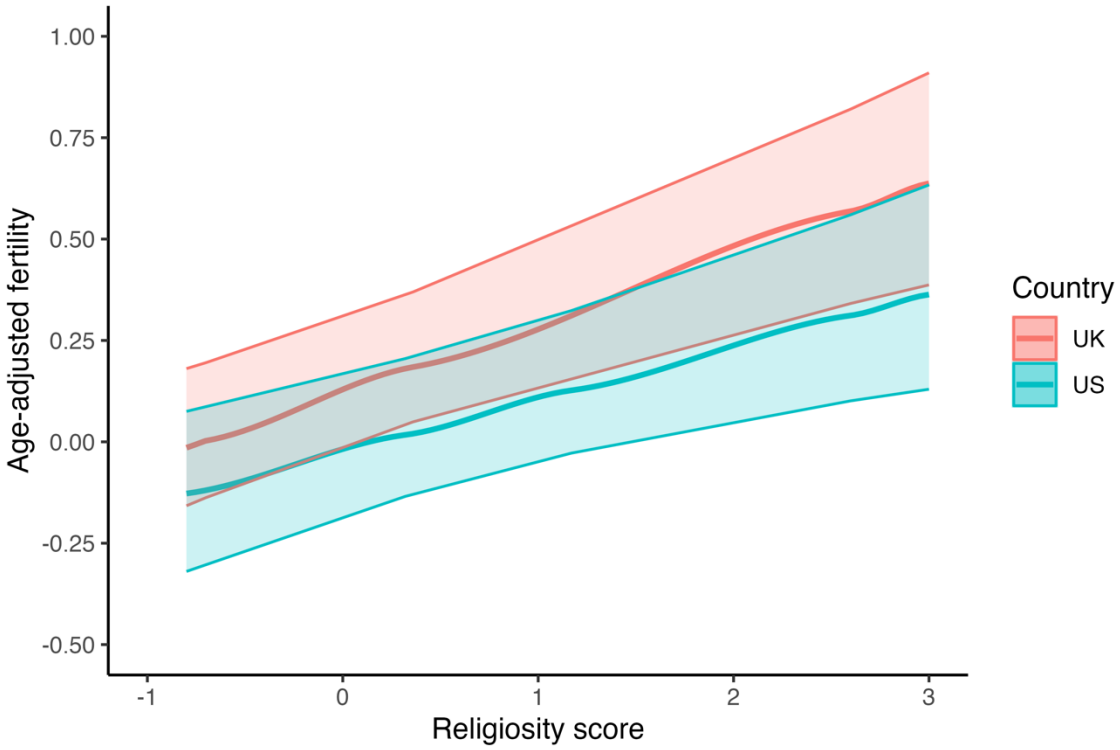

Figure 5. Model predictions for the impact of religiosity on the age-adjusted fertility, with all other predictor variables held at the mean or baseline.

3.4 Prediction 4 (not supported): Women who receive more allocare from kin will have higher fertility

This prediction was not supported by the data. For women in the UK, receiving more childcare help from kin was associated with a decrease in age-adjusted fertility (Beta [95% CI] = -0.06 [-0.11, 0.00], Supplementary Table S15, Figure 6), while in the US there was no association between the two (Beta [95% CI] = 0.01 [-0.07, 0.08] , Supplementary Table S15). Similar relationships were observed for household help received and age-adjusted fertility. For UK participants, the relationship between the two appeared to be inverse, though the effect was unclear as the 95% credibility interval crossed over zero (Beta [95% CI] = -0.04 [-0.09, 0.25], Supplementary Table S16), and there was no association for US participants (Beta [95% CI] = 0.01 [-0.06, 0.08]], Supplementary Table S16).

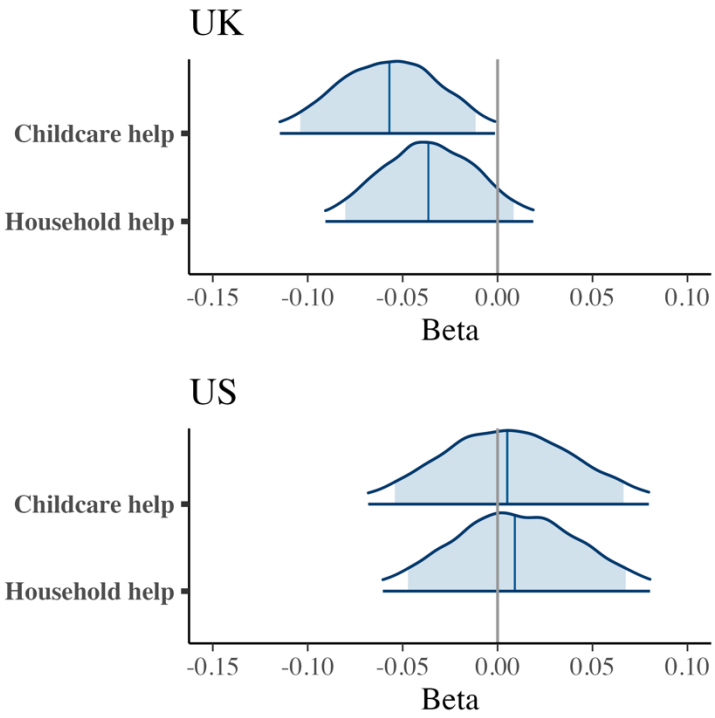

Figure 6. Posterior distributions for the coefficient for childcare help and household help (Beta), across models using these to predicting age-adjusted fertility. Blue shading indicates the 89% credibility interval and the full distribution represents the 95% credibility interval.

3.5 Prediction 5 (not supported): The amount of allomaternal investment received from kin will mediate the relationship between religiosity and fertility

In the UK, we found no mediating role of either allomaternal support from kin or of household help from kin (Figure 7, Supplementary Tables S17 and S18). For the US sample, while we similarly find no mediation when considering household help, there was weak evidence that childcare support from kin may mediate the relationship between religiosity and age-adjusted fertility (0.02, 95% ETI [-0.001, 0.010], Supplementary Table S17). The percentage of the effect of the independent variable (religiosity) that could be explained by the mediator (childcare support from kin) was 7.8%, but had an extremely wide credibility interval (-81.8%, 97.3%) Overall, the models showed little evidence of a mediating effect of either childcare score or household help score on the relationship between religiosity and age-adjusted fertility.

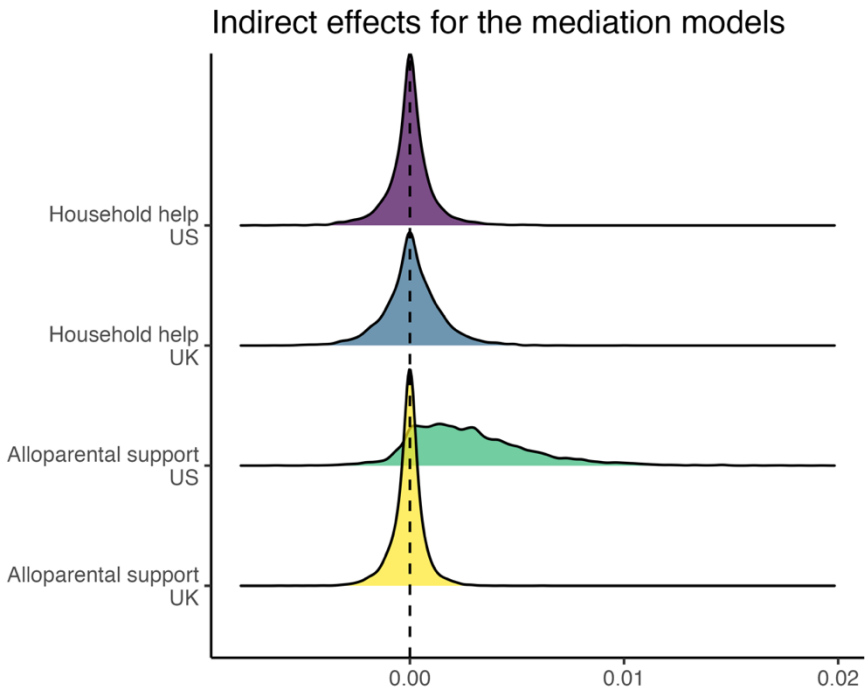

Figure 7. Posterior distributions of the average causal mediation effects (ACME), the indirect effect of the independent variable on the dependent variable through the mediator, for the models investigating the mediation of childcare and household help provided by kin in the US and UK separately

4. Discussion

Our findings, summarized in Table 3, show that more religious mothers receive greater support from non-partner kin in both the UK and the US. This is particularly striking given our finding that more religious mothers (at least in the UK) have more geographically diffuse kin networks, although they do maintain comparable emotional connections with kin despite geographic distance. We do not find evidence, however, that more religious mothers' higher fertility is driven by the greater allomaternal support they receive. In fact, allomaternal support is either inversely related to or not related to fertility. This provides mixed support for our predictions: though religious women do seem to be able to mobilize a larger amount of help from their allomaternal networks, this may not be the mechanism through which they are able to achieve higher fertility than less religious peers.

These findings add to previous work on religion, allomaternal support, and fertility, which document a relationship between religiosity and both maternal receipt of practical and emotional support (Shaver et al. 2020), as well as with an allomother's likelihood of providing support

(Shaver et al. 2019). Our study augments this existing evidence by directly measuring the childcare and household help provided by each allomother, enabling us to differentiate between the allomaternal support provided by different individuals in the allomaternal networks. Both studies, as does ours, document a positive association between religiosity and mother's fertility. Existing evidence on the relationship between maternal support measures and fertility from, however, was mixed in that different measures of allomaternal support had opposite relationships with fertility (Shaver et al. 2020). Our own mixed findings add to this unclear evidence. This growing body of literature confirms one portion of the *religious alloparenting hypothesis* suggested by Shaver (2017) to explain the *paradox of religious fertility*: more highly religious mothers do indeed appear to receive more allomaternal support than do less religious mothers. However, our study does not test the full model proposed by Shaver (2017), in that we do not extend our analysis to consider either child outcomes or family size. Future studies should test other components of the *religious alloparenting hypothesis*, for example the relationship between religiosity, family size, and child outcomes, as well as the full pathway proposed by Shaver (2017) to explain the *paradox of religious fertility*.

Our finding that more religious women have more geographically disperse networks was contrary to our predictions. However, a recent analysis of religiosity and social networks of women living in a rural region of Bangladesh showed similar results, namely that more religious women tended to have greater geographic spread of their kin networks (Lynch et al. 2022). This analysis differed from ours in that it modelled the proximity of each social network member residing in the same neighborhood, municipality, or elsewhere, depending on the mother's religiosity. One explanation for these findings is that religious individuals who move to a new area may seek to build relationships by connecting with religious communities through attendance at rituals and/or religious social groups. Studies of changes in religious behavior post-migration focus on international migration, these have found that individuals tend to increase religious participation immediately after immigration (Aleksynska and Chiswick 2013; Khoudja 2022), and that more religious migrants tend to develop more co-ethnic ties in their new country (Guveli 2015; Maliepaad and Scacht 2018), which can strengthen their religiosity in the longer term (Guveli 2015; Maliepaad and Scacht 2018; Guveli and Platt 2023). However, there is variation in the effect of heightened religiosity across denominations: some denominations may face structural barriers to participation that reduces their religious participation post-immigration (Massey and Higgins 2011; Khoudja 2022). Although these studies focus on international migration, it is likely that individuals migrating intranationally could also be seeking to connect to religious communities in order to rebuild social networks after a

move. This could explain why more religious women in our sample actually seem to have more geographically diffuse network, and highlights the key role that religion has in building social networks and cooperative ties between individuals.

Another factor complicating interpretation of this finding is the specific measure of kin proximity used in our analysis. The variable we used, a count of kin categories residing within an hour's travel time from the mother, was collected as it was expedient in a short online questionnaire. While it allowed us to model the relative geographic concentration of the mother's extended kin network, it does not reflect the absolute count of kin residing nearby. For example, a mothers with one sister nearby would have the same count for kin category as a mother who has three sisters residing nearby. Our data could not differentiate between these two scenarios. However, the imprecision of this variable has no impact on the interpretation of the remainder of the analyses presented here; the allomaternal help networks collected information for each individual named to the mother's help network kin or otherwise.

Table 3. Summary of the predictions made in this analysis and the key findings on each prediction in the UK and the US

	Predictions	Key findings	
		UK	**US**
Higher religiosity will predict:	1a. More kin-dense social networks	No relationship	
	1b. More kin in close proximity	↑Religiosity ↓kin categories in close proximity	No relationship
	2a. More support from kin with household tasks		
	* Number of kin providing help	No relationship	
	* Amount of support from kin	↑Religiosity ↑ amount of support from kin with household tasks	
	2b. More support from kin with care for children		
	* Number of kin providing help	No relationship	
	* Amount of support from kin	↑Religiosity ↑ amount of support from kin with childcare	↑Religiosity ↓ amount of support from kin with childcare
	3. Higher fertility	↑Religiosity ↑ age-adjusted fertility.	
	4. Receiving more allomaternal support from kin will predict higher fertility	↑ childcare or household support from kin ↓ fertility	No relationship
	5. The amount of allomaternal support received from kin will mediate the relationship between religiosity and fertility.	No evidence of mediation	

Religious women do tend to receive more practical support in terms of childcare and household help from their kin, particularly kin beyond their partner. There was a contrast in the relationship between the woman's religiosity and the level of her partner's support between the two countries: in the UK, religiosity was associated with either no change (childcare) or an increase in involvement (household help) from the partner, while in the US, religiosity was associated with reduced partner involvement with both types of help. Apart from the mother's partners, grandmothers were the most commonly named allomother. However, the allomothers with the highest average help scores, both for childcare and household help, were the focal child's female siblings, not the grandmother. Thus, while mothers may be relying more on grandmothers, when older female children are present, they become important contributors to the households, especially in terms of providing help with household tasks. It is important to note that the child's female siblings represent a small percentage of the individuals reported by mothers to their allomaternal networks. In this study, small sample sizes for these helpers prevented us from more rigorous exploration of the role of female siblings in allomaternal networks, and these results should therefore be considered preliminary. However, the importance and in-house availability of older daughters may contribute to our finding that more religious women in our sample tend to receive more help from kin, despite living near fewer non-household kin. It is possible that because more religious women also tend to have more children, they are more likely to have this help available to them within their households. This finding is consistent with cross-cultural data that illustrates the importance of female siblings in child investment (Kramer 2005), and that allomaternal care by sisters, in particular, is often positively associated with fertility (e.g., Turke 1989). Future studies should carefully consider the role played by older female siblings as allomothers, particularly in larger families where mothers need more support and older daughters are more likely to be available to help.

An unexpected finding was that the partners of more religious women in the US tended to invest less in both childcare and household tasks than did the partners of less religious women. This was surprising given the extensive literature which suggests that religious fathers tend to invest more in their children than less religious fathers (Bartkowski and Xu 2000; King 2003, Lynn et al. 2016), though this may be due to a difference in how paternal investments are measured (e.g. here direct childcare versus emotional support in previous studies). It is conceivable that more religious fathers report better emotional connections with children, while providing less support with childcare due to more defined and separate gender norms in religious families. This unexpected finding could arise from the fact that our measure of religiosity was based on the mother's religious practices, and we did not assess the father's

religiosity, which could bias the analysis of the relationship between a father's religiosity and investment in childcare. Some studies have shown that mothers tend to underreport paternal investment in childcare relative to what fathers self-report (Mikelson 2008). This is not likely to explain our finding, as it is unclear whether or why more religious mothers in the US would consistently tend to underreport their partners' contributions more severely than non-religious mothers in our study. Our finding of a reverse effect in the UK, where religiosity was correlated with higher partner investment in household tasks, suggests that there is a difference between the settings in the role that religiosity plays in support networks.

Although we found that religiosity positively affected both the amount of support received by mothers, and their fertility, there was no clear evidence that the amount of support received by mothers mediates the relationship between religiosity and fertility. The lack of an effect of the mediator could reflect the lack of a pathway between religiosity and fertility that is mediated by support to mothers. This interpretation is supported by our finding that help to mothers does not predict fertility in the US, and likely predicts it negatively in the UK (prediction 4, section 3.4). However, it is possible that this lack of a relationship could be due to study design factors. First, and foremost, while cross-sectional mediation analysis is common in the social sciences, evidence suggests that mediation analysis is most effectively carried out in longitudinal studies (Cain et al. 2018). Here, our data are cross-sectional and this limits our ability to accurately model the relationship between allomaternal support to mothers and their reproductive behavior. Additionally, there is the possibility that our mediator is misspecified or mismeasured, which can lead to a downward suppression of the indirect effect, in favor of the direct effect (Blakely et al. 2013; Pearce and Vandenbroucke 2016). There is also the possibility that cross-denominational differences in the relationship between religiosity and fertility revealed in our models extend to the mediating role of allomaternal support. Lastly, our analysis tested two measures of support to mothers, but it is possible that these are not the mechanistic pathways through which allomaternal support to mothers act on fertility. For example, Brough and Sheppard (2022) have found that depending on their level of education, UK mothers most commonly identify a lack of support from either their partners or their parents as barriers to reproduction. Schaffnit and Sear (2017a) found that for mothers in the UK, emotional support predicts increased likelihood of progressing to a second birth, but financial support does not. In a related analysis of mothers in the Netherlands, the same authors argue that receiving childcare support from kin in high-income settings may be indicative of maternal needs that are not conducive to childbearing (e.g. needing family support in order to participate in paid work), while emotional support may encourage births by signaling the availability of support (Schaffnit and Sear 2017b). The models

presented in our analysis may not capture the nuance in different types of support that might be important to mothers when choosing to progress to further births.

Lastly, our study highlights the variation that can exist between different high-income, low fertility (HILF) settings. The ecology of religiosity, allomaternal investment and fertility appears to differ between our UK and US participants. Regardless of religiosity, descriptive statistics revealed that UK women tended to have less geographically diffuse kin networks, and that US women tended to have higher age-adjusted fertility, i.e., more children and earlier reproductive schedules, than UK women. Religiosity also varied across the countries: religious women in the UK were less religious than their religious peers in the US, and while Catholics tended to be less religious than other Christian denominations in the US, this was not the case in the UK. How religiosity relates to allomaternal support also seems to vary across the study settings, particularly with regards to a woman's partner's investment in childcare and household tasks. Operationalizing religiosity is not straightforward, especially when comparing denominations with different practices. Overall, the variation in findings between countries in our analysis reinforces that HILF countries are not monoliths (Stulp et al. 2016), and that even in two socioculturally similar countries such as the UK and the US (Clarke et al. 1998) varying socioecologies exist across HILF settings and can impact allomaternal support networks.

This study has some limitations. First, our survey did not collect data on the mother's own level of investment in childcare and household maintenance tasks. Given that religious women receive more help with household tasks, it would be logical to test whether these women are then able to invest more time into childcare. Alternatively, it could be that women who have more children, like the more religious women in our sample, must perform more work to care for all of their dependents, so that allomaternal support allows her to work less rather than invest more in her children. These questions unfortunately cannot be investigated using these data. Second, our data stem from an online survey of women who were asked in August or September, 2020 to self-report behaviors and measures of support pertaining to a typical month before the onset of the COVID-19 pandemic, i.e. February, 2020. Although we asked mothers to report on their experiences before the onset of the pandemic, the time lag between the behaviors and the data collection period likely leads to a loss of resolution in the data. Additionally, although Prolific achieves a more naïve participant pool than other online survey platforms, registration on such platforms is likely to be non-representative of the overall population, particularly considering that this survey of mothers was conducted during the first summer of the COVID-19 pandemic. Third, although we collected cross-sectional data, it is becoming clear that in studying the role of allomothering in human reproductive systems,

longitudinal data may provide crucial insights missed in cross-sectional studies (e.g., Starkweather et al. 2021). Because of the inherent time dimension of fertility decision-making, i.e., mothers are making reproductive decisions dynamically based on their current assessment of their readiness for another child, and due to the possible reverse causality between support and birth decisions, longitudinal data collection has the greatest potential to teach us about the relationship between allomaternal support and fertility behaviors. Finally, this analysis focused on allomaternal support from kin. While most allomothers are kin, non-kin including unpaid as well as paid and institutional sources of help, can and do provide important support to mothers, especially in HILF settings. Future studies should consider the role that non-kin sources of support, both paid and unpaid, play in allomaternal networks, examine potential tradeoffs between maternal and maternal investment, and . If we are to build better understandings of the relationships between allomaternal support and time-lagged outcomes such as fertility or child outcomes, such studies should leverage longitudinal study designs where possible.

5. Conclusion

In this study, we examined the relationships between religiosity, allomaternal care from kin, and fertility in a sample of women from the UK and the US. In this sample, allomaternal support from kin is contributed primarily by their partners, their mothers (children's grandmothers), and, when present, children's older sisters. We find that religiosity is positively related to the amount of allomaternal support received from kin that is not the partner, while its associations with help from the partner vary between the study settings. Because religious women tend to have higher fertility, their ability to recruit more allomaternal support may stem from their higher fertility rather than their higher levels of religiosity. While religiosity predicts both greater allomaternal investments and higher fertility, allomaternal care does not mediate the relationship between religiosity and fertility. In fact, allomaternal care has largely null, or even negative, direct associations with women's fertility. To better understand the complex relationships between religiosity, allomaternal support, and reproductive decision making, future analyses ought to leverage longitudinal study designs, incorporate measures of a mother's own level of investments in the tasks supported by allomothers, and consider the role played by paid or government-provided support in settings where it is relevant.

6. Acknowledgements

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7. Data availability

The data associated with this research are available on the project's OSF page at: https://osf.io/rg235/?view_only=0a12714822fd4d4f990bc67b07ff370f

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