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The association between religiosity and fertility intentions via grandparenting: Evidence from GGS data

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Abstract

Although the literature on the association between religiosity and fertility in European countries is already quite extensive, studies exploring the mechanisms of action of religiosity are rare. The main aim of this article is to study whether grandparenting is an intermediate or modifying variable in the association between religiosity and the intention to have a second or third child. One assumption is that more religious grandparents might put more effort into establishing a positive family relation with adult children and grandchildren, thus more strongly influencing their adult children's fertility intentions. Using Generations and Gender Survey (GGS) data for eleven European countries, we find evidence of a strong and positive effect of religiosity on fertility intentions. We also observe that receipt of regular or weekly help from grandparents positively modifies the association between religiosity and fertility intentions, albeit only the intention to have a second child.

1. Introduction

Europe has been defined as “the continent with the lowest fertility” (The ESHRE Capri Workshop Group, 2010). The decline in fertility below the replacement level of generations (2.1 children per woman) has been associated with the second demographic transition (SDT) process (Kertzer et al, 2009; Lesthaeghe, 2010; Zaidi and Morgan 2017; Lesthaeghe, 2020). In addition to low fertility, the other main features of the SDT are an increasing age at motherhood, an increase in divorce rates, and the spread of out-of-wedlock unions and births. This process began in the early sixties and coincides with a profound change in the values of Western societies with an orientation towards values of “self-realization” (Lesthaeghe, 2010). In this process, secularization – a decline in the influence of religion on social life

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and at the individual level – plays a major role (Philipov and Berghammer, 2007; Voas, 2009; Lesthaeghe, 2010).

Despite the considerable decline in religiosity, according to Pew Research Center, in 2010, 81.2% of citizens of the European Union were affiliated with a religion, and 74.5% declared themselves Christians. Researchers have detected not only a "Christian renewal" but also a change in religiosity, with an increase in "believing without belonging" (Philipov and Berghammer, 2007: 276). At the macro level, the effect of religiosity on fertility remains important (Pew Research Center, 2010). However, the association between religiosity and fertility is complex, as many EU countries with high religiosity have very low birth rates (see Poland, Italy, Greece and Romania). Also for this reason, researchers have focused mostly on religiosity's effect at the micro level. Previous literature shows that at the individual level, religious practice exerts a strong and positive effect on fertility (Buber-Ennser and Berghammer, 2021; Bein et al, 2020; Peri-Rotem, 2020; Bein et al, 2017; Peri-Rotem, 2016; Régnier- Loilier and Prioux, 2015; Baudin, 2015; Berghammer, 2012 and 2009; Régnier- Loilier and Prioux, 2008; Adsera, 2006).

Religious practice is also positively linked to strong family support (Dykstra and Fokkema, 2011), defined as "familialism". In the case of intergenerational relations, Dykstra and Fokkema (2011:557) identify the following features of "descending" familism: "living nearby, frequent contact, endorsement of family obligation norms, and primarily help in kind from parents to children". Previous studies show a positive association of religiosity and grandparental childcare, especially when religiosity is measured through attendance of religious services (Dykstra and Fokkema, 2011; King and Elder, 1999). Moreover, the literature shows that grandparental childcare is positively linked with both fertility intentions (Taskanen and Rotkirch, 2014) and the actual number of children (Taskanen et al., 2014).

Based on these findings, the main aim of this article is to study whether grandparenting is an intermediate variable in the association between religiosity and fertility. In other words, we posit that religiosity may be associated with grandparental help, which in turn is associated with fertility. Grandparenting could also be a modifying variable, meaning that the strength of the association between religiosity and fertility could vary depending on whether grandparents help (or not) with grandchildren. In particular, we posit that religious grandparents might be especially focused on having a positive relation with their adult children and grandchildren (King and Elder, 1999). Even if the literature studying the association between religiosity and fertility-related behaviour in European countries is already quite extended (Bein et al, 2020; Bein et al, 2017; Peri-Rotem, 2016; Baudin, 2015;

Berghammer, 2009 and 2012; Régnier- Loilier and Prioux, 2008; Adsera, 2006), studies that explore the mechanisms of action of religiosity, particularly the intervening role of grandparental childcare, are rare.

Regarding our choice to study fertility intentions instead of realized fertility, few studies address the effect of religious practice on fertility intentions (Buber-Ennser and Berghammer, 2021; Bein et al, 2020; Bein et al, 2017; Philipov and Berghammer, 2007). Moreover, compared to the actual number of children, fertility intentions are shaped more strongly by religious teachings (Charton et al, 2009; Hayford and Morghan, 2008). Indeed, the actual number of children might be more the result of economic constraints than cultural factors (Balbo and Mills, 2011; Hayford and Morghan, 2008). Additionally, in the study of the relationship between religiosity and fertility behaviour, reverse causality might be an issue: men and women might practise their beliefs more when they have children instead of having children because they practise more (Frejka and Westoff, 2008). This risk is limited in the context of fertility intentions.

In this article, we study the link between religiosity and the intention to have a second or a third child. Previous literature shows that the effect of religiosity is greater for the latter (Philipov and Berghammer, 2007). In our study, we do not consider the intention to have a first child. The effect of religiosity on the intention to have a first child may be underestimated due to lower rates of nonmarital fertility among the most religious (Hayford and Morgan, 2008). Another reason to focus on the intention to have a second or third child is that contemporary low fertility in European countries is due mainly to the low percentages of couples with second- and higher-order children (Philipov and Berghammer, 2007).

To measure the association between religiosity and fertility intentions, we use the first wave of the Generations and Gender Survey (GGS) for eleven European countries (Bulgaria, Russia, Georgia, Germany, France, Romania, Austria, Lithuania, Poland, Czech Republic and Sweden) for which information on religiosity, religious affiliation, and grandparenting is available.

This study is structured as follows. First, in section 3.2., we present the theoretical and empirical background, together with our hypotheses. We consider how men's and women's attendance of religious services affects their intentions to have a second or third child. In section 3.3., we present the data and methods and the operationalization of concepts. In section 3.4., we present our findings. Finally, in the conclusion, we discuss our results and the limitations of our study.

2. Theoretical background and previous findings

Religiosity and fertility

McQuillan (2004:49) identifies three elements of religion's influence on fertility: the "sense of attachment" to a religious group, the "behavioral norms of a religion ... that have linkages to fertility", and religion's "means to communicate its teachings". It has been assumed that religious teachings affect norms, the organization of family life, and fertility ideals and behaviours (Stonawski et al, 2015; Baudin, 2015; Adsera, 2006). Moreover, these teachings are conveyed in a context of socialization where couples receive support from other members of their religious community, or church members in the case of Christian (Philipov and Berghammer, 2007; Myers, 2004). According to Myers (2004: 68), "the overall collectivism of religious values creates an expectation that religious individuals provide support and assistance to other individuals".

In previous literature, two main indicators are employed to capture these dimensions: religious affiliation and attendance of religious services. Previous studies indicate a positive association between religious affiliation and fertility, although this link might depend on the national context (Philipov and Berghammer, 2007; Berghammer, 2009; Baudin, 2015; Pew Research Center, 2015). In particular, this effect is weak in countries where the vast majority of people belong to one denomination (Adsera, 2006). However, according to Adsera (2006), members of a religious denomination who do not actively participate are less likely to be "committed" to its teachings, and it is attendance of religious services that more strongly affects fertility (Baudin, 2015; Berghammer, 2009; Philipov and Berghammer, 2007; McQuillan, 2004). This is thus the indicator of religiosity taken into account in this study.

Some studies also show that men's religiosity has a stronger effect on fertility ideals than women's religiosity (Adsera, 2006; Hubert, 2015). This may be linked to the fact that the percentage of nonreligious individuals is higher among men than among women in most countries. The minority status of religious men probably indicates more conscious participation in religious services than that of religious women. Consequently, it is no surprise that religious men have more distinctive fertility behaviour than nonreligious men.

Thus, following previous studies, *we posit that religious practice is positively associated with fertility intentions (H1) and that this association is stronger for men than for women (H2).*

Religiosity and grandparenting

Previous studies indicate a positive effect of religiosity – measured with several indicators – on grandparental childcare (Dykstra and Fokkema, 2011; King and Elder, 1999). In particular, Dykstra and Fokkema (2011), in a comparative study on European countries, show that religiosity (specifically, praying) is positively associated with descending familism (as defined above). The reason may be found in the fact that "religious teachings and beliefs emphasize and support the centrality of the family and the importance of positive family relationships" (King and Elder, 1999: 318).

It should be noted that these studies take into account the religiosity of grandparents, while in our study, only information on the religiosity of adult children is available. However, the literature shows a strong correlation between the religiosity of adult children and that of their parents (e.g., Petts, 2015; Bengtson et al, 2009; Myers, 1996; Glass et al, 1986), making plausible the approximation of grandparents' religiosity with adult children's religiosity.

Grandparenting and fertility

Previous studies also show that grandparental support is positively associated with fertility-related behaviour (Aasve et al, 2012; Taskanen et al, 2014; Taskanen and Rotkirch, 2014). More specifically, grandparental involvement in childcare has a positive effect on both fertility intentions (Taskanen and Rotkirch, 2014) and the actual number of children (Taskanen et al., 2014).

For this reason, and considering previous findings on the associations between religiosity and fertility and between religiosity and grandparenting, *we hypothesize that family support in childcare is an intermediate variable in the association between religious practice and fertility intentions; i.e., grandparenting partially mediates the effect of religiosity on fertility intentions (H3). Alternatively, we propose the existence of a modification effect, i.e., that the effect of grandparenting on fertility intentions is greater among the most religious grandparents (H4).* As mentioned above, one possible mechanism could be that because of their stronger familism, religious grandparents put more effort into establishing a positive family relation with adult children and grandchildren (King and Elder, 1999). Because of this greater help, they might more favourably affect their children's fertility intentions than nonreligious grandparents.

3. Data and method

For the purposes of this paper, we use data from the Generations and Gender Survey (GGS), collecting comparable and multidimensional microlevel data on fertility, partnership, generations, economic activity, and care duties. The first wave of the GGS was conducted between 2004 and 2013 in 20 countries. An average of 9,000 individuals were interviewed per country. The first wave is the only wave with information on religiosity for a large number of countries. In particular, for this study, we use data from eleven European countries: Bulgaria, Russia, Georgia, Germany, France, Romania, Austria, Lithuania, Poland, the Czech Republic and Sweden. The selected countries are the only ones for which information on religious affiliation, attendance of religious services, and grandparenting is available. Other countries in the GGS lack information on religion or religiosity; e.g., for Australia, Italy and Estonia, information on religion affiliation is not available, while for the Netherlands and Hungary, data on attendance of religious services are lacking. In Italy, information on grandparenting is also not available.

We focus on men and women who have one or two children and who are aged 20–49 years and partnered (married or in cohabitation). Because of the small sample size at the country level, we pool the data from the eleven countries. Once we remove individuals with missing information, the final sample consists of 6,919 individuals having one child and 8,935 individuals having two children. We observe 3,984 individuals who intend to have a second child and 1,050 individuals who intend to have a third child within 3 years. As in other surveys, there are more women respondents than men (Fokkema et al, 2016), either due to men's refusal to answer or due to their unavailability.

We investigate the relationship between religiosity and fertility intentions. For the dependent variable, we group the four categories – 1 “definitely not”, 2 “probably not”, 3 “probably yes” and 4 “definitely yes” – of the variable “Intention to have a/another child during the next three years” under a binary variable where the value 1 represents a positive answer and the value 0 a negative one. The reason for focusing on fertility intentions “during the next three years” is that those who declare an intention of having a child “within 3 years” have almost decided to have another child. This answer reflects a real interest in having another child and reduces the possibility of a change in intentions (Hayford and Morgan, 2008).

Regarding religiosity, our main explanatory variable, by combining the variables on attendance of religious services and religious denomination, we create a new variable that contains three categories: (1) at least monthly attendance; (2) less than monthly attendance; (3) no religious affiliation. In this study, we refer to this variable as both “attendance of

religious services” and “religious practice”. We must point out that among the affiliated, Christian denominations represent 94.7% of the sample of parents with one child and 92.7% of the sample of parents with two children. Thus, our results mostly refer to the Christian denominations. In our robustness check, a second indicator of religiosity referring to the importance of religious ceremonies in case of birth, marriage and death is used.

Concerning grandparental childcare, we have two options: using either the variable on grandparents' regular help or the variable on weekly help. First, we use regular help from grandparents, as it is the most common practice among parents: in our sample, 37.7% of parents with one child receive regular grandparental help, while only 19.5% receive weekly help. The GGS questionnaire asks, “Do you (also) get regular help with childcare from relatives or friends or other people for whom caring for children is not a job?” In case of an affirmative answer, the survey also asks, “From whom do you get this help?” This allows us to create a dichotomous variable (yes/no) on grandparents' regular help. For childcare by grandparents, we include childcare by great-grandparents, who help more than 8% of the couples in our sample. Second, to check the robustness of our results, we replicate our analysis with the weekly help indicator (see the “Robustness check” section).

The control variables are age, marital status, educational level, sex, and activity status. Respondents' age is recoded into four categories: (1) 20 to 29 years; (2) 30 to 34 years; (3) 35 to 39 years; and (4) 40 to 49 years. Concerning the age of the youngest child, we create a new variable containing three categories: (1) 0 to 1 year; (2) 2 to 4 years; and (3) 5+ years. To create the variable marital status, we combine the GGS variables *marital status respondent* and *current partner status*. This variable includes two categories: (1) married and (2) in cohabitation. Regarding educational level, we create a variable with three categories: (1) low (preprimary level, primary level, lower secondary level); (2) medium (upper secondary level, postsecondary nontertiary level); and (3) high (first stage of tertiary, second stage of tertiary). Finally, we recode the variable *activity status respondent* and create a new variable with three categories: (1) employed/self-employed; (2) unemployed; and (3) inactive. Another control variable is the country of residence (see countries presented above).

Regarding the estimation method, a logistic regression analysis is used to measure the association between the intention to have another child within three years and religiosity at the time of the survey (Hilbe, 2014). To find support for our hypotheses, we estimate nine models for each parity (Table 5 and Table 6). In the first model, we study the association between religiosity and the intention to have another child. In models 2–7, we add control

variables. In model 8, we include grandparental childcare: if the effect of religiosity on fertility intentions varies once we add grandparental childcare to the model, this would represent the first evidence of the intermediate effect of grandparenting. In model 9, we add the age of the youngest child, an important predictor of fertility intentions.

A further model includes the interaction Religiosity*Grandparental childcare to verify whether the effect of religiosity on fertility intentions is modified by receipt of regular help from grandparents (Table 7). Another model includes the interaction Religiosity*Sex to ascertain whether the effect of religiosity on fertility intentions varies with the sex of the respondent (Table 7).

To check the robustness of our results, the interaction models are estimated with an alternative indicator of religiosity referring to the importance placed on religious ceremonies in case of birth, marriage or death (Table 8). Finally, to check the robustness of the results, in Table 9, we use weekly help from grandparents instead of regular help.

4. Results

4.1. Descriptive analysis for parents with one child

In the sample of individuals with one child, 51.8% of people want another child (Table 1). However, there are sharp differences among countries. For Georgia and Sweden, the percentages of people who want a second child are 73.4% and 75.2%, respectively; for Germany and Romania, they are 39.9% and 41%, respectively (Table 2).

Regarding religiosity, and considering all the countries in our sample, 28.4% of people attend religious ceremonies at least monthly, 57.9% attend less than monthly, and 13.7% have no religious affiliation (Table 1). Variations among countries are important. In Poland, 67.3% of people attend religious ceremonies at least monthly. This group makes up 44.1% in Georgia and 40.7% in Romania (Table 2). In Sweden and the Czech Republic, the percentages of individuals attending religious ceremonies at least monthly are only 4.1% and 6.6%, respectively (Table 2).

Concerning regular grandparental (and great-grandparental) help with childcare, 37.7% of parents receive regular help (Table 1). The countries with the highest percentages of grandparental childcare are Austria and Russia (54.8% and 48.2%; Table 2), while those with the lowest percentages are Romania and Lithuania (21.7% and 25.2%; Table 2). In Romania, this low percentage could be related to the fact that this country has one of the

highest rates of women's labour force inactivity among the countries in our sample (Table 2); it is likely that nonworking women are less in need of help from grandparents than working women.

4.2. Descriptive analysis for parents with two children

In the sample of individuals with two children, 10.6% want a third child within the next three years (Table 3). Georgia and France have the highest percentages (25% and 16%, respectively) of individuals who intend to have a third child and Bulgaria (3.8%) and Romania (4.3%) the lowest (Table 4).

Regarding religiosity, Poland and Romania are the countries with the highest percentages of individuals who attend religious services at least monthly (79.5% and 45.8%, respectively; Table 4). In these countries, the percentage of people with no religious affiliation is between 0 and approximately 1% (Table 4), while the Czech Republic and Sweden are the countries with the highest percentage of persons with no religious affiliation (72.9% and 21.6%, respectively; Table 4). Overall, we could say that with the exception of Poland and the Czech Republic, in all countries, the majority of people are practising, albeit less than once per month (Table 4).

Overall, the percentage of those who receive regular help with childcare from either grandparents or great-grandparents is 30.9% (Table 3). Austria has the highest percentage (50.4%) and Romania the lowest (15%; Table 4).

Finally, in all cases at the aggregate level and for respondents with two children, the percentages of grandparenting do not seem to vary according to the levels of religiosity (see the Appendix).

4.3. The effect of religious practice on the intention to have a second child

We run a logistic regression on the sample of individuals with one child (Table 5). Our findings show that religiosity is positively associated with the intention to have a second child. The association is statistically significant ($p < 0.01$), and it is particularly strong for people who attend religious services at least monthly in comparison to people with no religious affiliation ($OR = 1.88$, Table 5, Model 9). The odds of intending to have a second child are also higher for those who attend less than monthly than for those who have no affiliation ($OR = 1.44$, Table 5, Model 9).

Grandparental childcare help is positively associated with fertility intentions as well. The results are statistically significant ($p < 0.05$) and show that those who benefit from grandparental help have odds of intending to have a second child that are 13% higher than those of parents who do not benefit from grandparental help (Table 5, Model 8). However, once we control for the age of the youngest child, the effect of grandparental help with childcare is no longer significant (Table 5, Models 8–9). This result could depend on the fact that the age of the youngest child might be a confounding variable simultaneously affecting grandparental childcare and intentions to have a second child.

Adding the variable on grandparenting does not change the results about religiosity, contradicting our hypothesis about an intermediate role of grandparenting. However, the interaction Religiosity*Grandparental childcare is positive and statistically significant. This signifies that the association between religiosity and fertility intentions is modified by regular grandparental help with childcare. When grandparents do not help regularly with childcare, the odds of the intention to have a second child among those who attend religious services at least monthly are 64% higher than those among parents who have no religious affiliation ($OR = 1.64$, $p < 0.01$, Table 7, Model 1). When grandparents help regularly with childcare, the odds of the intention to have a second child are magnified by more than double ($OR = 2.29 = \exp(0.50 + 0.33 * 1)$, $p < 0.10$, Table 7, Model 1). A modification effect of grandparenting is also observed for those who practise less than monthly: $OR = 1.30$ when grandparents do not help regularly ($p < 0.05$) and 1.68 when grandparents do help regularly ($OR = \exp(0.26 + 0.26 * 1) = 1.68$, Table 7, Model 1), although the results are not significant.

Finally, the interaction Religiosity*Sex is positive and statistically significant, meaning that the association between religiosity and fertility intentions varies according to the sex of the respondent. Women who attend religious services at least monthly have odds 53% higher than those of women with no religious affiliation ($OR = 1.53$, $p < 0.01$). The odds are much higher for men: in the comparison of male respondents who attend at least monthly with male respondents with no religious affiliation, the OR is equal to 2.41 ($OR = \exp(0.42 + 0.46 * 1) = 2.41$, Table 7, Model 2). Finally, although less strong, a modification effect of sex is also observed for those who practise less than monthly: the OR is equal to 1.20 for women (but not significant) and 1.72 for men ($OR = \exp(0.18 + 0.36 * 1) = 1.72$, $p < 0.10$, Table 7, Model 2).

4.4. The effect of religious practice on the intention to have a third child

Religious practice is also positively associated with the intention to have a third child (Table 6). As already observed for the intention to have a second child, people who attend religious services at least monthly have higher odds than those with no affiliation ($OR = 1.95$, $p < 0.01$, Table 6, Model 9).

We find a weak positive association between grandparental childcare and fertility intentions, but the result is not significant (Table 6, Model 9). Adding the grandparental childcare variable to the model does not change the odds ratios of religiosity, contradicting our hypothesis about the intermediate role of grandparenting. Regarding the interaction Religiosity*Grandparenting, the results are not statistically significant (Table 7, Model 3), failing to support our hypothesis about a modification effect of grandparenting.

Similarly, the interaction Religiosity*Sex is not statistically significant (Table 7, Model 4).

The comparative interpretations of these results and those observed for the intention to have a second child are discussed in the final section.

4.5 Robustness check

Several robustness checks are performed. First, our nested models (Table 5 and Table 6) show that the positive effect of religiosity on fertility intentions slightly increases after we add control variables. In particular, adding the country of residence changes the religiosity coefficient the most. A model with interactions between religiosity and each country is also estimated. We expect a greater impact of religiosity (representing encouragement from religious teachings and religious communities) and of grandparental help on fertility intentions in countries where family policies are limited. However, no consistent pattern is detected (results not shown but available on request). We also run a model interacting religiosity, grandparenting, and country of residence. Again, no consistent results appear (results not shown but available on request).

Second, we try an alternative coding of the main explanatory variable: in addition to people with no religious affiliation, we add religious people who do not practise to the reference category. In this case, the interaction with regular grandparenting is no longer statistically significant. In other words, the joint effect of monthly attendance of religious services and grandparenting must be compared to the effect on those without an affiliation to detect a significant difference.

Third, we build an alternative indicator of religiosity. Specifically, we consider three variables measuring the importance that respondents attach to religious ceremonies in the case of births, weddings, and funerals. Then, we build an indicator summing the three variables. Generally, our results hold even if the magnitude of coefficients is smaller than those obtained when religiosity is measured as attendance of religious services (Table 8). This result is expected, as people's preference for religious ceremonies in the case of births, weddings and funerals might depend more on tradition than on religiosity, resulting in a weaker impact on fertility intentions. Baptism is a Christian practice; thus, Muslims might not respond to the question or declare that a ceremony related to birth is not important (Hubert, 2015), which could explain the smaller effects of this new indicator of religiosity on fertility intentions. Nevertheless, this is not the case in our sample: Muslims who do not respond are only 2.2% in the sample of one-child parents and 2.1% in the sample of two-children parents. Moreover, the percentage of Muslims saying that the ceremony is not important is not substantially different from that for respondents of other denominations (results not shown).

Finally, a further model is estimated with a different indicator for grandparenting. In this supplementary analysis, we use a dichotomous variable for grandparenting, where the value 1 designates receipt of grandparental help at least weekly, while 0 corresponds to no help or receipt of help less than weekly. This is a more demanding criterion than that used to construct the indicator in the previous analysis, where grandparenting is equal to 1 in the case of receipt of regular help. With the new indicator, the joint effect of grandparenting and monthly religious practice on the intention to have a second child becomes larger: $OR=2.51$ ($p<0.10$, Table 9) instead of 2.29 when the previous indicator on regular grandparenting is used. When the religious practice is less than monthly and grandparenting is weekly, $OR=1.29$ ($p<0.05$, Table 9).

4.6 Other results

Those who cohabit without being married are more likely to intend to have a third child than those who are married (Table 6, Models 3–9). This is in line with previous studies showing that many of those who have two children and cohabit are divorced and want a further child in the new union (Thomson et al, 2012). We conduct a descriptive analysis confirming the higher propensity of divorced people who cohabit to intend to have a third child. In our study, among those who cohabit and have two children, 11% are divorced people. Divorced persons who cohabit and have two children want a third child in 29.8% of cases; nondivorced

cohabitants who want a third child are 16.2%, while married persons who want a third child are 9.6%.

We also observe that educational level is positively associated with intention to have a second or a third child (Table 5 and Table 6, Models 4–9). Some previous studies show no consistent result for parities higher than one; however, other studies show a positive educational gradient in Sweden (Berinde 1999), Estonia (Klesment and Puur 2010), and France (Köppen 2006).

We observe that men are more likely to intend to have a second or a third child than women (Table 5 and Table 6). In this respect, previous literature is ambivalent, showing, in some countries, higher fertility intentions for men and, in other countries, higher intentions for women (e.g., Lappegard et al, 2015; Berrington, 2004).

Finally, inactive persons are more likely to intend to have a third child than employed and unemployed persons (Table 6, Model 6–8), echoing previous studies that show that women's labour force inactivity is positively related to fertility (Cooke, 2009; Pahlé and Solaz, 2012; Cazzola et al., 2016).

5. Discussion and conclusion

This study explores the association between fertility intentions, religiosity and grandparenting, pulling together data from eleven European countries. Our *first hypothesis* was that attendance of religious services is positively associated with fertility intentions. The hypothesis was supported by our results: those who attend religious services at least once per month are more likely to intend to have a second or a third child than those who have no religious affiliation. In other words, religious teachings promote pronatalist ideals, norms and behaviour (Stonawski et al, 2015; Baudin, 2015 Adsera, 2006), and those who attend religious services are more committed to these teachings and receive emotional and practical support from congregants (Philipov and Berghammer, 2007; Myers, 2004).

Our *second hypothesis* was also supported by our findings. Men who attend religious services at least monthly are more likely to intend to have a second child than women, confirming previous results from Adsera (2006) and Hubert (2015). As highlighted above, this evidence may be linked to the fact that in most countries, religious men constitute a small minority (Adsera, 2006), which probably indicates more conscious participation in religious services than religious women, together with a more distinctive fertility decision

process than that of men with no religious affiliation. However, a statistically significant result was observed only for the intention to have a second child.

In our *third hypothesis*, we posited that grandparental support is an intermediate variable in the association between religious practice and fertility intentions, and in our *fourth hypothesis*, we proposed that the effect of grandparenting on fertility intentions is greater among the most religious persons. To our knowledge, no previous studies have explored these mechanisms. In line with our fourth hypothesis, we found evidence for an interaction between religiosity and grandparenting but only for the intention to have a second child. Assuming that the religiosity of adult children could be taken as an approximation of their parents' religiosity, one mechanism that we already mentioned above could be that because of their stronger familism, most religious grandparents put more effort into establishing a positive family relation with adult children and grandchildren (King and Elder, 1999), thus favouring fertility intentions. Another explanation is that adult children who are more religious might be more receptive to encouragement to have another child and that this encouragement might come from their parents, especially when the latter help with childcare. Why would these mechanisms appear more clearly for the second child? Previous studies have shown that although grandparenting is beneficial for the health of grandparents (Danielsbacka et al, 2019), this is not the case when grandparenting is intensive (Arpino and Gómez-León, 2020). Moreover, grandmothers and grandfathers are older (the average years of birth are 1946 and 1942, respectively) in the sample of parents with two children than in the sample of parents with one child (the average years of birth are 1949 and 1946). Thus, encouragement to have a third child could be less likely from these older grandparents.

One limitation of our study is that only a restricted number of countries is considered. A larger number of countries would allow us to group them according to the welfare state typology and verify the role that the welfare state plays in the association between religiosity, grandparenting and fertility intentions. Another limitation concerns the lack of information on the religiosity of grandparents, inferred here from the religiosity of adult children (the respondents). Despite these limitations, studies on the association between religiosity and fertility intentions in European countries are rare, and even rarer are those exploring the mechanisms of the association while considering, in particular, grandparental help in childcare as a modifier.

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Tables

Table 1 Distribution of variables, one child

Intentions to have a second child during the next 3 years	%	Obs.
Does not want	48.20%	3396
Wants	51.80%	3649
Religiosity		
At least monthly attendance	28.40%	2364
Less than monthly attendance	57.90%	4826
No religious affiliation	13.70%	1146
Age		
20–29	31.90%	2659
30–34	31.80%	2647
35–39	22.70%	1896
40–49	13.60%	1134
Marital status		
Married	83.10%	6929
Cohabitant	16.90%	1407
Educational level		
Low	9.40%	779
Medium	58.40%	4873
High	32.20%	2684
Sex		
Female	54.60%	4554
Male	45.40%	3782
Activity status		
Employed/Self- Employed	80.80%	6734
Unemployed	9%	750
Inactive	10.20%	852
Countries		
Bulgaria	15.30%	1275
Russia	11.10%	918
Georgia	7.50%	626
Germany	6.70%	561
France	5.30%	443
Romania	12.50%	1043
Austria	6.40%	537
Lithuania	9%	749
Poland	16.70%	1393
Czech Republic	6%	498
Sweden	3.50%	293
Grandparenting regular		
Yes	37.70%	3143
No	62.30%	5193

Age of the youngest child

0–1 year	25.70%	2141
2–4 years	28.90%	2405
5+ years	45.40%	3787

Table 2 Distribution of independent variables by country, one child

	Bulgaria		Russia		Georgia		Germany		France	
Intentions to have a second child during the next 3 years	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.
Does not want	53.80%	616	57%	462	26.60%	132	60.10%	258	33.80%	121
Wants	46.20%	529	43%	349	73.40%	365	39.90%	171	66.20%	237
Religiosity										
At least monthly attendance	20.20%	257	7.80%	72	44.10%	276	13%	73	6.10%	27
Less than monthly attendance	72.50%	224	70.70%	649	55.10%	345	62.20%	349	78.10%	346
No religious affiliation	7.30%	94	21.50%	197	0.80%	5	24.80%	139	15.80%	70
Age										
20–29	32.30%	412	46.20%	424	44.30%	277	20.90%	117	25.30%	112
30–34	37%	472	31.20%	286	25.90%	162	28.10%	158	30.30%	134
35–39	20.90%	266	14.70%	135	15.60%	98	26.20%	147	27.50%	122
40–49	9.80%	125	7.90%	73	14.20%	89	24.80%	139	16.90%	75
Marital status										
Married	87.40%	1114	90.20%	828	65.70%	411	84.50%	474	58.90%	261
Cohabitant	12.60%	161	9.80%	90	34.30%	215	15.50%	87	41.10%	182
Educational level										
Low	12.20%	156	5.10%	47	7.70%	48	11.10%	62	10.80%	48
Medium	57%	727	49.80%	457	53.30%	334	63.80%	358	49.40%	219
High	30.80%	392	45.10%	414	39%	244	25.10%	141	39.80%	176
Sex										
Female	59.40%	757	56.90%	522	49.80%	312	62%	348	54%	239
Male	40.60%	518	43.10%	396	50.20%	314	38%	213	46%	204
Activity status										
Employed/Self- Employed	77.40%	987	82.40%	756	46.20%	289	80.90%	454	84%	372
Unemployed	18.40%	234	5.40%	50	23.80%	149	5.70%	32	10.40%	46
Inactive	4.20%	54	12.20%	112	30%	188	13.40%	75	5.60%	25
Grandparenting regular										
Yes	45%	574	48.20%	442	31.30%	196	31.90%	179	39.50%	175
No	55%	701	51.80%	476	68.70%	430	68.10%	382	60.50%	268
Age of the youngest child										
0–1 year	18.90%	241	19.20%	176	29.40%	184	28.20%	158	39.50%	175
2–4 years	24.80%	316	28.10%	258	34%	213	29.60%	166	32.70%	145
5+ years	56.30%	717	52.70%	484	36.60%	229	42.20%	237	27.80%	123

Table 2 (continued)

	Romania		Austria		Lithuania		Poland		Czech Republic	
Intentions to have a second child during the next 3 years	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.
Does not want	59%	572	45.90%	218	46.70%	292	43.70%	493	44.60%	183
Wants	41%	397	54.10%	257	53.30%	333	56.30%	635	55.40%	227
Religiosity										
At least monthly attendance	40.70%	424	21.20%	114	18.40%	138	67.30%	938	6.60%	33
Less than monthly attendance	59.30%	619	62.00%	333	74.10%	555	30.30%	422	19.30%	96
No religious affiliation	0%	0	16.80%	90	7.50%	56	2.40%	33	74.10%	369
Age										
20–29	20.50%	214	27.80%	149	38.90%	291	31.80%	443	32.90%	164
30–34	32.20%	316	26.80%	144	30.40%	228	32.70%	456	35.50%	177
35–39	34.30%	358	24.90%	134	19.80%	148	24.10%	336	18.90%	94
40–49	13%	135	20.50%	110	10.90%	82	11.40%	158	12.70%	63
Marital status										
Married	95.30%	994	67.60%	363	90.30%	676	89.90%	1252	81.50%	466
Cohabitant	4.70%	49	32.40%	174	9.70%	73	10.10%	141	18.50%	92
Educational level										
Low	16.90%	176	8.80%	47	8.30%	62	4.20%	59	12.90%	64
Medium	66.70%	696	71.30%	383	59.40%	445	56%	780	68.70%	342
High	16.40%	171	19.90%	107	32.30%	242	39.80%	554	18.40%	92
Sex										
Female	46.50%	485	60.70%	326	47.80%	358	55.10%	767	55.80%	278
Male	53.50%	558	39.30%	211	52.20%	391	44.90%	626	44.20%	220
Activity status										
Employed/Self- Employed	82.70%	862	89%	478	91.20%	683	80.60%	1192	92.60%	461
Unemployed	4.20%	44	3.50%	19	3.90%	29	8.20%	114	4.60%	23
Inactive	13.10%	137	7.50%	40	4.90%	37	11.20%	157	2.80%	14
Grandparenting regular										
Yes	21.70%	226	54.80%	294	25.20%	189	41%	571	37.20%	185
No	78.30%	817	45.20%	243	74.80%	560	59%	822	62.80%	313
Age of the youngest child										
0–1 year	15.50%	162	36.10%	194	22.70%	170	31.30%	435	19.70%	98
2–4 years	23.40%	244	28.10%	151	29%	217	32.10%	447	33.50%	167
5+ years	61.10%	637	35.80%	192	48.30%	362	36.60%	510	46.80%	233

Table 2 (continued)

	Sweden	
Intentions to have a second child during the next 3 years	%	Obs.
Does not want	24.80%	49
Wants	75.20%	149
Religiosity		
At least monthly attendance	4.10%	12
Less than monthly attend	64.20%	188
No religious affiliation	31.70%	93
Age		
20–29	19.10%	56
30–34	32.10%	94
35–39	19.80%	58
40–49	29%	85
Marital status		
Married	51.20%	150
Cohabitant	48.80%	143
Educational level		
Low	3.40%	10
Medium	45.10%	132
High	51.50%	151
Sex		
Female	55.30%	162
Male	44.70%	131
Activity status		
Employed/Self- Employed	92.20%	270
Unemployed	3.40%	10
Inactive	4.40%	13
Grandparenting regular		
Yes	38.20%	112
No	61.80%	181
Age of the youngest child		
0–1 year	50.70%	148
2–4 years	27.70%	81
5+ years	21.60%	63

Table 3 Distribution of variables, two children

Intentions to have a third child during the next 3 years	%	Obs.
Does not want	89.40%	8139
Wants	10.60%	965
Religiosity		
At least monthly attendance	31.40%	3311
Less than monthly attendance	56%	5900
No religious affiliation	12.60%	1327
Age		
20–29	10.80%	1139
30–34	24.80%	2617
35–39	33.30%	3508
40–49	31.10%	3274
Marital status		
Married	88.50%	9323
Cohabitant	11.50%	1215
Educational level		
Low	11.10%	1168
Medium	61.20%	6455
High	27.70%	2915
Sex		
Female	57.10%	6015
Male	42.90%	4523
Activity status		
Employed/Self- Employed	77.80%	8202
Unemployed	9.70%	1016
Inactive	12.50%	1320
Countries		
Bulgaria	13.50%	1418
Russia	6.60%	693
Georgia	11.10%	1169
Germany	7.70%	814
France	8.50%	900
Romania	8.90%	933
Austria	8.10%	859
Lithuania	7.30%	767
Poland	15.10%	1596
Czech Republic	7.60%	797
Sweden	5.60%	592
Grandparenting regular		
Yes	30.90%	3252
No	69.10%	7286

Age of the youngest child

0–1 year	16.70%	1762
2–4 years	24.10%	2541
5+ years	59.20%	6235

Table 4 Distribution of independent variables by country, two children

	Bulgaria		Russia		Georgia		Germany		France	
Intentions to have a third child during the next 3 years	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.
Does not want	96.20%	1257	91.70%	560	75%	736	92%	563	84%	665
Wants	3.80%	50	8.30%	51	25%	245	8%	49	16%	127
Religiosity										
At least monthly attendance	18.10%	257	7.50%	52	41.40%	484	24.30%	198	9.10%	82
Less than monthly attendance	75.10%	1064	75.30%	522	57.60%	673	58.50%	476	79.10%	712
No religious affiliation	6.80%	97	17.20%	119	1%	12	17.20%	140	11.80%	106
Age										
20–29	15.20%	216	13.00%	90	17.30%	202	8.10%	66	4.50%	41
30–34	30.40%	431	30.30%	210	27%	316	16.10%	131	23.10%	208
35–39	33%	468	32.60%	226	27.10%	317	30.60%	249	33.70%	303
40–49	21.40%	303	24.10%	167	28.60%	334	45.20%	368	38.70%	348
Marital status										
Married	87.30%	1234	93.40%	647	78.50%	918	94.20%	767	79.40%	715
Cohabitant	12.70%	180	6.60%	46	21.50%	251	5.80%	47	20.60%	185
Educational level										
Low	22.30%	316	6.60%	46	6.20%	72	10.10%	82	12.90%	116
Medium	55.60%	789	51.70%	358	59.20%	692	60.30%	491	48.80%	439
High	22.10%	313	41.70%	289	34.60%	405	29.60%	241	38.30%	345
Sex										
Female	61.90%	878	59.60%	413	52.50%	614	63%	513	55.90%	503
Male	38.10%	540	40.40%	280	47.50%	555	37%	301	44.10%	397
Activity status										
Employed/Self- Employed	71.90%	1020	80.50%	558	50.40%	589	73.10%	595	89%	801
Unemployed	24.10%	341	7.10%	49	19%	222	5.90%	48	5%	45
Inactive	4%	57	12.40%	86	30.60%	358	21%	171	6%	54
Grandparenting regular										
Yes	34.40%	488	33.30%	231	22.10%	258	22.40%	182	40.40%	364
No	65.60%	930	66.70%	462	77.90%	911	77.60%	632	59.60%	536
Age of the youngest child										
0–1 year	13.80%	196	18.50%	128	15.70%	184	17.20%	140	20.10%	181
2–4 years	20.90%	297	22.50%	156	22.90%	268	28%	228	27.60%	248
5+ years	65.30%	925	59%	409	61.40%	717	54.80%	446	52.30%	471

Table 4 (continued)

	Romania		Austria		Lithuania		Poland		Czech Republic	
Intentions to have a third child during the next 3 years	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.
Does not want	95.70%	818	87.10%	644	92.20%	616	90%	1227	92%	645
Wants	4.30%	37	12.90%	95	7.80%	52	10%	137	8%	56
Religiosity										
At least monthly attendance	45.80%	427	33.10%	284	22%	169	79.50%	1268	7.90%	63
Less than monthly attendance	54.10%	505	57.80%	497	71.70%	550	19.50%	311	12.20%	153
No religious affiliation	0.10%	1	9.10%	78	6.50%	48	1%	17	72.90%	581
Age										
20–29	9.70%	90	9.40%	81	10.60%	81	10.50%	168	10.70%	85
30–34	21%	195	22.10%	190	24.80%	190	27%	431	29.70%	237
35–39	44.90%	419	32.40%	278	33.10%	254	34.40%	549	32%	255
40–49	24.40%	229	36.10%	310	31.50%	242	28.10%	448	27.60%	220
Marital status										
Married	96%	896	87.10%	748	94.40%	724	94.70%	1511	94%	749
Cohabitant	4%	37	12.90%	111	5.60%	43	5.30%	85	6%	48
Educational level										
Low	22.70%	212	10.20%	88	9.50%	73	5.50%	87	8%	64
Medium	68.10%	635	70.60%	606	67.10%	515	66.50%	1061	76.80%	612
High	9.20%	86	19.20%	165	23.40%	179	28%	448	15.20%	121
Sex										
Female	47.40%	442	65.10%	559	49.80%	382	58.90%	940	54.50%	434
Male	52.60%	491	34.90%	300	50.20%	385	41.10%	656	45.50%	363
Activity status										
Employed/Self-Employed	75.80%	707	88.50%	760	87.10%	668	76.30%	1218	90.30%	720
Unemployed	4.70%	44	2.10%	18	6.10%	47	9.40%	150	6%	48
Inactive	19.50%	182	9.40%	81	6.80%	52	14.30%	228	3.70%	29
Grandparenting regular										
Yes	15%	140	50.40%	433	19.70%	151	33.70%	538	26.90%	214
No	85%	793	49.60%	426	80.30%	616	66.30%	1058	73.10%	583
Age of the youngest child										
0–1 year	13.10%	122	21%	180	12.40%	95	21.10%	336	11.50%	92
2–4 years	22.40%	209	27%	232	20.90%	160	25.30%	404	22.70%	181
5+ years	64.50%	602	52%	447	66.70%	512	53.60%	856	65.80%	524

Table 4 (continued)

	Sweden	
Intentions to have a third child during the next 3 years	%	Obs.
Does not want	86.10%	408
Wants	13.90%	66
Religiosity		
At least monthly attendance	4.60%	27
Less than monthly attendance	73.80%	437
No religious affiliation	21.60%	128
Age		
20–29	3.20%	19
30–34	13.20%	78
35–39	32.10%	190
40–49	51.50%	305
Marital status		
Married	69.30%	410
Cohabitant	30.70%	182
Educational level		
Low	2%	12
Medium	43.40%	257
High	54.60%	323
Sex		
Female	56.90%	337
Male	43.10%	255
Activity status		
Employed/Self-Employed	95.60%	566
Unemployed	0.70%	4
Inactive	3.70%	22
Grandparenting regular		
Yes	42.70%	253
No	57.30%	339
Age of the youngest child		
0–1 year	18.20%	108
2–4 years	26.70%	158
5+ years	55.10%	326

Table 5 Logistic regression models for the intention to have a second child within 3 years

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR
Religiosity (Ref=No religious affiliation)									
At least monthly attendance	1.38***	1.48***	1.54***	1.53***	1.61***	1.62***	1.90***	1.89***	1.88***
Less than monthly attendance	1.13*	1.15*	1.18**	1.18**	1.19**	1.20**	1.46***	1.45***	1.44***
Age (Ref=30–34)									
20–29		1.11*	1.09	1.13**	1.19***	1.20***	1.24***	1.23***	0.97
35–39		0.46***	0.46***	0.46***	0.44***	0.44***	0.41***	0.42***	0.49***
40–49		0.17***	0.17***	0.17***	0.16***	0.16***	0.13***	0.13***	0.16***
Marital status (Ref=Cohabitant)									
Married			0.78***	0.75***	0.74***	0.74***	1.12	1.12	1.2***
Educational level (Ref=Low)									
Medium				1.14	1.16*	1.15	1.02	1.02	0.99
High				1.64***	1.76***	1.73***	1.48***	1.45***	1.32***
Sex (Ref=Female)									
Male					1.49***	1.49***	1.51***	1.51***	1.38***
Activity status (Ref=Inactive)									
Employed/Self-employed						1.02	1.10	1.09	1.1
Unemployed						0.90	0.88	0.88	0.89
Countries (Ref=Bulgaria)									
Russia							0.75***	0.75***	0.77***
Georgia							3.45***	3.51***	3.25***
Germany							1.18	1.19	0.99
France							3.33***	3.34***	2.74***
Romania							0.87	0.89	0.86
Austria							2.05***	2.03***	1.7***
Lithuania							1.22*	1.25**	1.2*
Poland							1.37***	1.37***	1.2*
Czech Republic							2.11***	2.13***	1.98***
Sweden							6.82***	6.85***	5.13***
Grandparenting regular (Ref=No)								1.13**	1.09
Age of the youngest child (Ref=0–1 year)									
2–4 years									0.95
5+ years									0.49***
No.=	7043	7043	7043	7043	7043	7043	7043	7043	7043

Log likelihood= -4868 -4562 -4555 -4530 -4500 -4499 -4325 -4323 -4261
 ***p<0.01 **p<0.05 *p<0.1

Table 6 Logistic regression models for the intention to have a third child within 3 years

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR
Religiosity (Ref=No religious affiliation)									
At least monthly attendance	1.66***	1.69***	1.80***	1.70***	1.81***	1.73***	1.94***	1.94***	1.95***
Less than monthly attendance	1.32**	1.35**	1.36**	1.31**	1.35**	1.31**	1.40**	1.40**	1.38**
Age (Ref=30–34)									
20–29		1.43***	1.34***	1.50***	1.59***	1.53***	1.55***	1.55***	1.34***
35–39		0.54***	0.55***	0.53***	0.50***	0.51***	0.51***	0.51***	0.59***
40–49		0.31***	0.32***	0.29***	0.26***	0.26***	0.23***	0.23***	0.31***
Marital status (Ref=Cohabitant)									
Married			0.54***	0.51***	0.51***	0.51***	0.70***	0.70***	0.74***
Educational level (Ref=Low)									
Medium				1.30**	1.31**	1.36**	0.93	0.93	0.91
High				2.39***	2.50***	2.67***	1.56***	1.56***	1.41**
Sex (Ref=Female)									
Male					1.62***	1.77***	1.67***	1.68***	1.57***
Activity status (Ref=Inactive)									
Employed/Self-employed						0.64***	0.83*	0.82*	0.81*
Unemployed						0.70**	0.96	0.96	0.96
Countries (Ref=Bulgaria)									
Russia							2.37***	2.38***	2.32***
Georgia							7.05***	7.09***	7.13***
Germany							3.22***	3.24***	2.87***
France							6.31***	6.31***	5.7***
Romania							1.25	1.26	1.2
Austria							4.73***	4.70***	4.23***
Lithuania							2.45***	2.46***	2.44***
Poland							2.60***	2.60***	2.36***
Czech Republic							3.35***	3.37***	3.3***
Sweden							5.77***	5.76***	5.13***

Grandparenting regular (Ref=No)								1.04	1.01
Age of the youngest child (Ref=0–1 year)									
2–4 years									0.86
5+ years									0.55***
No.=	9104	9104	9104	9104	9104	9104	9104	9104	9104
Log likelihood=	-3068	-2950	-2929	-2890	-2868	-2860	-2724	-2724	-2705

***p<0.01 **p<0.05 *p<0.1

Table 7 Logistic regression models for the intention to have a second or a third child within 3 years (with interactions)

	Model 1 OR	Model 2 OR	Model 1 OR	Model 2 OR
	1 child sample		2 children sample	
MAIN EFFECTS				
Religiosity				
At least monthly attendance	1.64***	1.53***	1.77***	1.66**
Less than monthly attendance	1.3**	1.2	1.37*	1.29
INTERACTION TERMS				
Religiosity*Grandparenting				
At least monthly attendance*				
Grandparenting regular	1.39*		1.28	
Attendance less than monthly*				
Grandparenting regular	1.29		1.04	
Religiosity*Sex				
At least monthly attendance*				
Male		1.58***		1.30
Attendance less than monthly*				
Male		1.43**		1.1
No. =	7043	7043	9104	9104
Log likelihood=	-4259	-4257	-2704	-2705

Note: Control variables are religiosity, age, marital status, educational level, sex, activity status, country, grandparental childcare, and age of the youngest child.

***p<0.01 **p<0.05 *p<0.1

Table 8 Logistic regression models for the intention to have a second or a third child within 3 years (interactions using the importance of religious ceremonies variable)

	Model 1 OR	Model 2 OR	Model 1 OR	Model 2 OR
	1 child sample		2 children sample	
MAIN EFFECTS				
Importance of religious ceremonies				
	1.05***	1.06***	1.05***	1.05***
INTERACTION TERMS				
Importance of religious ceremonies*Grandparenting regular				
	1.09**		1.12***	
Importance of religious ceremonies*Sex				
		1.08		1.09*
No. =	7002	7002	9057	9057
Log likelihood=	-4230	-4232	-2688	-2691

Note: Control variables are religiosity, age, marital status, educational level, sex, activity status, country, grandparental childcare, and age of the youngest child.

***p<0.01 **p<0.05 *p<0.1

Table 9 Logistic regression models for the intention to have a second or a third child within 3 years (interactions using the grandparenting weekly variable)

	Model OR	Model OR
	1-child sample	2-children sample
MAIN EFFECTS		
Religiosity		
At least monthly attendance	1.75***	1.91***
Less than monthly attendance	1.33***	1.46**
INTERACTION TERMS		
Religiosity*Grandparenting		
At least monthly attendance *		
Grandparenting weekly	2.51*	2.16
Less than monthly attendance*		
Grandparenting weekly	2.01**	1.12

No. =	7043	9104
Log likelihood=	-4258	-2703

***p<0.01 **p<0.05 *p<0.1

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