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Research Article

Religion and contraceptive use in Kazakhstan: A study of mediating mechanisms

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Contents

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A study of mediating mechanisms

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Abstract

BACKGROUND
Since the collapse of the Soviet Union, religiosity has resurged in post-Soviet Kazakhstan. However, since the late 1990s, research on religion's impact on contraceptive use and differences between religious groups has been lacking. Islam and Christianity align with the major ethnicities, Kazakhs and Russians, and show variation in fertility and demographic transition stages.

OBJECTIVE
This study aims to explore contraceptive use variation among religious affiliations and to understand the underlying mechanisms.

METHODS
Using Kazakhstan's 2020 Generations and Gender Survey, this research employs causal mediation analysis and linear probability models.

RESULTS
The findings indicate lower contraceptive use among Muslims than Christians. Religiosity and desired children partially explain these differences. Notably, religious affiliation does not mediate through education, employment, or self-assessed wealth, suggesting other contextual factors are at play.

CONCLUSIONS
Current theories inadequately explain diverse family planning patterns within one nation. Further investigation is needed to rectify misconceptions about contraceptive permissibility and encourage sexual education in order to overcome cultural taboos around reproductive health.

CONTRIBUTION
This research enriches family planning literature in post-Soviet countries and Central Asia. By dissecting the links between religion and contraceptive use, these insights extend to similar contexts beyond Central Asia, encompassing middle-income countries with diverse populations.

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1. Introduction

Empirical evidence shows that religion plays a significant role in shaping contraceptive usage of women and couples in both less developed and more developed nations (Moulasha and Rama Rao 1999; Barrett et al. 2014; Pinter et al. 2016; Geist and Cole 2020). Various existing theories attempt to elucidate religious differentials in contraceptive use by referencing differences in theological doctrines, sociodemographic characteristics, the interplay between religious orientation and socioeconomic factors, or the minority status of certain religious groups (Goldscheider 1971; Chamie 1981). Nonetheless, explanations rooted in theological disparities and the minority status hypothesis often lack empirical substantiation, merely attributing outcome differentials to doctrinal distinctions or a minority affiliation. Similarly, support for both sociodemographic characteristics and interaction hypotheses is limited. The mechanisms by which religious affiliation influences contraceptive use have remained largely unexplored, yet a thorough examination of this aspect could provide crucial insights for policy interventions and programmatic decisions by developmental organizations like the United Nations Population Fund (UNFPA), which seek to enhance contraceptive use rates in developing countries.

By selecting the post-Soviet nation of Kazakhstan as a case study, this paper aims to assess diverse explanations of religious disparities in contraceptive use and to scrutinize the mechanisms through which specific religious affiliation impacts contraceptive practices. Kazakhstan presents an intriguing context for investigating religious disparities in contraceptive use and the potential underlying factors due to its major dual ethnic and religious groups, ethnic Kazakhs (Muslims) and ethnic Russians (Christians), which find themselves at different stages of the demographic transition (Kan 2023). Thus, it becomes possible to probe whether disparities in contraceptive use predominantly stem from variations in fertility intentions between distinct ethnic-religious groups.

Conversely, Muslims' and Christians' different levels of religiosity may also contribute to these disparities. Like many other post-Soviet countries, Kazakhstan experienced state-supported restrictions on religious activities during the Soviet era. However, there has been a recent resurgence of religiosity, particularly among Muslims, which ethnic Kazakhs see as a means of self-identification and nation-building to distinguish themselves from the long-standing influence of Russian culture (Telebaev 2003; Aydıngün 2007; Yerekesheva 2020). Socioeconomic factors, encompassing education, employment, and wealth status, are also worth investigating, given the potential variation in the composition of the two groups. These pathways are expected to account for a significant portion of the variation in contraceptive usage between Muslims and Christians.

This study adopts the Ready–Willing–Able framework (Coale 1973; Lesthaeghe and Vanderhoeft 2001) to delineate diverse pathways and mechanisms by which affiliation with a particular religion influences contraceptive use. Causal mediation analysis will be employed to disentangle the total, direct, and mediated effect of specific religious affiliations on contraceptive use. Utilising the most recent data from the 2020 Kazakhstan Generations and Gender Survey (GGS), the study evaluates the impact of religious affiliation (Islam or Christianity) on contraceptive use (of any method) while considering potential mediators such as fertility demand, religiosity, modern values, and socioeconomic indicators. Gender differences will be accounted for by studying women and men separately.

To the best of my knowledge, this study represents the first attempt to investigate the mechanisms underpinning the relationship between specific religious affiliation and contraceptive use. Furthermore, it offers valuable insights not only for Central Asia and other post-Soviet countries but also for other middle-income nations confronting similar demographic trends.

2. Theoretical framework

Several hypotheses have been used to explore the relationship between religion and fertility control. The particularized theology hypothesis posits that differences in fertility control are influenced by distinct religious doctrines regarding marriage, contraception, and abortion (Goldscheider 1971). Orthodox Christianity and Islamic teachings have different perspectives on contraception, with Islam generally permitting it within the context of marriage and Orthodox Christianity strongly condemning contraceptive use for birth control (Wynn et al. 2005; Mikirtichan et al. 2021).

Additionally, the characteristics hypothesis suggests that fertility control disparities across religious groups result from various demographic and socioeconomic characteristics, and controlling for these factors would theoretically diminish these disparities (Goldscheider 1971).

The minority status hypothesis, on the other hand, proposes that fertility differentials stem from minority ethnic or religious groups making adjustments to enhance their security or social mobility (Goldscheider and Uhlenberg 1969). These adjustments can involve either decreasing or increasing fertility depending on the group's circumstances.

Chamie (1981) reviews these hypotheses but finds discrepancies, leading to the development of the interaction hypothesis, which considers the interplay between religious affiliation and socioeconomic status. According to this hypothesis, fertility differentials are more pronounced in lower socioeconomic status groups, while higher socioeconomic status groups tend to converge in their use of fertility control, regardless of religious affiliation.

In the context of these hypotheses, the Ready–Willing–Able (RWA) framework, initially established by Coale (1973) and further developed by Lesthaeghe and Vanderhoeft (2001), offers a comprehensive perspective on the acceptance of new behaviours such as contraceptive use (for other applications of this framework to contemporary contraceptive research, see Mannan and Beaujot 2006; Dereuddre, van De Putte, and Bracke 2016; Svallfors and Billingsley 2019).

The three main mechanisms of acceptance of new behaviour (e.g., contraceptive use) are readiness, willingness, and ability. 'Readiness' refers to the individual rational choice of having or not having children, driven by economic reasons, when individuals perceive lower fertility as more advantageous and are propelled to change their fertility behaviour (Coale 1973; Lesthaeghe and Vanderhoeft 2001). Differences between affiliates of different religions may be related to their different levels of urbanisation and industrialisation. The demand for children may thus differ across different religious groups. This also relates to the level of individualism and whether a person's decision is truly driven by cost–benefit calculus or by the influence of others. Different religious groups may have different family/kinship ties that may differentiate their individual decision-making. Fertility intentions are seen as a proximate determinant of fertility behaviour (Balbo, Billari, and Mills 2013; Dereuddre, van De Putte, and Bracke 2016) and as a mediator between an individual's perceived costs of having or not having children or using or not using contraception and their actual behaviour (childbearing or using contraception).

'Willingness' refers to the normative and legitimate acceptability of fertility control and whether individuals are willing to overcome traditional beliefs and codes of conduct by employing it (Coale 1973; Lesthaeghe and Vanderhoeft 2001). This makes religious affiliation itself a part of the willingness component, but it can be further measured by other different components. When we look at religious teachings we may look not only at the narrow vision concerning the permissibility of contraceptive use, but also more broadly at teachings related to gender roles and family life that may have linkages to fertility outcomes (McQuillan 2004). Thus, attitudes regarding the importance of familial relations (Dereuddre, van De Putte, and Bracke 2016) may function as a sub-component of the link between religious affiliation and contraceptive use. In addition, as McQuillan (2004) points out, the stronger the attachment to the religious community, the higher the potential influence of religion on demographic outcomes. This means that the level of religiosity among the followers of different religious groups should be considered when assessing the effect of religious affiliation on contraceptive use.

The last factor of the framework, 'Ability', refers to contraception being available and accessible, giving people the means to use it. At the individual level within the same context, this can refer to people's socioeconomic status, their knowledge of contraceptive techniques (education), and their means to access it (employment and income).

The Ready–Willing–Able framework can be applied to assess how the relationship between contraceptive use and affiliation to a specific religion may be mediated through different factors: readiness (fertility intentions), willingness (level of religiosity and modern values), and ability (education, employment, and wealth status). A more detailed description of the application of the framework is given in the section on expectations.

3. The context of Kazakhstan

Kazakhstan had become a Russian majority country by the late 1930s, and during Soviet times the Kazakh language and culture were highly discriminated against, the local language and culture were neglected, and Russification of the population was enforced. The interplay between cultures and the marginalization of the local language and culture during the Soviet period laid the foundation for a resurgence of interest in Kazakh roots and traditions following the collapse of the Soviet Union.

The Soviet regime also had a unique political ideology, as it was anti-clerical and promoted "a radical atheistic worldview" (Froese 2005: 475). In an attempt to undermine the presence of religion in Central Asia, the regime focused on eradicating religious symbols. Both mosques and churches were destroyed in Kazakhstan in the mid-20th century. The Soviets eliminated or banned numerous religious rituals and dismantled the institutional structures associated with them. However, it seems that they were unable to entirely convert people to atheism; instead, they compelled individuals to conceal their religious beliefs and practice within highly private settings.

3.1 Islam

Numerous rituals and symbols of Islamic adherence were practiced in private settings, enabling individuals to uphold their religious affiliations during the era of anti-clerical ideology (Aydıngün 2007). Instead of the ceremonies being openly staged, they were conducted in closed settings and passed down from older to younger generations. During the Soviet era many ceremonies eventually became more culturally bound and a representation of being Kazakh, rather than having a truly religious connotation.

Additionally, it is worth noting that Kazakhs have traditionally adhered to the Hanafi School of Islam, known for its more liberal tenets and adaptability to local contexts. As a result, this school facilitated a smoother integration into the daily lives of nomadic tribes in Central Asia by not demanding the complete abandonment of earlier rituals such as ancestor worship, which the more conservative and radical schools of Islam prohibit. Even in modern times, the practice of ancestor worship has been preserved. The liberal nature of the Hanafi School allowed local Muslims to adapt to the Soviet regime and

profit from industrialisation and modernisation programmes, while at the same time preserving their more traditional family beliefs. Furthermore, according to some local scholars, during the communist era Muslims in Central Asia existed in 'two dimensions': publicly, they embraced Soviet attitudes, values, and loyalties, while privately they maintained a predominantly traditional outlook shaped by Islamic customs and preconceptions (Froese 2005). In addition, the transmission of these local customs and rituals was facilitated by the patriarchal structure of Kazakh families, which remained unchanged despite the Soviet regime's attempts to modify it.

Various studies have shown an increase in religiosity following Kazakhstan's independence in 1991, particularly among Muslims (Telebaev 2003; Aydıngün 2007; Yerekesheva 2020). This rise in religiosity and the resurgence of traditionalism can be attributed to a range of factors. It can be argued that this occurred as a result of the repression and discrimination against Kazakh culture and Islam during the Soviet period, as previously described. An alternative explanation is that a void was created once communist ideology was eradicated. The country underwent a significant economic crisis during the transition to a market economy, coupled with the redistribution of property through the process of 'privatization' of previously state-owned industries. The 1990s were also marked by widespread marginalization as numerous industries and professions ceased to exist following the collapse of the centralized Soviet economy. A lack of employment opportunities and significant wage arrears resulted in an unprecedented increase in criminal activity during the 1990s, which was unlike any period before or since. The people lost the previous certainty of how the state and society operated and what they could expect. The basic social protection that the Soviet state had provided disappeared and it was uncertain whether the new elites and government could provide it, and unclear which ideology they would adhere to. In such a state of uncertainty, returning to one's cultural and religious 'roots' could be viewed as a means of coping with the challenges of criminal activity and low living standards.

During these uncertain times, Kazakhstani society sought a guiding framework to navigate through the challenges. As Geertz (1964) highlights, culture and religion serve as ideologies that provide "mechanisms for perceiving, understanding, judging, and manipulating the world" (Geertz 1964: 199). Kazakhs sought an ideology to legitimize their independent state and to distinguish themselves from the significant Russian population. Religion and the revival of traditionalism have frequently been employed as tools for nation building. In the context of Kazakhs in Kazakhstan, a combination of nationalism, reconstructed traditionalism, and growing religiosity emerged as responses to gaining independence, the emergence of new ruling elites, an inexperienced government, and the proliferation of mass communication.

It is worth noting that Kazakhs (Muslims) maintained and adhered to strict family–kin groupings even during the Soviet period. Particularly in the context of family formation, they observed a clear differentiation by horde (with three main hordes, or *zhuz*

in Kazakh), followed by identification with tribes within a horde, and further identification of specific clans or kin (*ruu*) within a tribe. This family–kin grouping continues to be observed in the modern era, distinguishing them from followers of Christianity in Kazakhstan who are less influenced by such familial ties.

3.2 Christianity

Christians were mainly represented by the Russian Orthodox Church and also experienced periods of persecution in both Central Asia and other parts of the Soviet Union. The Russian Orthodox Church was the first to be persecuted, but also the first to start cooperating with the Soviet state during World War II, with increasing reliance on Russian nationalism (Bociurkiw 1959). Central Asia saw the emergence of new settlements as a result of agricultural and industrialization initiatives, which were accompanied by more lenient rules regarding religious practices. Additionally, the population of Christian communities in the region grew due to the forced relocation of various ethnic and religious groups (Peyrouse 2008).

The number of religious institutions decreased considerably during the Soviet period, and gaining independence brought a revival of not only Islam but also Christianity. The period of ideological instability in the newly formed state in the 1990s and ethnic Russians becoming a minority in Kazakhstan led many to return to religion as a source of ethnic identification. Hence, several scholars highlight a resurgence in Kazakhstan following the dissolution of the Soviet Union, particularly of the Orthodox denomination within Christianity (Zhapekova et al. 2018; Ganje 2019). Furthermore, despite being a secular state, Kazakhstan acknowledges the prominent status of Sunni Islam and Orthodox Christianity as the two primary denominations within the country. This is evident in the designation of Orthodox Christmas and the festival of Kurban-ait (Eid al-Adha, the Feast of the Sacrifice, an Islamic holiday) as non-working days, allowing people to observe the respective religious rituals and customs. (Erekesheva 2012).

Recent studies comparing the religiosity of followers of Islam and Christianity in Kazakhstan find some differences. A survey conducted among urban residents in Kazakhstan reveals that approximately 12% of self-identified Orthodox Christian women and 5% of men report being active believers, whereas the corresponding figures for both women and men practicing Islam are around 42% (Alimbekova, Shabdenova, and Lifanova 2022). Another study (Burova et al. 2020) shows that 40% of Muslims and 20% of Orthodox Christians express support for an increased influence of religion. Similarly, the study reveals disparities in the adherence to secular norms, with 30.5% of Muslim respondents and 62.2% of Orthodox Christian respondents endorsing them.

3.3 Current religious composition

According to the latest Kazakhstan National Census from 2021 (Statistics Committee 2022), 69% of the population of Kazakhstan follow Islam, while Christians (mainly Russian Orthodox) constitute 17%. Ethnic Kazakhs and other Central Asian ethnicities such as Uzbek, Kyrgyz, and Tajik predominantly follow Islam. On the other hand, ethnic Russians, Belarusians, Ukrainians, and other European ethnicities tend to follow Christianity. The proportion of Muslims and Christians in the country closely correlates with the proportion of ethnic Kazakhs (70.4%) and ethnic Russians (15.5%). Among the other ethnicities are Uzbeks, Uighurs, Dungans, and Tatars, who are predominantly Muslim, and Ukrainians, Germans, Belarusians, Poles, and Koreans, who are predominantly Christian.

3.4 Reproductive behaviour

Kazakhs have long had a higher total fertility rate (TFR) than Russians, both during the Soviet era (Urlanis 1974; Mazur 1976) and after gaining independence (Agadjanian, Dommaraju, and Nedoluzhko 2013; Spoorenberg 2013, 2015). During the significant influx of ethnic Russians to Kazakhstan in the mid-1960s, ethnic Kazakhs were in the pre-transitional stage of the demographic transition (Urlanis 1974; Mazur 1976), while by that time ethnic Russians were assumed to have completed the first demographic transition (Zakharov 2008).

Only a few studies in Kazakhstan have focused on religion as the primary independent variable concerning reproductive behaviour, whereas several studies have examined ethnic differentials. Several studies have thus assessed ethnic differentials between Kazakhs and Russians in fertility intentions and preferences as well as parity progressions (Agadjanian 1999; Agadjanian, Dommaraju, and Glick 2008; Agadjanian, Dommaraju, and Nedoluzhko 2013; Spoorenberg 2013, 2015; Kan 2023). Kan (2023) finds a sustained fertility increase across all birth orders during the 2000s that is shared across both main ethnicities in the country. Some indication of fertility postponement is observed among ethnic Russian women in the early 21st century. By contrast, no indication of a continuous trend towards a postponement of motherhood is found among ethnic Kazakh women. Moreover, for ethnic Kazakh women Kan (2023) finds increasing rates for all higher-order births, which is contrary to what would be expected from the classical demographic transition theory, solidifying the difference in fertility rates between Russians and Kazakhs.

Most studies of differentials in contraceptive use and abortion in Kazakhstan refer to the 1990s. Scholars find that abortions were more widespread among Russians than Kazakhs in the 1990s (Mahler 1997; Westoff 2000; Agadjanian 2002). Furthermore,

Westoff (2000) finds separate effects of both religion and ethnicity on abortion rates in Kazakhstan. Agadjanian (2002) finds that contraceptive prevalence rose for both married Russian women (from 65% to 70%) and married Kazakh women (from 54% to 64%) between 1995 and 1999. He also points to Kazakhstani women using a combination of contraception and abortion to regulate fertility. In neighbouring Uzbekistan, Barrett (2007) finds a negative association between ever using contraception and Muslim religion in a study of urban Muslim and Christian women. Meanwhile, Buckley and colleagues (2008) find that being of non-Kazakh ethnicity increases the odds of accessing family planning information among young Kazakhstani women.

3.5 Access to contraception and family planning indicators

Access to contraception in Kazakhstan faces significant challenges, according to the Kazakhstan Family Planning National Framework Program 2017–2021 (United Nations Population Fund 2016). The 2011 survey of the Kazakh Association of Sexual and Reproductive Health (ibid.) identifies the high price of contraceptives as a significant barrier for young people. A private pharmaceutical market with no government regulation results in Kazakhstan having some of the most expensive contraceptives in ex-Soviet countries. Moreover, the UNFPA's 2014 analysis finds that rural residents, adolescents, youths from disadvantaged families, labour migrants, disabled people, and groups with behavioural risk of HIV transmission have limited access to contraception due to affordability and availability issues (ibid.).

The contraceptive prevalence rate for women aged 15–49 in Kazakhstan is 43% (United Nations Population Fund 2022). Furthermore, the abortion culture that was prevalent during Soviet times is still present in the country. Kazakhstan is still high in the list of countries with a high abortion rate. In 2015–2019 there were a total of 696,000 pregnancies annually in Kazakhstan, of which 259,000 were unintended and 212,000 ended in abortion (Guttmacher Institute 2022).

3.6 Expectations

We cannot test the particularized theology or minority status hypotheses directly, apart from attributing religious differentials to theological differences or assuming a minority status of Christians in Kazakhstan. A minority status of Christians in Kazakhstan is also questionable because, as described in the context section, the country has articulated a special position for both Islam and Christianity. However, we can test the other two dominant hypotheses, and then we can look at the potential underlying mechanisms using the Ready–Willing–Able framework (Coale 1973).

1. In line with the characteristics hypothesis, we expect that religious differentials in contraceptive use in Kazakhstan will be negligible once we control for demographic and socioeconomic characteristics.
2. In line with the interaction hypothesis, we expect religious differentials in contraceptive use will be found among the lower socioeconomic class, while convergence or absence of religious differentials will be found among the higher socioeconomic class.

The Ready–Willing–Able framework (Coale 1973) and its components, and the hypotheses mentioned above are not mutually exclusive. Instead, they incorporate various mechanisms that explain the relationship between religion and contraceptive use and can be supported by the hypotheses.

1. In line with the 'Readiness' factor, we expect that the effect of religion on contraceptive use will be mediated by the demand for children measured by fertility intentions. Kazakhs and other Central Asian ethnic groups (Muslims) are at earlier stages of demographic transition than Russians and other European origin groups (Christians) and thereby have a higher demand for children. Furthermore, due to the strong family–kin ties among Muslims, they may be less exposed to the individualistic rational choice driven by cost–benefit analyses that is behind the readiness factor. This may make them less 'ready' to use contraception. It will be tested through mediation via a short-term fertility intentions mediator (planning to have children in the next 3 years).
2. In line with the 'Willingness' factor, which refers to the normative and legitimate acceptability of contraception use and the possibility of countering traditional beliefs, we expect that:
a. Assuming that religiosity is associated with more traditional values, the influence of religion on contraceptive use will be mediated by the level of religiosity. A higher level of religiosity will be connected to a reduced willingness to use contraception. After the collapse of the Soviet Union, Kazakhs (Muslims) were searching for self-identification, including through increased religiosity as a nation-building instrument that differentiated them from Russians. Thus, it is assumed that Muslims are more prone to being religious and follow religious norms, and this may have a stronger effect on contraceptive use. It will be tested through mediation via religiosity level.
b. The effect of religion on contraceptive use will be mediated by the level of modern values, where a higher degree of modern values is associated with a greater willingness to use contraception. This could be connected to previous research on religious differentials which were explained by a higher resistance to modern values among Muslims (Kirk 1967). Also, modernization is connected with "the

breakdown of the dominance and centrality of family–kin groupings" (Goldscheider 1971:149). This breakdown of kinship dominance and the shift to a nuclear family, closely tied to modernization, is seen as a prerequisite for new behavioural patterns emerging and a transition from high to low fertility (Goldscheider 1971). As described in the context section, Kazakhs (Muslims) preserve and strictly follow family–kin grouping. Thus, it is expected that there are differentials in modern values that are closely connected to family formation and that in turn may affect contraceptive use through the 'Willingness' factor. It will be tested through mediation via a composite variable of post-modern values.

3. The 'Ability' factor (or availability and accessibility of contraception) relates to the characteristics and interaction hypotheses because of its focus on socioeconomic characteristics. It is expected that socioeconomic factors will mediate the effect of religion because we may assume that religious teachings, especially in the context of religious revival, will have an additional effect on people's education and employment, especially when considering gender differences in such outcomes. We expect that the religious differentials in contraceptive use will be mediated through the means to use innovations (education), or ability to use contraceptives, and accessibility (employment and income) of fertility control. It will be tested through mediation via education, employment, and self-assessed wealth status.

4. Data and methods

4.1 Data

The first wave of the Generations and Gender Survey (GGS) 2020 in Kazakhstan (Dossanova et al. 2020) was used for the analysis. It has a sample of 16,000 respondents aged 18–79 (response rate 93%, N = 14,857), which includes both women and men. We restrict the sample to married and cohabiting women (age 18–45) and men (age 18–49) in a heterosexual partnership who are not pregnant or sterilized, and whose partner is not pregnant or sterilized, and who are either Muslim or Christian (mostly Orthodox Christians but also a very small number of Catholics and Protestants). The sample is restricted to these main denominations, which represent more than 90% of the population. The non-affiliated is a distinct category that is too small in this sample (N = 86) to use as a comparison. Another religious group – a combined Buddhist/Hindu category (N = 261) – was also excluded from the sample because we cannot accurately link it to any ethnic group (Kazakhs or Russians) to position it in the previous literature on ethnic and religious differentials in the country. In addition, according to data from the World Religion Database (2020), these denominations represent only 0.12% (Buddhists) and

0.01% (Hindus) of the country's population.[2] Thus, the restricted sample size is 3,204 people (see Figure A-1 in the Appendix for a detailed breakdown of the sample selection).

The GGS survey conducted in Kazakhstan utilized the 2009 population census as a basis for sampling (Dossanova et al. 2020). A comparison between Kazakhstan's GGS and descriptive statistics of the 2009 population census showed that women were overrepresented, while 18–34 year olds were underrepresented compared to the census data. The sample also had a higher proportion of individuals with lower secondary and tertiary education as well as working men and women. A comparison of relevant descriptive statistics for unweighted and weighted samples is presented in Table A-1 in the Appendix. Due to the differences observed, analytical post-stratification weights were applied in the main effect and interaction models, while the mediation method used in this analysis does not allow the use of analytical weights.

The GGS data has the advantage of capturing questions not found in population censuses. Additionally, the survey provides more precise measurements of religious affiliation and religiosity than previous surveys conducted in the country. It is worth noting that it also has limitations due to its cross-sectional design. These limitations include difficulties in establishing cause-and-effect relationships between variables, the possibility of conjunctural effects specific to the time and place of data collection, the inability to analyse changes over time, and response bias arising from factors like social desirability bias.

4.1.1 Dependent variable

The main dependent variable is the use of any contraception method. The cross-sectional variable of current contraceptive method type is a binary variable measuring whether the respondent was using contraception (1) or not (0) at the time of interview. Contraceptive methods include condoms, pills, intra-uterine devices (IUDs), injections, condoms, foam or jelly, injectables, implants, withdrawal, and the safe period (rhythm) method.

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[2] Hindus represent 5.7% of the total GGS survey sample (840 of 14,857) and 6.6% of the restricted sample (age and pregnancy criteria) for the analysis (261 of 3,934). The author has reservations regarding the reporting of affiliation with this particular religious group since it represents only 0.01% to 0.12% of the total population. However, 99.6% of the respondents referred to as Buddhist/Hindu were surveyed in the Kazakh language, while the majority of Muslims (who are also mostly ethnic Kazakhs and other Turkic Central Asian groups) were surveyed in Russian or "other" language (probably Uzbek or Uighur). The overrepresentation of the Buddhist/Hindu group in the survey in comparison to the official figures, and also the language of the interview and the fertility characteristics (being even higher than among Muslims and with even greater skewedness towards higher-order births) raised concerns about selection bias and reservations regarding the interpretation of differentials between this religious group and the main denominations. Another reservation regarding using this category is that in the context of Kazakhstan the Buddhists are mainly ethnic Koreans, who do not have high fertility and would rather be interviewed in the Russian language.

4.1.2 Independent variables

The main independent variable is the binary variable 'religion', measuring whether a respondent is Christian or Muslim.

4.1.3 Control variables

The control variables include a number of individual background characteristics that may vary across religious denominations and are likely to influence the propensity to use contraception. The variable 'age' measures the respondent's age at the time of interview and is grouped into 5-year categories (except for the youngest group, comprising ages 18–24). Binary variables for the respondent's education and partner's education measure the highest level of education completed by the time of interview (lower than tertiary or tertiary). The self-reported variable 'Can make ends meet' (6 categories: With great difficulty, with difficulty, with some difficulty, fairly easily, easily, very easily) was dichotomised into a wealth status binary variable[3] (difficult or easy to make ends meet). The respondent's and partner's employment statuses are binary variables measuring whether or not a respondent/partner is working at the time of interview. Other demographic variables are total number of children ever born, age of youngest child, and region of residence (North Kazakhstan combining Akmola, Kostanay, Pavlodar, and North Kazakhstan oblasts; East and Central Kazakhstan comprising Karaganda and East Kazakhstan oblasts; West Kazakhstan comprising Aktobe, Atyrau, West Kazakhstan and Mangistau oblasts; and South Kazakhstan comprising Almatinskaya, Zhambyl, Kyzylorda, and Turkistan oblasts and including Shymkent city and the cities of Almaty and Astana). Although urban/rural residence could be essential to control for in the analysis, this information is missing in the dataset. However, regional residence may in some way reflect these differentials. Thus, the category 'the cities of Almaty and Astana' is urban, whereas 62% of South Kazakhstan's population is rural. East and Central Kazakhstan has 70% urban population, whereas 45% of the people in the regions of West and North Kazakhstan live in rural areas (Statistics Committee 2022).

4.1.4 Mediating variables

The 'short-term fertility intentions' variable was constructed based on a question asking whether the respondent intended to have a child within the next three years. The answers

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[3] A sensitivity analysis was also conducted, treating the variable as continuous.

'definitely not', 'probably not', and 'unsure' were further categorized as 'no' (0), while the answers 'probably yes' and 'definitely yes' were categorized as 'yes' (1).

'Self-assessed religiosity' at the time of the interview, ranked from 0 to 10, was dichotomized into a binary variable. For easier interpretation in the mediation analysis, answers from 0 to 5 were categorized as less religious (0) and answers from 6 to 10 as more religious (1). Sensitivity analysis of the results was conducted treating the variable as continuous.

The 'Modern values' composite variable is based on eight statements with the following scale of responses: strongly agree (1), agree (2), neither agree or disagree (3), disagree (4), and strongly disagree (5). Responses to the statements 'women need children to be fulfilled', 'a child needs a father and mother', 'men need children to be fulfilled', and 'pre-school children suffer if their mother works' were ranked as more traditional to more modern. Responses to the statements 'divorce is permissible', 'single motherhood is acceptable', 'a working mother can secure warm relations', and 'pre-school children suffer if their father works long hours' were reverse-scored to make all the composite variable items move from more traditional to more modern. The composite variable is similar to that of Dereuddre, van De Putte, and Bracke (2016): some variables were omitted ('marriage is outdated', 'cohabitation is acceptable', 'marriage should be for lifetime') because they did not increase the reliability score. The Cronbach's alpha of the composite variable was 0.7, a level that is universally considered to indicate high internal consistency (Nunnally and Bernstein 1994). The continuous composite variable ranges from 1 to 5.

The respondent's education, employment, and wealth status were also assessed separately as mediators. The dichotomization of socioeconomic variables was driven by the causal mediation analysis package, which allows either continuous or binary variables.

4.2 Methods

4.2.1 Main effect models

I use a linear probability regression model with robust standard errors to analyse data with a binary outcome for the main effect models (to check whether contraceptive use remains higher among one religious group than the other, as well as to assess the characteristics hypothesis). The regression estimates the probability that contraception is used using a linear function. The model directly estimates the effect of independent variables on the probability of contraceptive use by providing the coefficients that represent the change in the predicted probability for a one-unit change in the independent

variable. This simplicity makes it easier to understand and interpret the results, especially for non-technical audiences.

4.2.2 Interaction effect models

A linear probability regression model with robust standard errors is used to analyse possible interactions between religion and the socioeconomic indicators education, employment, and wealth status for the interaction effect models (to check the interaction hypothesis).

4.2.3 Mediation analysis

I first assess whether the relationship between religion and contraceptive use is changed by entering potential mediators one at a time in separate models. I then employ causal mediation analysis to explore the mechanisms that may explain the relationship between religion and contraceptive use. Univariate counterfactual mediation was conducted in Stata 17. As Hicks and Tingley (2011: 608) succinctly explain, "the mediation package calculates the average mediation and direct effects by simulating predicted values of the mediator or outcome variable, which we do not observe, and then calculating the appropriate quantities of interest (average causal mediation, direct effects, and total effects)".

According to causal mediation analysis (Imai, Keele, and Tingley 2010), to properly identify the average causal mediated effect (ACME) and average direct effect (ADE), the assumption of sequential ignorability (SI) should be met (Imai, Keele, and Yamamoto 2010). According to this, (1) it is assumed that the exposure is not related to potential unmeasured confounders, and (2) an observed mediator is supposed to be unrelated to potential unmeasured confounders. Due to the strong assumption of SI, I conduct sensitivity analyses to check the robustness of the results to the violation of the SI assumption (Hicks and Tingley 2011).

5. Results

5.1 Descriptive results

Table 1 shows descriptive statistics for the sample population by religion and gender. This is individual, not couple data. Contraceptive use is reported by respondents

describing the method they use with a partner. Thus, a man can respond that an IUD is used. Both Christian women and men report higher contraceptive use than Muslim women and men. Only around half of women and men in samples of Muslim respondents report the use of modern contraceptive methods, while the respective figures for both Christian women and men are above 60%. Samples of Muslims and Christians have a similar mean age for both women and men. The majority of women and men who report affiliation with Islam in the full sample live in South Kazakhstan, while the majority of women and men who report affiliation with Christianity in the full sample live in North Kazakhstan. Interestingly, both women and men in the Muslim sample report a higher level of education (tertiary) than their counterparts in the Christian sample. This may be considered a limitation of the sample, as representatives of the two religious groups do not differ significantly in terms of educational attainment. The weights used in the regressions correct for some portion of this deviation. However, it also indicates that the supposition that higher educational attainment is associated with higher contraceptive use is not supported in the context of the available sample and existing educational differentials between the religious groups in the sample. On the other hand, Christian men report higher involvement in the labour market than Muslim men, and a similar trend can be observed in the comparison of women's labour force participation. Both Muslim women and men report higher religiosity, higher fertility intentions, and lower modern values than Christian women and men.

Table 1:   Distribution of the characteristics of the sample population by religion and gender

	Muslims				Christians			
	Women		Men		Women		Men	
	N = 1476	% (col.)	N = 1085	% (col.)	N = 568	% (col.)	N = 402	% (col.)
Contraceptive use (any)								
No	595	40.3	451	41.6	153	26.9	106	26.4
Yes	801	54.3	546	50.3	386	68.0	265	65.9
Missing	80	5.4	88	8.1	29	5.1	31	7.7
Modern contraception use								
No	636	43.1	484	44.6	175	30.8	126	31.3
Yes	760	51.5	513	47.3	364	64.1	245	61.0
Missing	80	5.4	88	8.1	29	5.1	31	7.7
Age in 5-year groups								
18–24	129	8.7	41	3.8	57	10.0	28	7.0
25–29	354	24.0	190	17.5	95	16.7	60	14.9
30–34	333	22.6	248	22.9	155	27.3	101	25.1
35–39	317	21.5	210	19.4	123	21.7	88	21.9
40+	343	23.2	396	36.5	138	24.3	125	31.1
Mean age	33.5		36.2		33.8		35.5	

Table 1:   (Continued)

| | Muslims | | | | Christians | | | |
| | Women | | Men | | Women | | Men | |
	N=1476	% (col.)	N=1085	% (col.)	N=568	% (col.)	N=402	% (col.)
Region of residence								
North Kazakhstan	187	12.7	174	16.0	209	36.8	181	45.0
East and Central Kazakhstan	207	14.0	101	9.3	144	25.4	94	23.4
West Kazakhstan	233	15.8	129	11.9	49	8.6	22	5.5
South Kazakhstan	618	41.9	504	46.5	77	13.6	54	13.4
Astana and Almaty	228	15.5	177	16.3	89	15.7	51	12.7
Missing	3	0.2	0	0.0				
Education								
Lower than tertiary	771	52.2	695	64.1	382	67.3	308	76.6
Tertiary	705	47.8	390	35.9	186	32.8	94	23.4
Employment								
Not employed	720	48.8	139	12.8	246	43.3	44	11.0
Employed	756	51.2	946	87.2	322	56.7	358	89.1
Partner's employment								
Not employed	177	12.0	538	49.6	45	7.9	166	41.3
Employed	1291	87.5	544	50.1	522	91.9	236	58.7
Missing	8	0.5	3	0.3	1	0.2	0	0.0
Can make ends meet								
Difficult	1022	69.2	740	68.2	380	66.9	259	64.4
Easy	417	28.3	321	29.6	175	30.8	135	33.6
Missing	37	2.5	24	2.2	13	2.3	8	2.0
Total children ever born								
0	116	7.9	101	9.3	67	11.8	51	12.7
1	263	17.8	221	20.4	197	34.7	146	36.3
2	480	32.5	326	30.1	230	40.5	152	37.8
3	340	23.0	254	23.4	55	9.7	41	10.2
4	172	11.7	117	10.8	13	2.3	9	2.2
5	67	4.5	47	4.3	3	0.5	3	0.8
6+	38	2.6	19	1.8	3	0.5	0	0.0
Mean number of children	2.4		2.3		1.6		1.6	
Age of youngest child								
No children	116	7.9	101	9.3	67	11.8	51	12.7
0–2 years	567	38.4	411	37.9	128	22.5	96	23.9
3–5 years	332	22.5	212	19.5	118	20.8	69	17.2
6–8 years	185	12.5	150	13.8	81	14.3	71	17.7
9 years and older	271	18.4	208	19.2	173	30.5	114	28.4
Missing	5	0.3	3	0.3	1	0.2	1	0.3
Religiosity								
Less religious	533	36.1	406	37.4	340	59.9	259	64.4
More religious	902	61.1	660	60.8	213	37.5	137	34.1
Missing	41	2.8	19	1.8	15	2.6	6	1.5
Fertility intentions								
No	712	48.2	459	42.3	350	61.6	243	60.5
Yes	642	43.5	518	47.7	178	31.3	129	32.1
Missing	122	8.3	108	10.0	40	7.0	30	7.5
Modern values								
Less modern	925	62.7	694	64.0	286	50.4	205	51.0
More modern	542	36.7	385	35.5	282	49.7	194	48.3
Missing	9	0.6	6	0.6	0	0.0	0.75	0.8

Source: Kazakhstan's Generations and Gender Survey of 2020, author's calculations.

5.2 Regression results

Table 2 presents the results of linear probability models (LPM) of contraceptive use (both modern and traditional methods) in Kazakhstan. In Model 1 (women) and Model 3 (men), the effect of religion on contraceptive use is estimated without adjusting for other characteristics. Being Muslim in Kazakhstan is related to a lower probability of contraceptive use for both women and men. Model 2 (women) and Model 4 (men) are adjusted for control variables. Although the effect of religion remains quite strong for both women and men even after adjusting for demographic and socioeconomic characteristics, there is a reduction in the variance explained by affiliation when controlling for these factors. Being employed is positively related to contraceptive use among men. Partner's employment is also positively related to contraceptive use among women. The probability of using contraception is not stratified across educational categories for either women or men. Women living in Western Kazakhstan have a 9% lower probability of using contraception than women living in North Kazakhstan, while men living in the largest cities (Astana and Almaty) have an almost 15% lower probability of using contraception than men living in North Kazakhstan. This social gradient is not reflected in wealth differentials measured by whether a person can or cannot make ends meet.

Further, to assess the interaction hypothesis, I ran separate models with an interaction between religious affiliation and different socioeconomic characteristics (education, employment, and wealth status) adjusted for all other available demographic characteristics in the main effect models. No interactions improved the model fit according to AIC/BIC criteria (see Appendix for the tables). Thus, the interaction hypothesis was not supported as an explanation for how religious differences operate in contraceptive use.

To further explore the difference between Christians' and Muslims' contraceptive use, I assessed various mediating mechanisms. Starting with the adjusted linear probability model presented in Table 2, I entered one mediator at a time and observed whether the relationship between religion and contraceptive use is attenuated or changes direction when the specific mediator is added to the model, as presented in Table 3. Models 5–7 are adjusted for other control variables, including controls for socioeconomic variables. For Models 8–10, adjusted models are first presented without the specific socioeconomic variable of interest (employment, education, wealth status) and then including the variable that acts as mediator.

Table 2: **Results of LPMs, associations between women's and men's contraceptive use (any method) and characteristics, weighted**

	Women		Men	
	Unadjusted probability Model 1	Adjusted probability Model 2	Unadjusted probability Model 3	Adjusted probability Model 4
Religion (ref. Christian)				
Muslim	−0.155	−0.124	−0.169	−0.136
	[−0.203, −0.106]	[−0.178, −0.071]	[−0.226, −0.111]	[−0.200, −0.073]
Age in 5-year groups (ref. 25–29)				
18–24		0.045		−0.018
		[−0.042, 0.132]		[−0.146, 0.110]
30–34		0.044		−0.07
		[−0.020, 0.108]		[−0.153, 0.014]
35–39		0.07		−0.041
		[−0.002, 0.142]		[−0.132, 0.049]
40+		0.095		−0.01
		[0.014, 0.176]		[−0.104 ,0.083]
Region (ref. North Kazakhstan)				
East and Central Kazakhstan		−0.029		0.016
		[−0.100, 0.041]		[−0.072, 0.104]
West Kazakhstan		−0.162		−0.223
		[−0.244, −0.081]		[−0.323, −0.123]
South Kazakhstan		−0.172		−0.169
		[−0.240, −0.105]		[−0.242, −0.096]
Astana and Almaty		−0.021		−0.121
		[−0.095, 0.053]		[−0.211, −0.031]
Education (ref. Lower than tertiary)				
Tertiary		0.022		−0.034
		[−0.026, 0.070]		[−0.094, 0.027]
Employment (ref. Unemployed)				
Employed		0.014		0.136
		[−0.035, 0.064]		[0.056, 0.217]
Can make ends meet (ref. Difficult)				
Not difficult		0.012		−0.006
		[−0.036, 0.060]		[−0.062, 0.050]
Total children ever born (ref. 0)				
1		0.303		0.259
		[0.206, 0.400]		[0.147, 0.371]
2		0.399		0.329
		[0.309, 0.489]		[0.219, 0.440]
3		0.408		0.371
		[0.308, 0.507]		[0.255, 0.487]
4		0.371		0.47
		[0.254, 0.487]		[0.331,0 .610]
5		0.295		0.377
		[0.142, 0.448]		[0.195, 0.559]
6+		0.307		0.333
		[0.117, 0.497]		[0.079, 0.588]

Table 2:   (Continued)

	Women		Men	
	Unadjusted probability Model 1	Adjusted probability Model 2	Unadjusted probability Model 3	Adjusted probability Model 4
Age of youngest child (ref. 3–5)				
No children		(omitted)		(omitted)
0–2 years		−0.05		−0.004
		[−0.112, 0.013]		[−0.079, 0.072]
6–8 years		−0.111		−0.035
		[−0.189, −0.033]		[−0.125, 0.054]
9 years and older		−0.117		−0.121
		[−0.190, −0.045]		[−0.212, −0.030]
Employment of partner (ref. Unemployed)				
Employed		0.116		0.028
		[0.039, 0.193]		[−0.027, 0.083]
Constant	0.714	0.336	0.709	0.435
	[0.673, 0.754]	[0.215, 0.458]	[0.661, 0.757]	[0.302, 0.567]
N	1,875	1,875	1,329	1,329
R–squared	0.02	0.10	0.02	0.09

Source: Kazakhstan's Generations and Gender Survey of 2020, author's calculations.

Table 3:   Results of LPMs, associations between women's and men's contraceptive use (any method) and religion, weighted

	Women		Men	
	Adjusted probability	Adjusted probability	Adjusted probability	Adjusted probability
Model 5 [a]				
Muslim	−0.126	−0.089	−0.138	−0.103
	[−0.181, −0.070]	[−0.144, −0.033]	[−0.205, −0.072]	[−0.168, −0.038]
Fertility intentions (ref. No)				
Yes		−0.275		−0.25
		[−0.325, −0.224]		[−0.309, −0.191]
Constant	0.709	0.803	0.734	0.805
	[0.584, 0.835]	[0.676, 0.929]	[0.568, 0.900]	[0.646, 0.965]
N	1,746	1,746	1,225	1,225
R–squared	0.09	0.15	0.10	0.14
Model 6 [a]				
Muslim	−0.122	−0.099	−0.132	−0.098
	[−0.176, −0.068]	[−0.154, −0.044]	[−0.196, −0.068]	[−0.163, −0.033]
Religiosity (ref. Less religious)				
More religious		−0.11		−0.123
		[−0.156, −0.064]		[−0.178, −0.068]
Constant	0.717	0.75	0.738	0.764
	[0.596, 0.838]	[0.630, 0.871]	[0.580, 0.896]	[0.607, 0.921]
N	1,830	1,830	1,313	1,313
R–squared	0.09	0.11	0.09	0.10

Table 3:   (Continued)

	Women		Men	
	Adjusted probability	Adjusted probability	Adjusted probability	Adjusted probability
Model 7 [a]				
Muslim	−0.123	−0.118	−0.138	−0.132
	[−0.177, −0.070]	[−0.172, −0.064]	[−0.201, −0.075]	[−0.196, −0.068]
Modern values		0.039		0.051
		[−0.015, 0.093]		[−0.009, 0.111]
Constant	0.728	0.617	0.745	0.597
	[0.607, 0.848]	[0.422, 0.812]	[0.588, 0.903]	[0.367, 0.828]
N	1,870	1,870	1,326	1,326
R–squared	0.09	0.09	0.09	0.10
Model 8 [b]				
Muslim	−0.124	−0.124	−0.139	−0.136
	[−0.177, −0.070]	[−0.178, −0.071]	[−0.203, −0.076]	[−0.200, −0.073]
Employment (ref. Not employed)				
Employed		0.014		0.136
		[−0.035, 0.064]		[0.056, 0.217]
Constant	0.732	0.73	0.851	0.742
	[0.612, 0.852]	[0.610, 0.850]	[0.711, 0.992]	[0.585, 0.900]
N	1,875	1,875	1,329	1,329
R–squared	0.10	0.10	0.09	0.09
Model 9 [b]				
Muslim	−0.121	−0.124	−0.141	−0.136
	[−0.174, −0.067]	[−0.178, −0.071]	[−0.204, −0.079]	[−0.200, −0.073]
Education (ref. Lower than tertiary)				
Tertiary		0.022		−0.034
		[−0.026, 0.070]		[−0.094, 0.027]
Constant	0.73	0.73	0.743	0.742
	[0.610, 0.850]	[0.610, 0.850]	[0.587, 0.900]	[0.585, 0.900]
N	1,875	1,875	1,329	1,329
R–squared	0.10	0.10	0.09	0.09
Model 10 [b]				
Muslim	−0.124	−0.124	−0.136	−0.136
	[−0.178, −0.071]	[−0.178, −0.071]	[−0.200, −0.073]	[−0.200, −0.073]
Wealth status (ref. Difficult to make ends meet)				
Not difficult/Easy		0.012		−0.006
		[−0.036, 0.060]		[−0.062,0.050]
Constant	0.732	0.73	0.741	0.742
	[0.612, 0.852]	[0.610, 0.850]	[0.584, 0.898]	[0.585, 0.900]
N	1,875	1,875	1,329	1,329
R–squared	0.10	0.10	0.09	0.09

Notes: The coefficients for adjusted probabilities without mediator (columns 1 and 3) are slightly different from Table 3 due to the need of similar sample sizes to compare with models with mediator. [a]=Adjusted for age, region, education, employment, wealth status, total children ever born, age of youngest child and partner's employment. [b]=Adjusted for the same control variables as [a] apart from the mediator.

Adding fertility intentions to the model partially reduces the strength of the negative relationship between being Muslim and contraceptive use for both women and men. Women and men who want children within three years have a lower propensity to use contraception than those who do have this intention, with quite strong coefficient effects (Model 5).

Adding religiosity to the model also partially deflates the relationship between being Muslim and contraceptive use, for both genders. Religious women and men both exhibit a similar pattern, with a nearly 12% lower probability of using contraception than their less religious counterparts. We also assess willingness to use contraception through modern values. For both women and men the association lacks confidence interval support, yet it portrays a favourable correlation for both genders, albeit with a minor impact. The coefficients pertaining to education and wealth status (considered ability factors) did not exhibit notable confidence interval support. Among men, those who were employed (also categorized as an ability factor) displayed a greater inclination towards contraception usage than their unemployed counterparts.

The average causal mediation effect (ACME) is presented separately for each potential mediator in Table 4 (women) and Table 5 (men), adjusting for individual characteristics. Fertility intentions, religiosity (for both genders), education (for women), and modern values (for men) were found to partially mediate the relationship between religious differences and contraceptive use, as shown in Tables 4 and 5. However, the direct association between religious affiliation and contraceptive use remained for both women and men.

Table 4: **ACME from mediation analyses of religious differentials, women's contraceptive use (any method), and potential mechanisms**

Mediator	Total effect	Confidence interval		ADE	Confidence interval		ACME	Confidence interval		% mediated
Fertility intentions [a]	−0.161	−0.216	−0.107	−0.119	−0.173	−0.067	**−0.043**	**−0.060**	**−0.027**	26.4%
Religiosity [b]	−0.160	−0.214	−0.105	−0.130	−0.185	−0.077	**−0.030**	**−0.044**	**−0.018**	18.7%
Modern values [c]	−0.159	−0.213	−0.109	−0.152	−0.207	−0.100	−0.007	−0.016	0.001	4.4%
Education [d]	−0.150	−0.201	−0.098	−0.159	−0.211	−0.108	**0.009**	**0.003**	**0.017**	−6.1%
Employment [e]	−0.159	−0.211	−0.108	−0.159	−0.211	−0.108	0.000	−0.002	0.002	0.0%
Wealth status [f]	−0.159	−0.212	−0.108	−0.159	−0.211	−0.108	0.000	−0.003	0.001	0.2%

Table 5: **ACME from mediation analyses of religious differentials, men's contraceptive use (any method), and potential mechanisms**

Mediator	Total effect	Confidence interval		ADE	Confidence interval		ACME	Confidence interval		% mediated
Fertility intentions [a]	−0.176	−0.244	−0.109	−0.135	−0.202	−0.070	**−0.042**	**−0.062**	**−0.025**	23.6%
Religiosity [b]	−0.166	−0.232	−0.099	−0.131	−0.198	−0.066	**−0.036**	**−0.053**	**−0.019**	21.3%
Modern values [c]	−0.172	−0.238	−0.111	−0.162	−0.228	−0.099	**−0.009**	**−0.020**	**−0.001**	5.5%
Education [d]	−0.170	−0.232	−0.109	−0.170	−0.233	−0.108	0.000	−0.007	0.006	0.3%
Employment [e]	−0.173	−0.235	−0.110	−0.170	−0.233	−0.108	−0.003	−0.010	0.003	1.5%
Wealth status [f]	−0.170	−0.233	−0.108	−0.170	−0.233	−0.108	0.000	−0.003	0.002	0.1%

Source: Kazakhstan's Generations and Gender Survey of 2020, author's calculations.
Adjusted for age, region, education, employment, wealth status, total children ever born, age of youngest child, and partner's employment for [a], [b], and [c].
Adjusted for the same control variables apart from the mediator for [d], [e], and [f]. 95% confidence intervals.

Fertility intentions played a role in mediating religious differences in Muslims' and Christians' contraceptive use, accounting for approximately 24%–26% of the total effect of religious affiliation on contraceptive use, with similar patterns observed across genders. Surprisingly, despite confirming the expectation about operationalization through the readiness factor, the study revealed that this mediation was only partial, challenging the assumption that fertility differences were the primary driving force behind contraceptive use differentials between religious groups.

Religiosity was found to mediate 19% of the total effect of religious differences on contraceptive use in the women's sample and 21% in the men's sample, supporting the expectation of mediation through willingness factors. On the other hand, modern values only mediated around 6% of the total effect of religious affiliation on contraceptive use in the men's sample.

Furthermore, the mediation analysis revealed a noticeable impact of education in the women's sample, reducing the adverse influence of religious affiliation on contraceptive use by 6.1%, as indicated by the confidence intervals. This finding partly aligned with the anticipation of mediation through socioeconomic status indicators (the ability factor), but solely in the context of education and exclusively among women.

6. Discussion and conclusion

This study explores the pathways through which religious affiliation (Islam or Christianity) influences contraceptive use in Kazakhstan by employing causal mediation analysis. As expected based on past research, but in contrast to what religious doctrine would predict, Muslims were less likely to use contraception than Christians in 2018. Prevailing hypotheses in the literature were assessed and the findings suggest that we can reject the characteristics hypothesis and the interaction hypothesis because socioeconomic factors do not explain away differences between these religious groups, nor do patterns converge at a higher socioeconomic status.

In terms of the mechanisms of the association between religious affiliation and contraceptive use, it was found that part of the effect of religious belonging was mediated through short-term fertility intentions. Based on previous studies of Kazakhstan that reveal ethnic differentials in fertility and different stages of demographic transition for the two ethnic and religious groups in the country, and thereby different levels of demand for children (Kan 2023), one could assume that mediation through fertility intentions would explain much more of the variation in contraceptive use between Muslims and Christians. However, despite having the strongest effect of all potential mediators for both women and men, it still explains only a fraction of the variation. We may assume that short-term fertility intentions have less explanatory power regarding contraceptive use if the desired number of children is not considered. Especially in a context where

unplanned pregnancies are very common, short-term fertility intentions alone may not capture a person's overall reproductive goals. Without considering the desired number of children, it is possible to misinterpret contraceptive behaviours. For example, someone who is not actively trying to conceive in the short term might still want a large family and therefore will not be using contraception consistently. Including the desired number of children in future analyses may enhance the explanatory power of the effect of short-term fertility intentions on contraceptive use.

Based on previous studies arguing that there is a revival of religiosity especially among ethnic Kazakhs (Telebaev 2003; Aydıngün 2007; Yerekesheva 2020), it was assumed that the differences in religiosity between Muslims and Christians were also behind the religious differentials in contraceptive use in Kazakhstan. The findings of the study reveal that this indeed is one of the mediators of the difference in contraceptive use. Yet, again it explains only a fraction of the variation and can thereby not be taken as the main explanation behind religious differentials.

Based on the findings that the strongest mediators – religiosity and fertility intentions – explain rather little of the variation, we must assume that the religious differentials are driven by other, untested mechanisms. For example, there could be misconceptions regarding the permissibility of contraception, especially by followers of Islam. As explained in the context section, Islam's teachings on contraceptive use are more relaxed than the teachings in Christianity, but they are also more open to interpretation. This means that after the time of religious prohibition, those who translated the teachings of Islam in the Kazakh post-independence context may not fully have explained Islam's position on the permissibility of contraception to its followers. As pointed out by Barrett (2007) in a qualitative study on neighbouring Uzbekistan, Muslim women were uncertain about religious positions on contraception and widely articulated a reliance on "how many Allah gives" in regard to family planning.

Another factor that could potentially contribute to disparities between religious groups is Muslims' and Christians' varying exposure to education. While this could be a significant factor in some contexts, it is important to note that all ethnic and religious groups in Kazakhstan have relatively high educational attainment. Mediation via education revealed only a very small attenuation of the total difference in contraceptive use among women by religious affiliation.

Education serves as a valuable tool for understanding differences in norms and family values. However, it is crucial to recognize that in the specific context of Kazakhstan the educational level may not accurately reflect access to or knowledge of family planning methods. This limitation is primarily due to the absence of sex education in the country's educational curriculum. Therefore, while education can provide insight into cultural and societal perspectives, in this particular context it may not fully capture individuals' understanding or awareness of family planning.

It is important to consider that the discrepancies between Muslims and Christians in accessing family planning may not solely stem from religious dimensions but could also be interconnected with the cultural norms of ethnic Kazakhs. There is a highly articulated norm of taboo or shame (*uyat* in Kazakh) that is connected with a fear of condemnation by 'others' (relatives, neighbours, etc.). Sexual reproductive health and sexual education is *uyat* in traditional and religious families, which thus can limit accessibility of family planning knowledge and actual use.

Another explanation for the unexplained variation could have to do with a high acceptance of unintended pregnancies following non-use of contraception (Curtis, Evens, and Sambisa 2011). It could be that Muslims in Kazakhstan have a higher acceptance of unplanned pregnancies than Christians.

On the other hand, the abortion culture that prevailed in the Soviet Union still exists in Kazakhstan, and it may be that fertility control and family planning occur through abortion rather than contraception. However, ethnic differentials in abortion can hardly explain the religious differentials in contraceptive use: ethnic Russians (Christians) have a mean number of induced abortions two times higher than ethnic Kazakhs (Muslims) (Statistics Committee 2016). There is a possibility that ethnic Kazakhs (Muslims) underreport their abortion histories more than Christians due to social desirability bias, and therefore the survey data may not be accurate. However, the vital statistics of medical abortions by region (Statistics Committee 2021) show lower abortion rates in southern regions that are more homogenously Muslim than in northern Kazakhstan, which has a higher proportion of Christians. Illegal abortions (outside of medical facilities), especially in regions of southern Kazakhstan, still exist and thus do not appear in these statistics. It could be that Muslims in Kazakhstan are more exposed to illegal abortions outside of medical facilities.

As in many other post-Soviet countries, people in Kazakhstan still have reservations about hormonal contraception, such as fear of cancer, obesity, and thromboembolism, and many obstetricians and gynaecologists still support these reservations (Lokshin and Kobzar 2015). This may in turn decrease the possibility of greater women's empowerment because this is a method that allows women to make their own decisions and choices regarding reproductive health, without relying on men's participation or agreement, as is the case with male condom use or seeking medical help for IUD insertion. This lack of access to and knowledge about hormonal contraception may further strengthen the differentials between Muslims and Christians in women's empowerment in reproductive health decision-making in Kazakhstan. The potential low level of women's empowerment in decision-making related to their own health may also be behind the big unexplained part of religious differentials.

Future research could look at identifying qualitatively how religious affiliation prevents contraceptive use; for example, whether there are misinterpretations of how particular religions permit contraception. Comparative studies in Central Asia that could

compare across borders the same ethnic groups belonging to particular religions would improve our understanding of how context influences decisions on contraceptive use. It would also be beneficial to study whether there is any non-overlapping effect of religion and ethnicity. A possible policy implication of the current study is to work with religious leaders to spread information about contraception and how religions (Islam or Christianity) consider contraception permissible. The study also hints at potential differentials in sex education, which governmental and non-governmental organizations should promote in order to remove cultural taboos on sensitive topics related to sexual and reproductive health. Such initiatives as the *Uyatemes* ('not a shame') website should be further promoted and expanded.

This study contributes to the literature on family planning in Central Asia and post-Soviet countries by analysing the mechanisms of the association between religious differentials and contraceptive use. The insights could be helpful in similar contexts: not only Central Asian states and post-Soviet countries but also other middle-income countries with diverse populations.

7. Acknowledgements

Ethical issues

Since the study includes sensitive topics such as religious affiliation and health-related variables (contraceptive use), before the analysis commenced it was evaluated by the Swedish Ethical Review Authority (Dnr 2022-03710-01) and granted ethical approval. The data was obtained from the Generations and Gender Programme (GGP) through a registration process and signing of the GGP Terms of Acceptable Usage.

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Appendix

Figure A-1: Selection flow and final population

All women (18–45) and men (18–49)
N = 8,642

Excluded for not having partner (N = 2,931)
Excluded due to pregnancy of respondent or partner (N = 346)
Excluded due to own or partner's sterilization/confirmed infertility (N = 135)
Excluded due to being same sex couple (N = 93)

Exclusions due to missing, non-applicable (NA), or refusal to answer the question
'are you trying to get pregnant?' (N = 1,198). The latter exclusion is based on the fact that when people do not respond to the question about pregnancy, they are not asked questions about contraception. The group could not be categorized as non-users because we were unsure about their contraceptive usage due to their non-response to the pregnancy question. Those who answered that they were trying to get pregnant (and were also not asked questions about contraception) were classified as non-users.
Exclusion due to missing total children (N = 5)
Excluded due to not belonging to either Islam or Christianity (N = 403 including 261 Buddhist/Hindu, 86 non-affiliated, and 56 who refused to report religious affiliation)
Exclusion due to missing contraceptive use (N = 228)
Exclusions due to missing either age of youngest child, region, wealth status, or partner's employment (N = 99)
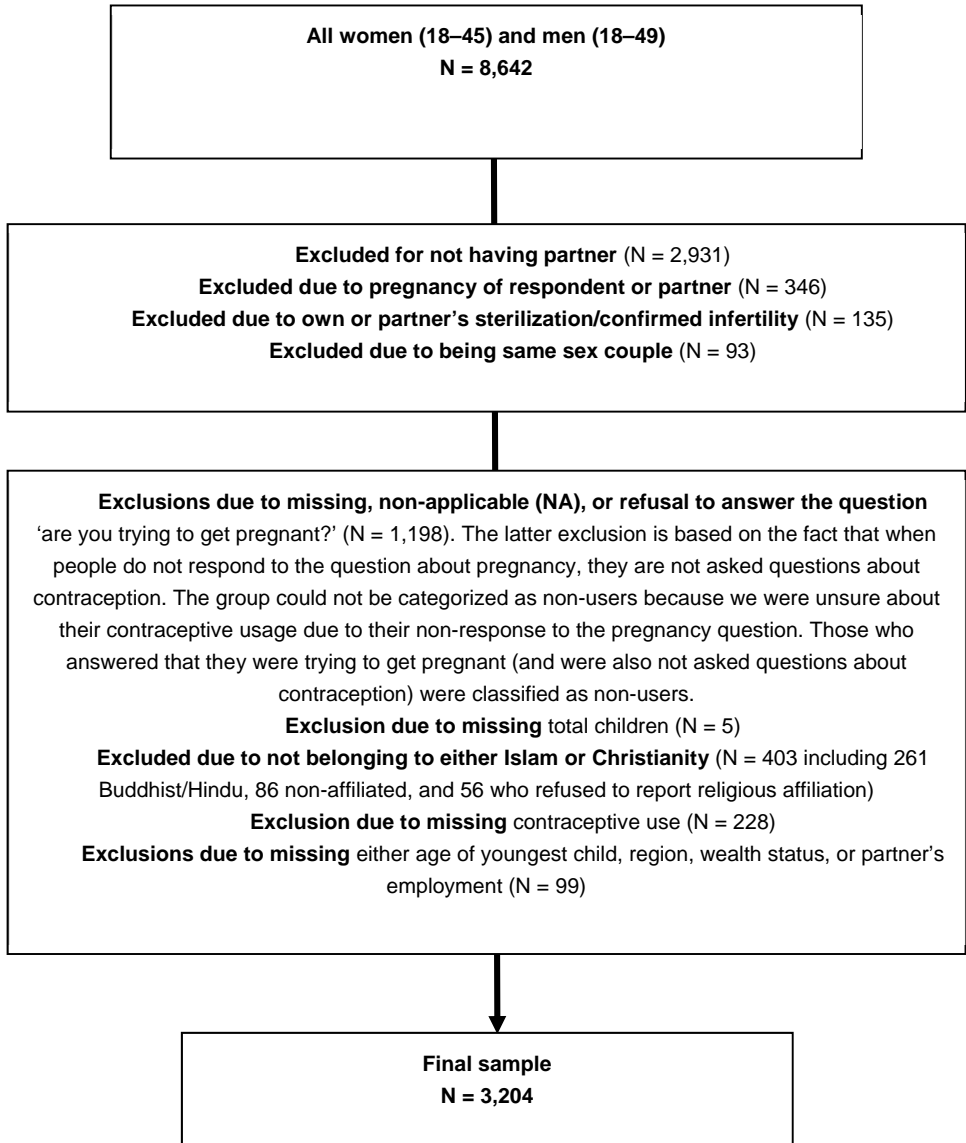
Final sample
N = 3,204

Table A-1: Descriptive statistics, GGS full sample vs. 2009 population census

	Census 2009 (%)	GGS 2020 full sample	GGS 2020 full sample, weighted
Age			
18–34 (15–34 in 2021 census)	44.5	32.2	41.6
35–64	47.6	55.9	50.2
65–79 (65 and older in 2021 census)	7.8	11.9	8.3
Gender			
Women	51.7	60.9	52.6
Men	48.3	39.1	47.4
Marital status			
Yes	57.1	56.5	55.2
No	42.9	43.5	44.8
Education			
Lower secondary and less	18.3	31.9	32.2
Secondary	58.7	36.5	36.1
Tertiary	23.0	31.6	31.8
Employment			
Yes	54.3	58.8	61.6
No	45.7	41.2	38.4
Women's employment (15 and older for census)	46.4	53.2	55.1
Men's employment (15 and older for census)	63.1	67.7	68.7

Source: Kazakhstan's Generations and Gender Survey of 2020, author's calculations.

Table A-2: Linear probability models of women's and men's contraceptive use, by religion and education, weighted

	Women		Men	
	without interaction	with interaction	without interaction	with interaction
Religion (ref. Christian)	−0.124	−0.118	−0.136	−0.144
	[−0.178, −0.071]	[−0.186, −0.051]	[−0.200, −0.073]	[−0.215, −0.072]
Education (ref. Lower than tertiary)	0.022	0.033	−0.034	−0.057
	[−0.026, 0.070]	[−0.047, 0.114]	[−0.094, 0.027]	[−0.173, 0.060]
Constant	0.336	0.333	0.435	0.439
	[0.215, 0.458]	[0.208, 0.457]	[0.302, 0.567]	[0.305, 0.573]
N	1875	1875	1329	1329
R–squared	0.11	0.11	0.11	0.11
AIC	2478.58	2480.49	1783.25	1785.06
BIC	2605.92	2613.36	1902.67	1909.68

Note: Models adjusted for age, age of the youngest child, employment, partner's employment, self-assessed wealth level, total number of children, region.

Table A-3:   Linear probability models of women's and men's contraceptive use, by religion and employment, weighted

	Women		Men	
	without interaction	with interaction	without interaction	with interaction
Religion (ref. Christian)	–0.124	–0.153	–0.136	–0.169
	[–0.178, –0.071]	[–0.229, –0.077]	[–0.200, –0.073]	[–0.357, 0.020]
Employment (ref. Not employed)	0.014	–0.023	0.136	0.108
	[–0.035, 0.064]	[–0.104, 0.058]	[0.056, 0.217]	[–0.064, 0.280]
Religion # Employment		0.052		0.037
		[–0.044, 0.148]		[–0.157, 0.230]
Constant	0.336	0.357	0.435	0.459
	[0.215, 0.458]	[0.230, 0.484]	[0.302, 0.567]	[0.267, 0.651]
N	1,875	1,875	1,329	1,329
R–squared	0.11	0.11	0.11	0.11
AIC	2478.58	2479.44	1783.25	1785.09
BIC	2605.92	2612.31	1902.67	1909.7

Note: Models adjusted for age, age of the youngest child, education, partner's employment, self-assessed wealth level, total number of children, region.

Table A-4:   Linear probability models of women's and men's contraceptive use, by religion and self-assessed wealth, weighted

	Women		Men	
	without interaction	with interaction	without interaction	with interaction
Religion (ref. Christian)	–0.124	–0.116	–0.136	–0.127
	[–0.178, –0.071]	[–0.179, –0.052]	[–0.200, –0.073]	[–0.203, –0.052]
Can make ends meet (ref. Difficult)	0.012	0.03	–0.006	0.012
	[–0.036, 0.060]	[–0.054, 0.114]	[–0.062, 0.050]	[–0.084, 0.108]
Religion # Self–assessed wealth		–0.026		–0.025
		[–0.128, 0.076]		[–0.142, 0.091]
Constant	0.336	0.331	0.435	0.43
	[0.215, 0.458]	[0.206, 0.455]	[0.302, 0.567]	[0.296, 0.564]
N	1,875	1,875	1,329	1,329
R–squared	0.11	0.11	0.11	0.11
AIC	2478.58	2480.34	1783.25	1785.08
BIC	2605.92	2613.21	1902.67	1909.69

Note: Models adjusted for age, age of the youngest child, education, employment, partner's employment, total number of children, region.

Sensitivity analysis

The sensitivity analysis was conducted using the Stata *medsens* command to address potential unmeasured factors in the study. It examined the robustness of the results by testing the violation of the sequential ignorability (SI) assumption (Hicks and Tingley

2011). The analysis was performed separately for different mediators (fertility intentions, religiosity, modern values, education) in both women's and men's samples.

Table A-5:   Results of the sensitivity analysis with the products of the R2 method

	Women			Men		
Mediator	Fertility intentions	Religiosity	Education	Fertility intentions	Religiosity	Modernization
Rho at which ACME = 0	−0.2737	−0.132	0.0671	−0.2375	−0.129	0.0577
R^2_M*R^2_Y* at which ACME = 0	0.0749	0.0174	0.0045	0.0564	0.0166	0.0033
R^2_M~R^2_Y~ at which ACME = 0	0.0532	0.0153	0.0038	0.0406	0.0137	0.0029

For the mediation through fertility intentions in the women's sample, a negative correlation of 0.274 between the error terms of the mediator and outcome regression models would indicate a potential violation of the SI assumption. Additionally, the product of the coefficient of determination (R2) method suggested that the mediated effect would be zero if the confounders collectively explained 7.49% or more of the residual variance.

In the men's sample, the sensitivity analysis for fertility intentions revealed that a negative correlation of 0.238 between the error terms would indicate a potential violation of the SI assumption. The product of the coefficient of determination method indicated that the mediated effect would be zero when the confounders explained 5.64% or more of the residual variance.

For religiosity in the women's and men's samples, a negative correlation of 0.132 and 0.129 between the error terms, respectively, would suggest a potential violation of the SI assumption. The product of the coefficient of determination method indicated that the mediated effect would be zero when the confounders explained 1.74% or more of the residual variance for women, and 1.66% or more for men.

Similarly, for modern values in the men's sample, a positive correlation of 0.058 between the error terms would indicate a potential violation of the SI assumption. The product of the coefficient of determination method suggested that the mediated effect would be zero when the confounders explained 0.33% or more of the residual variance.

Lastly, for education in the women's sample, a positive correlation of 0.067 between the error terms would indicate a potential violation of the SI assumption. The product of the coefficient of determination method suggested that the mediated effect would be zero when the confounders explained 0.45% or more of the residual variance.

In relation to the findings, the sensitivity analysis raises concerns about potential violations of the SI assumption. This implies that unmeasured factors could be influencing both the mediator and the outcome, which could introduce bias into the study results. It indicates the need for caution when interpreting the findings, as the presence of unmeasured confounders may impact the validity of the mediated effects.

In summary, the sensitivity analysis points out potential problems by indicating a potential for violations of the SI assumption in various mediation models. These violations suggest the influence of unmeasured confounders, which can affect the study's findings. Therefore, researchers should consider these limitations and exercise caution in drawing conclusions based on the results.