Global Evolutionary Perspectives on Gender Differences in Religiosity, Family, Politics and Pro-Social Values Based on the Data from the World Values Survey*

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ABSTRACT

Recent studies show that the global increase in gender equality does not reduce gender differences in values. These findings somewhat undermine the social role theory and increase the need for additional explanations. These findings also imply that gender differences in val-

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ues may stem from some underlying universalities that persist even through changes associated with socio-economic development. This gives us reason to explore an evolutionary perspective on gender differences in values. We discuss evolutionary mechanisms that could underlie certain universal gender differences in values, and then test whether these differences are truly universal across the world (we use data from World Values Survey to search for empirical support for our evolutionary hypotheses). We provide evidence for the global scale of gender differences in religiosity, family values, political values, and pro-social values through our calculations.

Keywords: *gender equality, gender differences in values, socio-economic development, universal gender differences, religiosity, family values, political values, pro-social values.*

Gender values have been the subject of research for decades. One of the earliest perspectives on gender differences in values was offered by the psychologist David Bakan (1966). His work specifies agency and communion goals or values. Agency goals/values are associated with achieving high positions in the social hierarchy and are oriented towards tough competition, while communion goals/values are oriented towards maintaining good relations within the group and avoiding conflict. Agency goals are viewed as more masculine, and community goals as more feminine. In this way, Bakan connects gender and deep value attitudes that influence decision-making about education, future careers, political preferences, *etc.* His approach has found empirical support in a number of later studies (see, *e.g.*, Eagly 1987, Block *et al.* 2018). Later on, Schwartz and Bilsky (1987) introduced a somewhat related distinction between values that serve individualistic or collectivistic interests. Another study shows that Schwartz and Bilsky's motivational categories of achievement and self-direction to overlap with masculine stereotypes, whereas feminine stereotypes overlap with their categories of prosociality and maturity (Di Dio *et al.* 1996).

Expanding knowledge about multi-dimensional gender differences in values observed in different societies at different levels of social and economic development (for literature reviews see, *e.g.*, Croson and Gneezy 2009; Eagly and Wood 1991) requires the development of sufficiently comprehensive explanations. Probably the most common approach is related to the social roles of males and females and assumes that these differences are of a purely social nature – that is, they are constructed and imposed by society. Scholars addressing social role theory to search for the roots of gender differences suggest

that values corresponding to agency and communal modes of behavior are formed as social stereotypes that are assimilated by boys and girls and internalized as personal values later in life (see, *e.g*., Eagly 1987; Fiske *et al.* 2002; Ridgeway 2001; Bell and Burkley 2014; Martin and Ruble 2004).

Others argue that differences in behavior between men and women are weakly associated with a set of socially assimilated gender stereotypes (Costa Jr, Terracciano and McCrae 2001; Connolly, Goossen and Hjerm 2020; Haines, Deaux and Lofaro 2014; Hyde 2014; Prentice and Carranza 2002; Beutel and Marini 1995). On the one hand, Ronald Inglehart and his co-authors pay considerable attention to the issue of increasing gender equality in developed countries that is transforming traditional gender roles in the family, the household, and the workforce (Inglehart and Norris 2003; Inglehart, Norris and Welzel 2003). From perspective of social role theory, as traditional roles are eroded, traditional gender differences in values should begin to vanish (or, at least, should considerably weaken). On the other hand, research suggests that this is not the case – on the contrary, gender differences are shown to be most pronounced in European and American cultures where traditional gender roles are minimized (Costa Jr, Terracciano and McCrae 2001; Connolly, Goossen and Hjerm 2020). Another study, comparing the data from surveys conducted in the early 1980s with similar data from 2014, concludes that despite the great success of women in various economic and political fields, psychological and behavioral differences between the genders have remained about the same (Haines, Deaux and Lofaro 2014; see also Hyde 2014; Prentice and Carranza 2002; Beutel and Marini 1995). These findings suggest that gender differences in values may have some underlying universalities that persist even through changes associated with socioeconomic development.

In this study, we aim to reveal such universalities using an evolutionary perspective. Clearly, not all gender differences in values are universal across societies and cultures. We discuss evolutionary mechanisms that might give rise to certain universal differences in values between the sexes, and then test whether these differences are truly universal across the world (we use data from World Values Survey to search for empirical support for our evolution-based hypotheses).

A notable contribution to the discussion of gender values and gender differences in values have come from evolutionary scientists, particularly evolutionary psychologists and evolutionary anthropologists (Buss 1989, 2007; Buss *et al*. 2020; Fromhage and Jennions

2016; Van Vugt and Smith 2019). Sexual selection theory predicts the existence of male and female reproductive strategies associated with access to reproductive partners as well as parental behavior (Wade and Shuster 2002; Kaplan and Lancaster 2003). Women's confidence in parenthood and their more energy-intensive contributions to offspring (Beaulieu and Bugental 2008), against the general background of more limited potential opportunities for reproductive success compared to men (Trivers 1972), make women more interested in the family. Meanwhile, male reproductive strategies, formed as a result of selection between the sexes and intrasexual selection, have led to the formation of two different sets of reproductive values in humans: 'good genes' and the ability of the earner, on the one hand, and the qualities of a caring father, on the other. In the first case, selection provided reproductive benefits for the male, while in the second case (selection for good father qualities) it increased the reproductive success for both sexes through parental investment (Antfolk and Sjölund 2018). The correlations between these two variants of male strategies and parental input run in opposite directions, and each may be attractive to women depending on the situation. Fundamental contradictions between them underlie the gender conflict (Chang, Lu, and Zhu 2017). In pre-industrial societies, regardless of economic type, masculine qualities that ensure success and the achievement of a higher social status function as an integral part of the reproductive strategy ('good genes' and 'successful earner') and have a greater impact on reproductive contribution than on offspring well-being (Von Rueden and Jaeggi 2016). Universal differences between men and women in reproductive success and parental contribution can be traced in all societies, including modern large-scale Western societies (Hopcroft 2006). The greater emphasis on parental contribution among women also predicts a greater role for the family in women's lives compared to men. The social and political spheres, in turn, should be less important to women – namely, due to the fact that men in many societies are characterized by a greater orientation and emphasis on success in public life and the achievement of social status, which go hand in hand with reproductive success.

All other things being equal, evolutionary theory suggests that producing offspring is much more energetically costly for women. In addition, women are more confident in their genetic relatedness to children and, therefore, more interested in the survival of their offspring; they also invest more effort in caring for children. The need to ensure not only their own survival, but also the survival of children dependent on them, shaped the characteristics of female behavior and

psyche. Data from various sources indicate that women are more anxious than men, and these differences are not accidental. Women are better at recognizing danger signals and threats from the environment (Day and Stevenson 2020). This increases survival rates and provides the formation of protective responses, which is extremely important for women as it is they who play the leading role in caring for the offspring and train them to survive in the early stages of individual development. Women are better than men at recognizing negative emotions (Thompson and Voyer 2014), particularly the emotions of fear (Brivio, Lopez and Chen 2020). In general, we can speak of the existence of evolutionary adaptive sex differences in sensitivity to stress. In this context, the high general religiosity of women may have deep evolutionary roots and is explained by the need to reduce anxiety and stress in uncertain life situations. The same point may explain the more pronounced belief in supernatural powers among women.

Obvious gender differences are reported for stress and anxiety (Street and Dardis 2018; Yamada *et al.* 2018; Burkova *et al.* 2021; Semenova *et al.* 2021). Given the greater exposure to anxiety and stress, we would expect women to be more committed to pro-social values aimed at ensuring greater stability and well-being in society, although data from a number of authors indicate differences in the range of variability in levels of cooperation within gender (Thöni, Volk and Cortina 2020; Rostovtseva *et al.* 2020). Men are characterized by greater variability, with pronounced altruists or egoists observed among them, while most women demonstrate moderate altruism (see Butovskaya *et al.* 2020 for details). Importantly, a number of authors have shown that women are more empathetic and better able to sense other people's states (Di Tella *et al.* 2020); these gender differences have evolutionary roots in maternal behavior (Preston and De Waal 2002).

The discussion of gender differences in religiosity may be of particular interest. The fact that males and females differ considerably in their religious behaviour and attitudes was explicitly stated in a classic book on the psychology of religion as early as the mid-1970s (Argyle and Beit-Hallahmi 1975). Since then, empirical evidence of such differences has mounted thanks to numerous studies using a variety of approaches, methods, and data sources (see Francis 1997; Walter and Davie 1998; Stark 2002 for reviews). Women have been shown to be more prone to accepting both emerging and conventional religions ever since the times of ancient Egyptian, Greek and Roman cults (Beard, North and Price 1998; Burkert 1987) and early Christianity

(Stark 1996). A number of explanations have been provided, but there is no unanimous agreement on the nature of gender differences in religiousness (*e.g.*, Cornwall 1989, 2009; Feltey and Poloma 1991; Sullins 2006). Some explanations are criticized for focusing on genetics and not taking into account the social studies perspective (Cornwall 2009); others concentrate on the diversity of social factors failing to take into account empirical data which corroborate the universality of gender differences in religiosity. The sociobiological (evolutionary psychological) bases of religiosity are subject to vigorous discussion. Feierman (2009) assumes that the capacity to believe in God in general (rather than a particular God) may be a phylogenetic adaptation. Voland notes that religiosity has several components, namely cognitive, spiritual, socially binding, identity-forming, communicative and moral, and assumes that religiosity may have evolved in order to deal with the so-called second-order 'free-rider' problem, as religions aim to strengthen the moral standards within a group that must overcome incentives for short-term self-interest (Voland 2009: 12). Multiple cross-cultural studies provide evidence corroborating this hypothesis (Johnson 2005; Roes and Raymond 2003; Shariff and Norenzayan 2007; Johnson and Bering 2006).

As for sex and gender differences in religiosity, Miller and Stark summarize the existing literature to find 'three distinct ways in which gender-specific socialization leads to greater levels of differential religiousness':

> The first involves personality characteristics. Females are socialized to be more passive and nurturing, characteristics associated with greater levels of religiousness. The second involves traditional gender roles. Women are socialized into the role of mother, family caretaker, and so on, which are seen as subsuming religiousness. Third, women are raised in societies where they are denied social and economic power, which is seen as leading to greater religiousness by encouraging female passivity and submissiveness (a variation of the first explanation), forcing women to accept the role of mother and family caretaker (a variation of the second explanation), and increasing religion's appeal as a provider of social and emotional support to deal with blocked social and economic aspirations (a variation of classic deprivation theory) (Miller and Stark 2002: 1405–1406).

Indeed, it is frequently implied that 'girls learn traditionally "feminine" personality characteristics that are associated with religiousness

during primary socialization' (Roth and Kroll 2007: 205). However, no insight is provided as to why girls tend to be raised in this way. Another hypothesis deals with the traditional female and male roles, stating that women tend to have more free time and spend a greater portion of their time around the house (Roth and Kroll 2007: 205; Stark 2002). However, this explanation is not consistent with empirical evidence, as career women tend to outperform men in religiosity, as do the housewives. Moreover, this would not explain the gender differences in religiosity in sub-Saharan Africa, where women tend to be main workers in the traditional hoe agriculture (*e.g.*, Korotayev *et al.* 2016) and also tend to be more religious than men.

The currently best-established hypothesis for biological origins of sex and gender differences in religiosity, proposed by Miller and Hoffmann (1995), deals with risk-aversion and risk-taking. This hypothesis is based on the assumptions that men are more inclined than women to risk-taking behavior, and that to be irreligious means risking divine punishment. This view quickly gained considerable support (Forthun *et al.* 1999; Sherkat and Ellison 1999; Stark 2002; Whitmeyer 1998). In line with this explanation, it is suggested that male irreligiousness, along with male lawlessness, stems from the fact that 'far more males than females have an underdeveloped ability to inhibit their impulses, especially those involving immediate gratification and thrills' (Stark 2002: 496). However, there is one serious logical objection to this explanation – if a person chooses to be irreligious, they do not believe in the risk of eternal damnation and thus do not perceive this behavior as risky. Moreover, Miller and Stark suggest that this explanation is plausible only for religions such as Christianity and Islam that emphasize religious exclusivity and assert the possibility of punishment after death for being irreligious. This explanation does not suffice to explain gender differences in religiosity, say, in East Asia and/or other regions where religions other than the religions of the Book are widespread. The invalidity of risk-related explanations for gender differences in religiosity is showed by Roth and Kroll (2007) using the data from the World Values Survey. However, we assume that, risk-taking aside, gender differences in religiosity may still have evolutionary (sociobiological) origins, as higher female religiosity may bear universal character and stem from females' tendency to experience higher levels of anxiety and stress than males for the reasons we have specified above.

We put forward a number of hypotheses regarding sex and gender differences in values that we expect to bear universal character:

H1: Women should universally attribute higher value to religiosity than men.

H2: Women should universally place a higher value on family (particularly, parental care for their offspring) than men.

H3: Men should universally value politics higher than women.

H4: Women should universally support prosocial values more than men do.

DATA AND METHODS

We use data from the long-term global sociological project 'World Values Survey' from the first to the seventh wave of the WVS. We use a longitudinal data file (World Values Survey 2021).

We consider multivariate models in which the variables describing values are dependent on gender and are controlled for age and cohort, education level (numerical value from 1 to 8), marital status (categorical variable), labor market position / employment (categorical variable), and income level (numerical variable). We also control for all country-waves using the corresponding dummy variables (see Shulgin *et al.* 2019 for more details on this methodology).

As a basic one, we use the logistic model (1) to explain the relationship when the dependent variable is binomial, that is, when there are only two types of answers, for example, 'Yes' (1) / 'No' (0). The results of estimating the coefficient for the variable 'sex' in the logistic model are shown in column (1) (see Table 2 below and Tables S1–S6 in the online Supplement).

The ODDS ratio column (see column 3 in Table 2 below and Tables S1–S6 in the Supplement) shows how much the chances of choosing the answer (1) increase in comparison with the answer (0) when the respondent is a woman.

We use the ordinal logistic model (2) to explain relationships when the dependent variable is binomial with two or more independent values (*e.g.*, 'Very happy' (1) 'Rather happy' (2), 'Rather unhappy' (3), 'Not happy at all' (4)). The results of estimating the coefficient for the variable 'sex' in the ordinal logistic model are shown in column (2) (see Table 2 below and Tables S1-S6 in the Supplement).

For all variables analyzed, we also present OLS estimates of model (3) for the influence of gender obtained using the multiple linear regression model (see column 4 in Table 2 below and Tables S1–S6 in the Supplement).

For the OLS model, the specification of the equation is given below.

$$Value = \beta_0 + \beta_1 age + \beta_2 cohort + \beta_3 education + \beta_4 sex + \beta_5 income + \sum_{m=2}^{8} \gamma_m D_m + \sum_{l=2}^{8} \delta_l D_l + \sum_{cw=2}^{45} \mu_{cw} D_{cw} + e \quad (1)$$

where *Value* in OLS estimates is the respondent's answer regarding his/her idea of values. In the logistic and ordinal logistic model, *Value* is the probability of the respondent choosing the corresponding answer;

age, *cohort*, *education*, *sex*, *income* are variables describing the age, cohort, education, sex, and income level of the respondent;

D_m, D_l, D_{cw} are dummy variables for the corresponding levels of marital status, labor market position and belonging to one of the 45 country-waves;

β, γ, δ, μ are the coefficients of the regression equation whose numerical estimates are obtained as a result of evaluating this model on the data.

We estimate models (1), (2) and (3) for six regional subsamples of respondents of both sexes from high-income OECD countries (a subgroup of developed countries); Eastern Europe; Latin America; the Middle East and North Africa; sub-Saharan Africa; and East and South-East Asia. Lists of countries belonging to each region and wave of the WVS are presented in Table 1.

Table 1

Countries and country-waves belonging to six regional subsamples

Region	Countries and country-waves
OECD 16 countries 56 country-waves 78,102 respondents	Australia (1981, 1995, 2005, 2012, 2018), Canada (1990, 2000, 2006), Finland (1981, 1996, 2005), France (2006), Germany (1997, 2006, 2013, 2018), Israel (2001), Italy (2005), Japan (1981, 1990, 1995, 2000, 2005, 2010, 2019), Netherlands (2006, 2012), New Zealand (1998, 2004, 2011, 2020), Norway (1996, 2007), Spain (1990, 1995, 2000, 2007, 2011), Sweden (1982, 1996, 1999, 2006, 2011), Switzerland (1989, 1996, 2007), UK (1998, 2005), United States (1982, 1990, 1995, 1999, 2006, 2011, 2017)
Eastern Europe 21 countries 52 country-waves 64,760 respondents	Albania (1998, 2002), Belarus (1990, 1996, 2011), Bosnia and Herzegovina (1998, 2001), Bulgaria (1997, 2005), Croatia (1996), Czech Republic (1991, 1998), Estonia (1996, 2011), Greece (2017), Hungary (1982, 1998, 2009), Latvia (1996), Lithuania (1997), Macedonia (1998, 2001), Moldova (1996, 2002, 2006), Montenegro (1996, 2001), Poland (1989, 1997, 2005, 2012), Romania (1998, 2005, 2012, 2018), Russia (1990, 1995, 2006, 2011, 2017), Serbia (1996, 2001, 2017), Slovakia (1990, 1998), Slovenia (1995, 2005, 2011), Ukraine (1996, 2006, 2011), Yugoslavia, Serbia and Montenegro (2005)

Table 1 (continued)

Region	Countries and country-waves
Latin America 17 countries 53 country-waves 74,341 respondents	Argentina (1984, 1991, 1995, 1999, 2006, 2013, 2017), Bolivia (2017), Brazil (1991, 1997, 2006, 2014, 2018), Chile (1990, 1996, 2000, 2006, 2012, 2018), Colombia (1997, 2005, 2012, 2018), Dominican Republic (1996), Ecuador (2013, 2018), El Salvador (1999), Guatemala (2004, 2020), Haiti (2016) Mexico (1981, 1990, 1996, 2000, 2005, 2012, 2018), Nicaragua (2020), Peru (1996, 2001, 2006, 2012, 2018), Puerto Rico (1995, 2001, 2018), Trinidad and Tobago (2006, 2010), Uruguay (1996, 2006, 2011), Venezuela (1996, 2000)
Middle East and North Africa 16 countries 40 country-waves 64,298 respondents	Algeria (2002, 2014), Egypt (2001, 2008, 2013, 2018), Iran (2000, 2007, 2020), Iraq (2004, 2006, 2013, 2018), Jordan (2001, 2007, 2014, 2018), Kuwait (2014), Lebanon (2013, 2018), Libya (2014), Morocco (2001, 2007, 2011), Pakistan (1997, 2001, 2012, 2018), Palestine (2013), Qatar (2010), Saudi Arabia (2003), Tunisia (2013, 2019), Turkey (1990, 1996, 2001, 2007, 2011, 2018), Yemen (2014)
Sub-Saharan Africa 11 countries 25 country-waves 44,109 respondents	Burkina Faso (2007), Ethiopia (2007, 2020), Ghana (2007, 2012), Mali (2007), Nigeria (1990, 1995, 2000, 2011, 2018), Rwanda (2007, 2012), South Africa (1982, 1990, 1996, 2001, 2006, 2013), Tanzania (2001), Uganda (2001), Zambia (2007), Zimbabwe (2001, 2012, 2020)
East and South-East Asia 18 countries 55 country-waves 82,467 respondents	Bangladesh (1996, 2002, 2018), China (1990, 1995, 2001, 2007, 2018), Hong Kong (2005, 2013, 2018), India (1990, 1995, 2001, 2006, 2014), Indonesia (2001, 2006, 2018), Kazakhstan (2011, 2018), Kyrgyzstan (2003, 2011, 2020), Macao SAR (2020), Malaysia (2006, 2012, 2018), Myanmar (2020), Philippines (1996, 2001, 2012, 2019), Singapore (2002, 2012), South Korea (1982, 1990, 1996, 2001, 2005, 2010, 2018), Taiwan (1994, 2006, 2012, 2019), Tajikistan (2020), Thailand (2007, 2018), Uzbekistan (2011), Vietnam (2020)

RESULTS

Religious values. In the OECD, women are significantly more likely than men to assert that they are religious (F034), believe in God (F050), that religion is very important in their lives (A006), that God is very important in their lives (F063), that they often reflect on the meaning and purpose of life (F001), they often attend religious services (F028), they trust the Church a lot (E069_01), they are active members of a church / religious organization (A098), religious faith is an important quality in children (A040), they believe in hell (F053).[*] Here and below, all significant variables for religious values are listed

in order of the size of the gender difference (the first variable to be listed is the one with the largest difference between sexes).

In Eastern Europe, women are significantly more likely than men to assert that they are religious (F034), believe in God (F050), frequently attend religious services (F028), God is very important in their lives (F063), religion is very important in their lives (A006), they believe in hell (F053), trust the Church a lot (E069_01), often reflect on the meaning and purpose of life (F001), are active members in a church / religious organization (A098), religious belief is an important quality in children (A040).

In Latin America, women are significantly more likely than men to assert that they are religious (F034), believe in God (F050), that religion is very important in their lives (A006), God is very important in their lives (F063), they often attend religious services (F028), are active members in a church / religious organization (A098), religious belief is an important quality in children (A040), they trust the Church a lot (E069_01), believe in hell (F053), they often reflect on the meaning and purpose of life (F001).

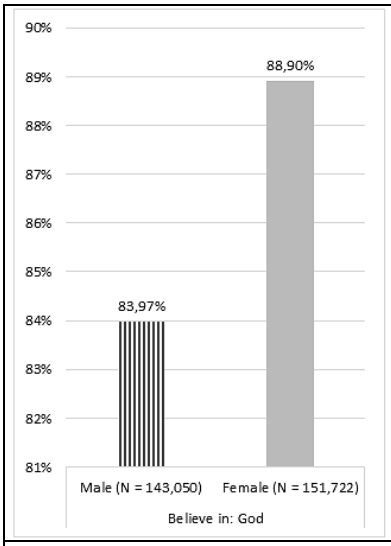
In sub-Saharan Africa, women are significantly more likely than men to assert that they are religious (F034), believe in God (F050), frequently attend religious services (F028), are active members of a church / religious organization (A098), religion is very important in their lives (A006), they trust the Church a lot (E069_01), religious faith is an important quality in children (A040), and they believe in hell (F053).

In East and South-East Asia, women are significantly more likely than men to assert that they are religious (F034), believe in God (F050), that God is very important in their lives (F063), they believe in hell (F053), that religion is very important in their lives (A006), they trust the Church a lot (E069_01), that religious belief is an important quality in children (A040), they often reflect on the meaning and purpose of life (F001).

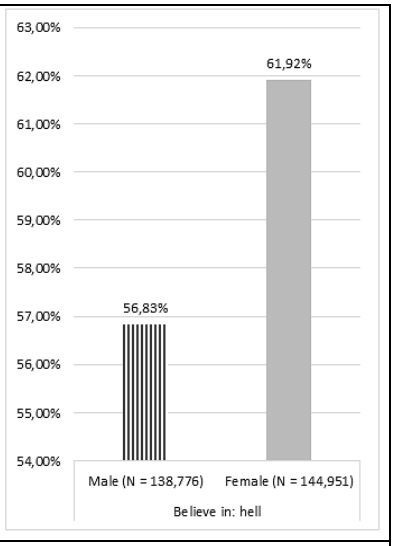
In the Middle East and North Africa, women are significantly more likely than men to say that they often reflect on the meaning and purpose of life (F001), and that religion is very important in their lives (A006). Women are also more likely than men to claim that they believe in God (F050) (marginally significant with two-tailed test, significant with one-tailed test) and that God is very important in their lives (F063) (marginally significant with one-tailed test). However, in the Middle East and North Africa, men are significantly more likely than women to claim that they often attend religious services (F028) and are active members of a church / religious organization (A098). Thus, women tend to support religious values significantly more than

men everywhere with a partial exception of the MENA region. However, as will be shown in the Discussion section, within a certain dimension of religious values we find higher female support to be totally universal.

Worldwide, the strongest correlation between sex and value orientations is observed for variable F034: women are much more likely than men to assert that they are religious (F034) – see Table 2 below. The second strongest correlation is for variable (F050): women are more likely than men to assert that they believe in God (see also Figure 1a). Other correlations (listed in order of the size of the gender difference) are as follows: women are more likely than men to assert that religion is very important in their lives (A006) – see Figure 2a, they believe in hell (F053) – see Figure 1b, they are active members of a church / religious organization (A098), they trust the Church a lot (E069_01), they often reflect about the meaning and purpose of life (F001), religious faith is an important quality in children (A040), they often attend religious services (F028) (see Table 2 below).



a) Per cent of World Values Survey respondents answering 'Yes' to the question 'Do you believe in God?', worldwide, 1981–2020

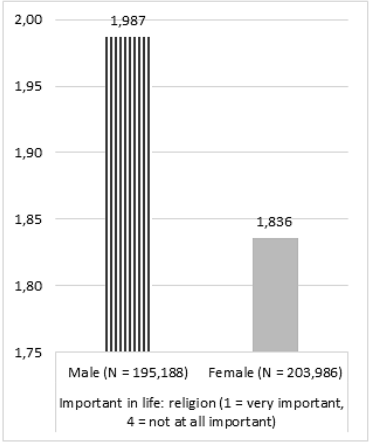


b) Per cent of World Values Survey respondents answering 'Yes' to the question 'Do you believe in hell?', worldwide, 1981–2020

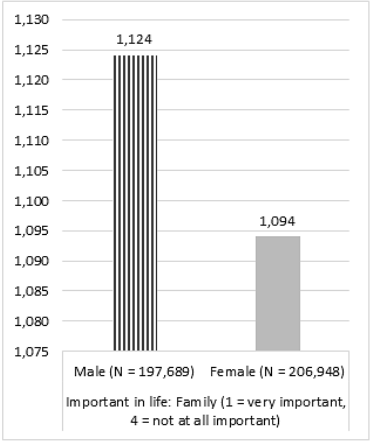
Fig. 1. Distribution of answers of male and female WVS respondents to the questions on religious beliefs (%)

Family values. Women are significantly more likely than men to assert that family is very important in their lives (A001) in OECD countries, Eastern Europe, Latin America, the Middle East and North Africa, Sub-Saharan Africa, East and South-East Asia, as well as worldwide – see Figure 2b, Table 2 below and Tables S1–S6.

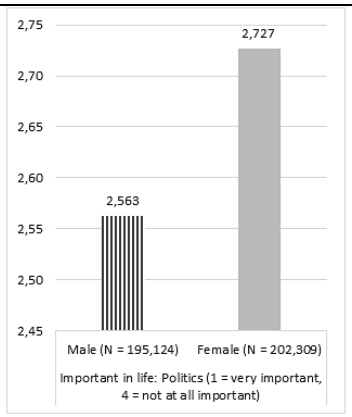
The value of politics. Women are significantly more likely than men to assert that politics is not at all important in their lives (A004), that they are not at all interested in politics (E023), that they are not members of a political party (A102), that they have never take part in unofficial strikes (E028) and boycotts (E026) in OECD countries, Eastern Europe, Latin America, the Middle East and North Africa, sub-Saharan Africa, East and Southeast Asia (see Tables S1–S6). All these correlations between gender and value orientations in the political sphere are observed worldwide as well – see Figures 2c and 2d and Table 2 below.



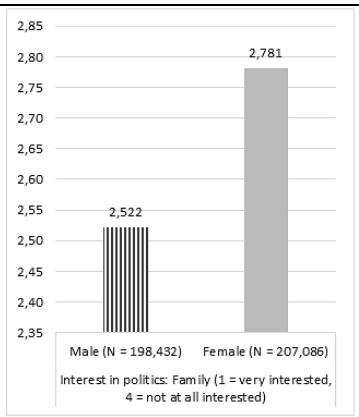
a) Mean value of answers of males and females to the question 'How important is religion in your life?', worldwide, 1981–2020



b) Mean value of answers of males and females to the question 'How important is family in your life?', worldwide, 1981–2020



c) Mean value of answers of males and females to the question 'How important is politics in your life?', worldwide, 1981–2020

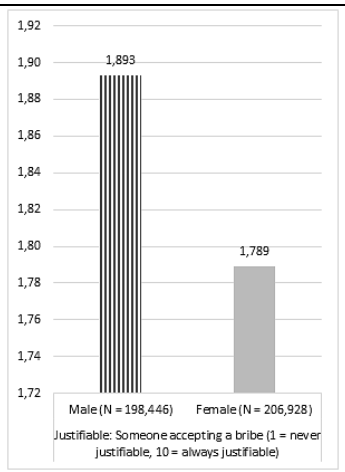


d) Mean value of answers of males and females to the question 'How interested are you in politics?', worldwide, 1981–2020

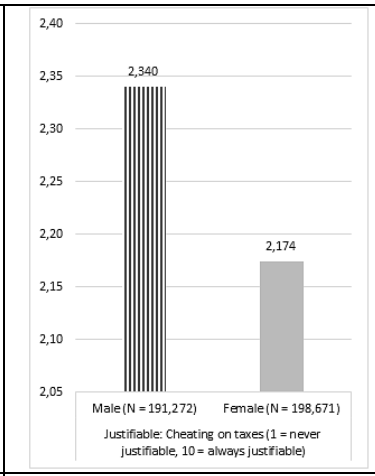
Fig. 2. Mean values of answers of male and female WVS respondents on the importance of different values in their lives. Note that the answers to these questions are coded as follows: from 1 = very important to 4 = not at all important. Thus, the higher the bar in the histogram, the less important the respective value is in the respondents' life. Hence, as the mean value of males' answers to the question on the importance of family indicated in Figure 2b is higher than the one for females, this means that males attribute less value to family than females do

Prosocial values. In OECD countries, women are significantly more likely than men to assert that cheating on taxes (F116), accepting a bribe (F117), or avoiding paying the fare on public transport (F115) is never justifiable (see Table S1). In Eastern Europe, women are significantly more likely than men to assert that cheating on taxes (F116), accepting a bribe (F117) is never justifiable (see Table S2). In Latin America, women are significantly more likely than men to assert that accepting a bribe (F117), cheating on taxes (F116), avoiding a fare on public transport (F115) is never justifiable (see Table S3). In the Middle East and North Africa, women are significantly more likely than men to assert that cheating on taxes is never justifiable (F116) (see Table S4). In sub-Saharan Africa, women are significantly more likely than men to assert that accepting a bribe is never justifiable (F117) (see Table S5). In East and Southeast Asia, women are significantly

more likely than men to assert that cheating on taxes (F116), accepting a bribe (F117) is never justifiable (see Table S6). Worldwide, women are much more likely than men to assert that accepting a bribe (F117), cheating on taxes (F116), or avoiding paying a fare on public transport (F115) is never justifiable – see Table 2, Figures 3a and 3b.



a) Mean value of answers of males and females to the question 'How justifiable is it for someone to accept a bribe?', worldwide, 1981–2020



b) Mean value of answers of males and females to the question 'How justifiable is it to cheat on taxes?', worldwide, 1981–2020

Fig. 3. Mean values of answers of male and female WVS respondents on the justifiability of different types of asocial behavior. The answers are coded as follows: from 1 = never justifiable to 10 = always justifiable. Hence, the higher the height of the respective bar in the histogram, the more the respective group finds respective type of asocial behavior justifiable

Conservation versus Openness. We also use Schwartz model, based on data collected in the 5th and 6th waves of the World Values Survey. According to this model, values are divided into four dimensions, namely Conservation ('values that emphasize order, self-restriction, preservation of the past, and resistance to change'), Openness ('values that emphasize independence of thought, action, and feelings and willingness to change'), Self-Transcendence/care for others ('values that emphasize concern for the welfare and interests of others'), and Self-Enhancement/self-empowerment ('values that emphasize pursuit of one's own interests and relative success and domi-

nance over others') (Schwartz 2012: 8). In all six country sub-samples women tend to be more inclined towards values of Conservation (Security, Tradition, and Conformity) than towards Openness.

Self-Transcendence versus Self-Enhancement. Our analysis of this axis reveals that in all sub-samples except sub-Saharan Africa, women tend to support values of Self-Transcendence as opposed to Self-Enhancement. In sub-Saharan Africa this result turns out to be insignificant, but the value of Self-Enhancement itself is statistically significant and negative, i.e., women tend not to support it, so this result is also in the predicted direction.

Table 2

Variables with significant gender effect, worldwide WVS sample (only variables pertaining to hypotheses H1 – H4 are presented)

WVS variable ID	WVS variable name	Logit	Ordinal logit	Odds ratio	r (p-value in brackets)
F034_1/3	Religious person: A religious person(1) / A convinced atheist(0)	0.732 (<0.001)		2.080	0.072 (<0.001)
F050	Believe in: God: No(0) / Yes(1)	0.611 (<0.001)		1.843	0.076 (<0.001)
E023	Interest in politics: Very interested(1) / Not at all interested(4)		0.435 (<0.001)	1.545	0.11 (<0.001)
A006	Important in life: Religion: Very important(1) / Not at all important(4)		–0.393 (<0.001)	0.675	–0.075 (<0.001)
F034_2/3	Religious person: Not a religious person(1) / A convinced atheist(0)	0.354 (<0.001)		1.424	0.058 (<0.001)
A102	Active/Inactive membership of political party: Not a member(0) / Active member(2)		–0.313 (<0.001)	0.731	–0.055 (<0.001)
E028	Political action: joining unofficial strikes: Have done(1) / Would never do(3)		0.299 (<0.001)	1.348	0.063 (<0.001)
E026	Political action: joining in boycotts: Have done(1) / Would never do(3)		0.292 (<0.001)	1.340	0.061 (<0.001)
F053	Believe in: hell: No(0) / Yes(1)	0.258 (<0.001)		1.294	0.045 (<0.001)
A004	Important in life: Politics: Very important(1) / Not at all important(4)		0.233 (<0.001)	1.263	0.061 (<0.001)
A098	Active/Inactive membership of church or religious organization: Not a member(0) / Active member(2)		0.227 (<0.001)	1.254	0.042 (<0.001)

Table 2 (continued)

WVS variable ID	WVS variable name	Logit	Ordinal logit	Odds ratio	r (p-value in brackets)
E069_01	Confidence: Churches: A great deal(1) / None at all(4)		–0.223 (<0.001)	0.800	–0.053 (<0.001)
F001	Thinking about meaning and purpose of life: Often(1) / Never(4)		–0.211 (<0.001)	0.810	–0.053 (<0.001)
A040	Important child qualities: religious faith: Not mentioned(0) / Important(1)	0.165 (<0.001)		1.179	0.029 (<0.001)
F117	Justifiable: someone accepting a bribe: Never justifiable(1) / Always justifiable(10)		–0.146 (<0.001)	0.864	–0.029 (<0.001)
F028	How often do you attend religious services: More than once a week(1) / Never practically never(8)		–0.132 (<0.001)	0.877	–0.031 (<0.001)
F115	Justifiable: avoiding a fare on public transport: Never justifiable(1) / Always justifiable(10)		–0.06 (<0.001)	0.942	–0.014 (<0.001)
F116	Justifiable: cheating on taxes: Never justifiable(1) / Always justifiable(10)		–0.178	NA	–0.041 (<0.001)

DISCUSSION

Our Hypothesis 1 is partly supported by empirical evidence, as women tend to attribute higher value to religiosity than men in all the regions surveyed. The exception is the Middle East and North Africa, where women are more likely to claim that they believe in God and that religion and God are very important in their lives, whereas men are more likely to claim that they often attend religious services and are active members of a church / religious organization. In order to gain more insight into the MENA exceptionalism, we employ factor analysis.

For the purpose of factor analysis, we re-coded the variables F028, E069_01 and A006 so that all variables have answers in the same direction, with responses indicating more religiosity having larger numerical values than responses indicating less religiosity. Thus, variable F028 was re-coded from ‘How often do you attend religious services: More than once a week (1) / Never practically never (8)’ into ‘How often do you attend religious services: Never practically never (1) / More than once a week (8)’. Variable E069_01 was recoded from ‘Confidence: Churches: A great deal (1) / None at all (4)’ into ‘Confidence: Churches: None at all (1) / A great deal (4)’. Variable A006 was recoded from ‘Important in life: Religion: Very important (1) / Not at all

important (4)' into 'Important in life: Religion: Not at all important (1) / Very important (4)'.

The factor analysis of religious values allows us to identify two principal components with an eigenvalue more than 1.0: see Table 3.

Table 3

Principal components eigenvalues

Component number	Eigenvalue
1	12.95
2	3.92
3	0.84
4	0.69
5	0.51
6	0.46
7	0.20
8	0.16
9	0.05

The principal components analysis gives the following results (see Table 4).

Table 4

Loadings of two principal components

WVS religious values		PC1	PC2
F028	How often do you attend religious services: Never practically never(1) / More than once a week(8)	0.55	–0.81
A098	Active/Inactive membership of church or religious organization: Not a member(0) / Active member(2)	0.09	–0.10
E069_01	Confidence: Churches: None at all(1) / A great deal(4)	0.15	–0.04
A040	Important child qualities: religious faith: Not mentioned(0) / Important(1)	0.06	–0.02
F034	Religious person: A religious person(1) / A convinced atheist(0)	–0.10	–0.01
A006	Important in life: Religion: Not at all important(1) / Very important (4)	0.21	<0.01
F050	Believe in: God: No(0) / Yes(1)	0.07	0.03
F063	How important is God in your life: Not at all important(1) / Very important(10)	0.78	0.58
Eigenvalues		12.95	3.92
Per cent of Variance		0.65	0.20
Cumulative %		0.65	0.85

The loadings presented in Table 4 suggest that PC1 can be interpreted as a general index of religiosity (the higher the index value, the higher the religiosity), with the highest loadings on this component belonging to F063 (How important is God in your life: Not at all important (1) / Very important (10)) and to F028 (How often do you attend religious services: Never practically never (1) / More than once a week (8)). The correlation of this component with the sex of respondents is as follows (see Table 5):

Table 5

Correlation of general religiosity index PC1 with the sex of respondent for MENA and the world

	R	p-value
MENA	–0.2311	<0.001
World	0.0999	<0.001

It is important to note that the sex of respondents in our tests is coded as 1=female, 0=male. Thus, the tests presented in Table 4 apparently confirm the overall picture of MENA exceptionalism, whereby women tend to be more religious than men everywhere except in the Middle East and North Africa.

Let us consider PC2. Contrary to what we have seen with PC1, for PC2 the different values have different signs of their loadings. In general, the PC2 axis counterposes religious behavior (tending to its negative pole) and religious belief (tending to its positive pole), with the highest negative loadings belonging to F028 (How often do you attend religious services: Never practically never (1) / More than once a week (8)) and A098 (Active/non-active membership of church or religious organization: Not a member (0) / Active member (2)), whereas the highest positive loadings belong to F063 (How important is God in your life: Not at all important (1) / Very important (10)) and F050 (Believe in God: No (0) / Yes (1)).

We now conduct similar tests for PC2 as we have done for PC1 and find that they yield rather different results – see Table 6.

Table 6

Correlation of general religiosity index PC2 with the sex of respondent for MENA and the world

	R	p-value
MENA	0.321	<0.001
World	0.159	<0.001

With respect to the second principal component, we do not observe any MENA exceptionalism. Both in MENA and in the world as a whole, we observe a significant positive correlation between PC2 and the sex of the respondents. As has already been mentioned, the PC2 axis counterposes religious behavior (tending towards its negative pole) and religious belief (tending towards its positive pole). As the sex of respondents in our tests is coded as 1=female, 0=male, this means that, taking into account the influence of PC2, men tend to be more religious in terms of religious behavior and women tend to be more religious in terms of religious belief both in the world as a whole and in the MENA region in particular. Thus, female support for religious values turns out to be really universal. This means that our Hypothesis 1 is supported. Our data on religiosity extend the earlier findings of Schnabel (2018). Using the U.S. data from the Baylor Religion Survey and cross-national data from the International Social Survey Programme, this author shows that women are generally more religious, but less dogmatic than men (Schnabel 2018).

Our data demonstrate that women are universally more likely than men to assert the importance of family in their lives. Hence, Hypothesis 2 is also supported. This trend is evident for both Western and non-Western countries, independent of the level of egalitarianism and gender equality. These gender differences may be rooted in the very nature of sex differences (Shelton and John 1996), and in particular in differences in parental investment (Trivers 1972; Apostolou 2007). Males and females face different challenges, and the Parental Investment Theory developed by Trivers suggests that the males and females differ in the proportion of parental investment and the sex that invests more in offspring is the 'choosier' one. Males have a higher reproductive rate, but usually provide less direct parental care, while females carry substantially higher parental burdens compared to males (and this is true in most mammals – Janicke *et al.* 2016). There is an obvious conflict between sexes over levelling the amount of parental investment (Geary 2000; Archer 2009). In humans, males represent the lesser-investing sex, they mate at lower cost and are potentially biased towards mating with more partners, compared to females, the more-investing sex (Buss 1989, 2007; Buss *et al.* 2020; Fromhage and Jennions 2016). Although good-father mate values correlate positively with paternal investment in offspring (mainly in the form of provisioning), the intrinsic imbalance in biparental care is obvious (Chang *et al.* 2017). Female parental investment in the form of direct maternal care is a universal norm. Being a caring mother is a part of the women's mate values, and expressing parental warmth is more characteristic of

the mother's behavior, rather than that of the father. Hence, our findings about the higher values of family for women may indicate one of the basic adaptations of *Homo sapiens* for survival.

According to our results, men value politics higher than women. So, our third hypothesis is also supported. We suggest that evolutionary based explanations may be particularly useful in this case as well. Men are universally oriented towards leadership and public affairs, and they dominate women in the social and political sphere (Hrdy 1999; Smith *et al.* 2018; Starkweather *et al.* 2020). Universally men are more competitive for social status, both in small and large societies (Capra and Rubin 2020; Chagnon 1988; Chaudhary *et al.* 2018; Garfield *et al*. 2019a, b; Lee *et al.* 2018; Van Vugt and von Rueden 2020). These differences may be rooted both in our mammalian origin (Garfield *et al.* 2019a, b) and the division of sex role in our Paleolithic hunter-gatherer ancestors, for which modern nomadic forager communities may be models (Marlowe 2010; Butovskaya 2013; Garfield and Hagen 2020; Butovskaya *et al.* 2020; Apicella 2014; Hawkes and Bliege Bird 2002; Gurven and Von Rueden 2006; Smith 2004). Men with higher physical strength have better health, behave more dominantly, and may be more successful even in modern industrial societies (Sell *et al.* 2012). Some findings suggest that traits that facilitate status acquisition may have a genetic basis (Butovskaya *et al.* 2015), and are equally selected in men across non-industrial societies (Von Roeden and Jaeggi 2016). Note that universal sex differences in mate preferences remain robust across cultures. Men prefer attractive, young mates more than women, and women prefer older mates with financial prospects (Walter *et al.* 2020). Considering the results of our current study, it is important to emphasize that social status in men is associated with mating success and fertility, rather than with offspring mortality (Von Rueden and Jaeggi 2016). Hence, parental efforts are less related to social status in men, and this provides additional reasons for evolutionary explanations of our conclusions on sex differences in family values evaluations.

The results of our study provide support for our fourth hypothesis: women from the World Values Survey (2021) do support prosocial values more than men do. These findings are consistent with general conclusions about higher levels of prosociality among women (Croson and Gneezy 2009; Brody and Hall 1993; Diekman and Clark 2015; Luoto, Varella 2021). Other authors conclude that women are found to behave more honestly, while men cheat significantly more often when paying taxes, and this may reflect gender differences in prosociality (D'Attoma *et al.* 2018; Grosch and Rau 2017). However, the same

authors remind that other motivations, such as cooperation, should also be considered (D'Attoma *et al.* 2018). Traditionally, women are thought to be more socially supportive than men, and recent meta-analysis demonstrates gender differences in social support, either offline or online (Tifferet 2020): women tend to be less trusting and more risk averse than men, and have an increased tendency to be prosocial. Significant gender differences are reported in European volunteering rate (Gil-Lacruz *et al.* 2019).

Data from a cross-national sample on a one-shot prisoner's dilemma game demonstrate that women are less trusting, more risk-averse and more prosocially oriented compared to men (Dorrough and Glöckner 2019). Other scholars suggest that men evolved as a more competitive, risk-taking and risk-tolerant gender (Buss and Kensrick 1998; Byrneas *et al.* 1999; Charness and Gneezy 2012). However, resent findings from two meta-analyses, based on relatively large samples, suggest greater intrasex variability in males' cooperation, implying greater variation in social dilemmas compared to females; they are likely to act either selfishly or altruistically, compared to females, while women are likely to be moderately cooperative (Thöni *et al.* 2020; see also Diekman and Clark 2015). With the accumulation of data from various studies on human prosociality, there is a growing understanding that such gender differences may be due to differences in responses to different aspects of the social context, rather than differences in basic prosociality per se (Espnosa and Kovárík 2015).

CONCLUSION

To conclude, the results obtained in our study on gender differences in the values of religiosity, family, politics and prosociality are robust across cultures and turn out to be replicable. Note that women score higher than men on Care, Fairness, and Purity across cultures in another recently published study (Atari *et al.* 2020). The global gender differences in moral judgements are large, and especially noticeable in more individualistic and gender-egalitarian cultures.

A number of studies on gender differences in individual values have shown in various samples that women are more religious than men; that women are more committed to family values; that women are more committed to pro-social values; and that men are more committed to political values. Our study adds three aspects to the accumulated knowledge on gender differences in values.

First, our analysis of the World Values Survey data shows that for all the values listed above, the gender gap in the above directions is

universally observed both in the global sample and in all the regional sub-samples considered.

Second, our analysis makes it possible to clarify the thesis of greater female religiosity by showing that a greater female adherence to religious values is indeed universal, but only in relation to the values of religiosity associated with belief. The values associated with religious behavior turn out to be more important for women in most regions, but in the Middle East and North Africa regions these values are more significant for men, which is most likely associated with the peculiarities of religious behavior prescribed by Islam for believing Muslims.

Third, it seems to us that the synthesis of sociological and evolutionary explanations can significantly enrich our understanding of the nature of gender value differences, since some of these differences are due to fundamental differences in the male and female psyche, which, in turn, are rooted in the physiological differences between the two sexes.

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NOTE

[*] Hereinafter only significant correlations are reported unless otherwise stated.

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