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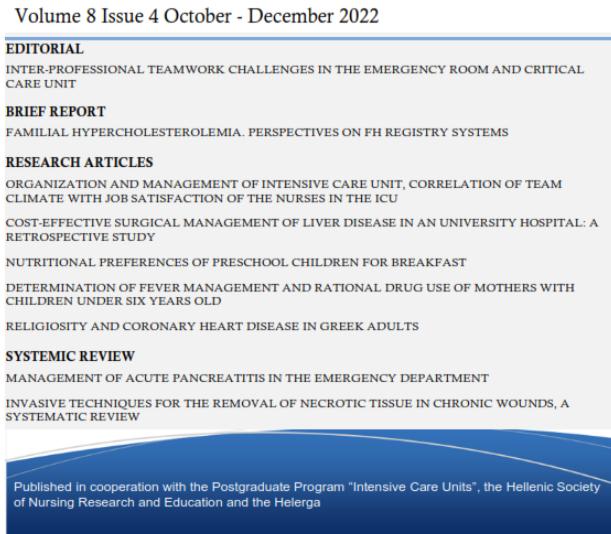
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RESEARCH ARTICLE

RELIGIOSITY AND CORONARY HEART DISEASE IN GREEK ADULTS

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Abstract

Background: In developed countries, cardiovascular disease is the most common cause of both death and functional disability. The last decades, scientific community shows an increasing interest exploring the relationship between religious and health factors.

Aim: The aim of the present study was to explore associations between factors related to religiosity and self-reported Coronary Heart Disease (CHD).

Material and Method: This was a descriptive observational study, conducted during a 2-year period. The final studied sample consisted of 1062 citizens of Greece. Data collection was performed by using a special designed questionnaire based on relevant literature review.

Results: Half of the studied sample was men, (n=529, 49.9%). The majority of participants (77.1%) was living in urban areas of the country and was mean educated (67.1%). When asked about their employment status, most of them (65%) answered that they were professionally active. As far as their medical history is concerned, the majority of participants (88%) had no CHD history, no history of diabetes mellitus (90.3%), no history of dyslipidemias (71.8%) and no history of hypertension (71.8%). Moreover, 29.9% of the participants were overweight. Religious fasting follows 51.4% of the sample and the reason for fasting is because the church imposes fasting rules. The factor "fasting" was also related to CHD occurrence, as those who were following religious fasting had no history of CHD. A significant difference was found between responders with conscious belief in God and CHD occurrence.

Conclusion: The findings of this study suggest that factors related to religiosity, such as doubt in God belief and religious fasting may influence CHD incidence. Prospective cohort studies and clinical trial studies that specifically designed to assess the effect of religiosity on CHD outcome are necessary to be conducted.

Keywords: Religiosity, coronary heart disease, belief.

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INTRODUCTION

Coronary artery disease (CAD) is a major cause of disability and death in developed countries.^{1,2} In recent decades, despite the fact that its mortality has gradually decreased in Western countries, it still causes about a third of all deaths in people over 35 years of age. Since the early 1950s, epidemiological research in cardiology has been systematized and turned its attention to those factors that contribute to the increase in the frequency of the disease in populations. The first chronologically is the Framingham Heart Study, which provided the scientific community with data to understand the etiology of the disease based on the observations of a closed population of approximately 8000 people in the town of Framingham, located near Boston, United States of America. The Framingham Heart Study perfectly summarizes the risk factors that contribute to the development of CAD, providing very important information for healthcare professionals about targets for primary and secondary prevention of CAD.^{3,4}

Then, in the early 1960s, came the Seven Countries Study,⁵ which studied 12,763 men aged 40-59 from the US, Greece, Italy, the Netherlands, (then called) Yugoslavia, Finland, and Japan, and contributed to drawing useful conclusions about the observed differences in both the incidence of CVD between populations and the differences in the risk of the disease under the influence of various factors. Among these factors, studies mention the "religion" factor, which for a large part of humanity is still very important for the promotion of the individual's health. According to the World Religion Index from 2012 (including 51,927 people from 57 countries on five continents), 59% of all people consider themselves religious. Religious beliefs and practices provide not only a sense of meaning in people's lives, but are also an important source of rules for right (moral) behavior. The terms religiosity and spirituality are often used interchangeably in the literature. However, despite some similarities one finds between them, they do not mean the same thing. Spirituality is more difficult to define; it is a broader concept that is not limited to religious traditions. Spirituality can be seen as an individual experience characterized by a search for the meaning of life and a relationship with the sacred that does not need to be associated with formal reli-

gious communities and institutions. Various mechanisms have been proposed as explanations for the impact of religion/religiosity on human health, namely healthy lifestyles, social support, religious practices, spiritual direction, coping with problems that arise in one's life, values and positive feelings. In addition, religious beliefs that promote behaviors such as forgiveness and empathy or virtues such as compassion, gratitude, humility, etc., can reduce feelings of anger and hostility and therefore be beneficial to health. In addition, participation in a religious activity can provide social cohesion and health-promoting support. Religious practices such as prayer and meditation can be forms of relaxation that help reduce stress levels. Religion can provide meaning, orientation, and a sense of control in life, as well as help individuals cope successfully with stressful and critical life situations, such as a serious illness.^{6,7}

Studies have reported on the relationship between religion, spirituality and cardiovascular disease. More specifically, religiosity and other protective lifestyle behaviors such as periodic fasting and attendance of worship services has been associated with beneficial effect on general health of the individual but still the data are not sufficient.^{8,9}

In addition, recent literature states that frequent participation in religious worship services can lead to risk factors modification and change of the individual's lifestyle (reduction or even cessation of smoking, avoidance of systematic alcohol consumption, increase in physical activity etc).¹⁰⁻¹³

Pray as a significant part of religious activities, can improve stress levels and encourage the person to have a healthy lifestyle and feel a sense of encouragement or social support.⁶

Fasting, the voluntary abstinence from certain foods, is a feature of many religions, and its purported health benefits have attracted scientific interest. Often, religious denominations prohibit foods from animal sources permanently or for specific periods. Greek Orthodox Christians fast for a total of 180-200 days each year.¹⁴⁻¹⁶

AIM

The aim of the present study was to explore associations between factors related to religiosity and self-reported CHD.

Objectives of the study was to assess sociodemographic factors and health-related behaviors in relation to religiosity and religious beliefs in the Greek setting.

MATERIAL AND METHODS

Study design

This is a descriptive observational study, conducted during a 2-year period.

Sample

The final studied sample consisted of 1062 citizens of Greece. The study was conducted during the recent COVID-19 pandemic so the difficulty on sampling recruitment methods should be taken into consideration.

According to the inclusion criteria of the research individuals should communicate effectively in the Greek language. A total of 1062 citizens were invited to take part in the study.

Measurements and data collection

Data collection was performed by using a special designed questionnaire based on relevant literature review.¹⁷ It was tested in a pilot study, with a sample of 60 individuals so as potential problems and deficiencies be identified prior the final form of the questionnaire be distributed to the final participants. The questionnaire was divided in two parts. The first part of the questionnaire included questions related to demographic and social characteristics of the participants. The second part of the questionnaire examined the individual and family history as well as data about medication intake. Moreover, information about belief in God, church attendance of worship services, were included.

Ethics

The researcher informed the participants of the purpose of the study and all patient were enrolled on a volunteer basis. They were informed about the study's protocol and signed a written informed consent before their enrollment. The anonymity and confidentiality of all data collected was ensured by coding all participants in the database.

Data analysis

Continuous variables are presented as mean values \pm standard deviation and categorical variables as frequencies. The Pearson χ^2 test was applied to test for associations between the afore-

mentioned variables and coronary artery disease. Univariate logistic regression models were constructed to quantify the effect of each category of the independent categorical variables on the occurrence of CAD (dependent variable). Multiple linear regression was then applied to test the extent to which religious, demographic, and medical factors were associated with CAD. The estimation of the relative risks of CHD was carried out by calculating the odds ratio and the corresponding confidence intervals (CI). All tests were two-tailed and considered significant if $p < 0.05$. Data were analyzed with the Stata statistical package.

RESULTS

The studied sample consisted of 1062 Greek citizens. Participants baseline sociodemographic characteristics including gender, education level and region of residence are presented in **Table 1**. Half of the studied sample was men, (n=529, 49.9%). The majority of participants (77.1%) was living in big cities of the country and was mean educated (67.1%). When asked about their employment status, most of them (65%) answered that they were professionally active. Medical history of the respondents is presented in **Table 2**. As far as history of CHD is concerned, the majority of participants (88%) had no CHD history, no history of diabetes mellitus (90.3%), no history of dyslipidemias (71.8%) and no history of hypertension (71.8%). Moreover, 29.9% of the participants were overweight. A large percentage (39.1%) of the participants were current smokers, rarely had physical activity (27.2%) and alcohol consumption (38.7%). As far as participants daily stress level is concerned, the majority (37.4%) stated high levels (**Table 3**).

Religious belief and related information are presented in **Table 4**. The majority of participants (96%) believed in God. A high percentage of the studied sample (76.5%) had no doubt about God's help. Almost half of the participants (58.8%) attends church services and as for the frequency, they choose name days for the attendance (54.4%). Religious fasting follows 51.4% of the sample and the reason for fasting is because the church imposes fasting rules.

In **Table 5**, results related to religiosity and history of CHD are presented. A significant difference was found between re-

sponders with conscious belief in God and CHD occurrence. Specifically, the majority of participants who declare conscious belief in God had no CHD, while participants who believe by tradition had history of CHD. The factor "fasting" was also related to CHD occurrence, as those who were following religious fasting had no history of CHD.

Regression analysis showed that family history of CHD, history of diabetes mellitus, hypertension, doubt in God and male gender have negative effect for CHD occurrence (**Table 6**).

DISCUSSION

In developed countries, CVD is the most common cause of both death and functional disability. The present study identified sociodemographic and factors related to religiosity that may influence CAD occurrence in the Greek setting. The last decades, scientific community shows an increasing interest exploring the relationship between religious and health factors. Religion plays an important role in the lives of most people and has a positive impact on human health as some religious practices indicate behavioral rules to follow so as to live in a health way.^{7,18,19}

According to literature, there are lifestyle factors such as quitting smoking, periodic fasting, proscription of alcohol, attendance of church services may positively affect CHD occurrence and lower cardiac mortality rate.^{6,9,20,21}

In our study, participants' attitude towards God belief was significant and related to history of CHD. Regression analysis showed that family history of CHD, history of diabetes mellitus, hypertension, doubt in God and male gender have negative effect on individuals as far as CHD occurrence is concerned. Moreover, the majority of participants who declare conscious belief in God had no CHD, while participants who believe by tradition had CHD. A significant difference was also found between frequency of religious service attendance and history of CHD.

Previous studies tried to explore the relation between people who attend religious services and incidence of CHD. Banerjee et al.,¹⁷ in their study examined the association between frequency of attending religious services and the prevalence of CHD in Canada. The studied sample consisted of 5442 individ-

uals and they had as the main independent variable the religious service attendance in the past 12 months. Their results showed no significant association between religious service attendance and prevalence of CHD.

Accordingly, Oh et al.,²² in their study investigated the clinical effect of religion on clinical outcomes in patients with Acute Myocardial Infarction (AMI). They categorized their study sample (2.348 patients) into two groups (religious and non-religious group). According to their results, no significant differences were found in 1-year follow up.

The factor of "attending church services" in relation to CHD incidence has not be clarified yet. More studies need to be conducted so as to explore its significant role.

In the present study, the factor "fasting" was also related to CHD occurrence, as those who were following religious fasting had no history of CHD.

It is widely accepted that religious fasts partaken for spiritual purposes. But, apart from this aspect, researchers came into some significant conclusions, such as the healthy influence of religious fasting on body mass index, on lipid and blood pressure control.²³ Fasting ameliorates many biochemical parameters related to cardiovascular risk.

There are two studies in literature conducted in Greece, that confirm the reduction in blood lipid profile and the beneficial role of fasting periods in obesity status of the participants.^{14,24} A possible explanation for this finding is the fact that while fasting, people consume fruit, vegetables, cereals, legume and olive oil; products with protective effects on terms of CHD.

Study limitation

The main limitation of the present study was that psychological and social variables were not taken into consideration. Level of depression or social support are factors that could affect the relationship between religiosity and CHD incidence. Moreover, laboratory findings of the participants were not recorded.

CONCLUSIONS

The findings of this study suggest that factors related to religiosity, such as doubt in God belief and religious fasting may influence CHD incidence.

Prospective cohort studies and clinical trial studies that specifically designed to assess the effect of religiosity on CHD outcome are necessary to be conducted. More targeted studies will determine the role of religious fasting in health outcomes.

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Conflict of Interest: The authors have no conflict of interest to declare.

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ANNEX

Table 1. Baseline sociodemographic characteristics (N=1062).

Baseline characteristics	n (%)
Gender	
Men	529 (49.9)
Women	533 (50.1)
Education level	
Primary to high school	664 (67.1)
University	325 (32.8)
Postgraduate studies	38 (4.3)
Employment status	
Employed	666 (65)
Retired	358 (33)
No answer	38 (2)
Family status	
Married	747 (71.1)
Unmarried	140 (13.3)
Divorced	46 (4.4)
Widow	117 (11.1)
Region of residence	
Urban area	218 (77.1)
Provincial city	65 (22.9)
Agricultural region	124 (11.7)

Table 2. Medical history at baseline (N=1062).

Medical history variables at baseline	n (%)
History of CHD	
Yes	125 (12)
No	913 (88)
Family history of CHD	
Yes	367 (35.6)
No	664 (64.4)
History of diabetes melitus	
Yes	99 (9.7)
No	920 (90.3)
History of dyslipidemias	
Yes	292 (28.2)
No	742 (71.8)
History of hypertension	
Yes	288 (28.2)
No	733 (71.8)
Obesity status: overweight	
Yes	310 (29.9)
No	727 (70.1)

CHD: Coronary Heart Disease

Table 3. Information related to lifestyle characteristics.

Lifestyle variables at baseline	n (%)
Smoker	
Yes	409 (39.1)
No	637 (60.9)
Physical activity	
Never	144 (13.9)
Rarely	312 (27.2)
Sometimes	282 (27.2)
Often	222 (21.4)
Always	75 (7.2)
Alcohol consumption	
Never	362 (34.8)
Rarely	403 (38.7)
1-2 times per week	145 (13.9)
3-5 times per week	69 (6.6)
Daily	62 (6)
Daily stress level	
Very low	92 (8.8)
Low	364 (34.9)
High	390 (37.4)
Very high	196 (18.8)

Table 4. Information related to religious belief.

Questions related to religious belief	n (%)
Believe in God existence	
Yes	1033 (97.3)
No	29 (2.7)
Believe in God	
Yes	996 (96)
No	0.5 (5)
No answer	61 (3.6)
Attitude toward God belief	
Conscious belief	862 (80.6)
By family tradition	200 (19.4)
It feels like sometimes God has abandon you	
Yes	240 (23.5)
No	822 (76.5)
Believe in life after death	
Yes	573 (54.8)
No	197 (18.8)
No answer	292 (26.4)
Fear of death	
Not at all	327 (29.9)
Only a little	442 (42.2)
Rather much	192 (18.3)
Very much	101 (9.6)
Pray in God	
Not at all	41 (3.9)
Only a little	345 (32.9)
Rather much	475 (44)
Very much	201 (19.2)
It feels like pray helps you feel better	
Not at all	42 (4)
Only a little	222 (21.3)
Rather much	509 (48.8)
Very much	289 (26)
Attending church services	
Not at all	96 (9.3)
Only a little	636 (58.8)
Rather much	244 (23.6)
Very much	86 (8.3)
Frequency of attending church services	
Every Sunday	309 (28.3)
Namedays	568 (51.4)
1-2 times per month	185 (20.3)
Reason for attending church services	
Personal need	765 (68.1)
Custom	216 (23.2)
Without a reason	81 (8.7)
Belief in God solves your problems	
Not at all	88 (7)
Only a little	250 (23.9)
Rather much	509 (48.6)
Very much	215 (20.5)

Belief in God solves your potential health problems

Not at all	98 (8.5)
Only a little	265 (24.5)
Rather much	456 (43.7)
Very much	243 (23.4)

Hospitalization

Yes	699 (65)
No	363 (35)

During hospitalization belief in God had a positive effect

Yes	607 (85.6)
No	102 (35)
No answer	353 (33.2)

Follow religious fasting

Always	322 (30.3)
Sometimes	546 (51.4)
Never	194 (18.3)

Reason for religious fasting

Fasting rules imposed by the church	592 (45.7)
Tradition	210 (24.2)
Health reasons	70 (8.2)
Self-control	190 (21.9)

Table 5. Results related to religiosity and history of CHD.

		History of CHD							
		NO			YES				
		Count	Row %	Col %	Count	Row %	Col %		
Gender	Women	479	92.65	52.46	38	7.35	30.65	χ^2	20.790
	Men	434	83.46	47.54	86	16.54	69.35	<i>p</i>	<0.001
Employment status	Employed	604	92.64	68.64	48	7.36	38.71	χ^2	42.753
	Retired	276	78.41	31.36	76	21.59	61.29	<i>p</i>	<0.001
Family status	Married	641	87.81	70.99	89	12.19	71.77	χ^2	16.817
	Unmarried	126	94.03	13.95	8	5.97	6.45	<i>p</i>	0.001
	Divorced	44	95.65	4.87	2	4.35	1.61		
	Widow	92	78.63	10.19	25	21.37	20.16		
Education level	University	176	89.34	20.71	21	10.66	17.50	χ^2	26.760
	Technological Institute	116	98.31	13.65	2	1.69	1.67	<i>p</i>	<0.001
	Primary to high school	245	90.07	28.82	27	9.93	22.50		
		313	81.72	36.82	70	18.28	58.33		
Region of residence	City	666	89.76	73.03	76	10.24	61.29	χ^2	12.596
	Provincial city	151	87.28	16.56	22	12.72	17.74	<i>p</i>	0.002
	Agricultural region	95	78.51	10.42	26	21.49	20.97		
Believe in God existence	No	25	92.59	2.76	2	7.41	1.60	χ^2	0.577
	Yes	882	87.76	97.24	123	12.24	98.40	<i>p</i>	0.448
Believe in God	No	4	80.00	0.45	1	20.00	0.80	χ^2	0.413
	Yes	857	87.81	96.18	119	12.19	95.20	<i>p</i>	0.813
	No answer	30	85.71	3.37	5	14.29	4.00		
Attitude toward God belief	Conscious belief	721	88.68	81.47	92	11.32	73.60	χ^2	4.320
	By family tradition	164	83.25	18.53	33	16.75	26.40	<i>p</i>	0.038
Believe in life after death	No	168	86.60	18.69	26	13.40	20.97	χ^2	2.314
	Yes	485	87.07	53.95	72	12.93	58.06	<i>p</i>	0.314
	No answer	246	90.44	27.36	26	9.56	20.97		
Fear of death	Not at all	271	88.85	30.11	34	11.15	27.20	χ^2	1.293
	Only a little	378	87.70	42.00	53	12.30	42.40	<i>p</i>	0.731
	Rather much	169	88.02	18.78	23	11.98	18.40		
	Very much	82	84.54	9.11	15	15.46	12.00		
Pray in God	Not at all	34	91.89	3.77	3	8.11	2.40	χ^2	1.082
	Only a little	297	87.87	32.96	41	12.13	32.80	<i>p</i>	0.781
	Rather much	401	88.13	44.51	54	11.87	43.20		
	Very much	169	86.22	18.76	27	13.78	21.60		
Attending church services	Not at all	77	84.62	8.64	14	15.38	11.38	χ^2	6.923
	Only a little	540	90.00	60.61	60	10.00	48.78	<i>p</i>	0.074
	Rather much	204	85.71	22.90	34	14.29	27.64		
	Very much	70	82.35	7.86	15	17.65	12.20		
Frequency of attending church services	Every Sunday	208	82.54	26.16	44	17.46	43.14	χ^2	13.797
	Namedays	417	90.26	52.45	45	9.74	44.12	<i>p</i>	
	1-2 times per month	170	92.90	21.38	13	7.10	12.75	<i>p</i>	0.001

Reason for attending church services	Personal need	560	89.31	69.48	67	10.69	61.47	χ^2	3.241
	Custom	177	84.69	21.96	32	15.31	29.36	<i>p</i>	0.198
	Without reason	69	87.34	8.56	10	12.66	9.17		
Belief in God solves your problems	Not at all	64	90.14	7.11	7	9.86	5.60	χ^2	8.367
	Only a little	204	82.59	22.67	43	17.41	34.40	<i>p</i>	0.039
	Rather much	445	89.18	49.44	54	10.82	43.20		
	Very much	187	89.90	20.78	21	10.10	16.80		
Family history of CHD	No	603	91.92	67.30	53	8.08	42.74	χ^2	28.621
	Yes	293	80.49	32.70	71	19.51	57.26	<i>p</i>	<0.001
Hospitalization	No	342	96.34	38.04	13	3.66	10.48	χ^2	36.522
	Yes	557	83.38	61.96	111	16.62	89.52	<i>p</i>	<0.001
During hospitalization belief in God had a positive effect	No	86	84.31	14.68	16	15.69	13.68	χ^2	0.079
	Yes	500	83.19	85.32	101	16.81	86.32	<i>p</i>	0.779
Follow religious fasting	Always	266	83.91	29.39	51	16.09	40.80	χ^2	12.504
	Sometimes	478	91.40	52.82	45	8.60	36.00	<i>p</i>	0.002
	Never	161	84.74	17.79	29	15.26	23.20		
Reason for religious fasting	Fasting rules imposed by the church	320	85.33	42.22	55	14.67	58.51	χ^2	11.136
	Tradition	189	90.87	24.93	19	9.13	20.21	<i>p</i>	0.025
	Health reasons	60	88.24	7.92	8	11.76	8.51		
	Self-control	177	94.15	23.35	11	5.85	11.70		
Smoker	No	535	86.29	59.31	85	13.71	70.25	χ^2	5.344
	Yes	367	91.07	40.69	36	8.93	29.75	<i>p</i>	0.021
Physical activity	Never	120	85.71	13.47	20	14.29	16.26	χ^2	3.583
	Rarely	265	85.76	29.74	44	14.24	35.77	<i>p</i>	0.465
	Sometimes	245	89.74	27.50	28	10.26	22.76		
	Often	193	88.94	21.66	24	11.06	19.51		
	Always	68	90.67	7.63	7	9.33	5.69		
History of dyslipidemias	No	666	91.48	75.17	62	8.52	49.60	χ^2	35.532
	Yes	220	77.74	24.83	63	22.26	50.40	<i>p</i>	<0.001
History of diabetes mellitus	No	802	88.91	91.14	100	11.09	82.64	χ^2	8.607
	Yes	78	78.79	8.86	21	21.21	17.36	<i>p</i>	0.003
History of hypertension	No	668	93.04	76.08	50	6.96	40.65	χ^2	66.789
	Yes	210	74.20	23.92	73	25.80	59.35	<i>p</i>	<0.001
Obesity status: overweight	No	638	89.48	71.60	75	10.52	60.00	χ^2	7.054
	Yes	253	83.50	28.40	50	16.50	40.00	<i>p</i>	0.008
Daily stress level	Very low	83	92.22	9.27	7	7.78	5.65	χ^2	14.651
	Low	326	90.81	36.42	33	9.19	26.61	<i>p</i>	0.002
	High	312	82.76	34.86	65	17.24	52.42		
	Very high	174	90.16	19.44	19	9.84	15.32		
Alcohol consumption	Never	303	86.32	33.89	48	13.68	38.71	χ^2	7.208
	Rarely	355	90.10	39.71	39	9.90	31.45	<i>p</i>	0.125

1-2 times per week	121	85.21	13.53	21	14.79	16.94	
3-5 times per week	57	82.61	6.38	12	17.39	9.68	
Daily	58	93.55	6.49	4	6.45	3.23	

Table 6. Logistic regression analysis.

Variables	Odds ratio	95% Confidence Interval		p
Family history of CHD	3.273	2.094	5.117	<0.001
History of diabetes melitus	2.006	1.096	3.671	0.024
History of hypertension	4.660	2.956	7.347	<0.001
Gender	2.973	1.832	4.826	<0.001
Believe in God existence	2.260	1.166	4.378	0.016
Family status	0.772	0.340	1.751	0.536
	0.332	0.072	1.535	0.158
	2.458	1.359	4.446	0.003
Believe in God	3.055	1.151	8.109	0.025
	1.440	0.546	3.799	0.462
	1.369	0.468	4.000	0.566