

THE ROLE OF PERSONALITY, COGNITIVE, ENVIRONMENTAL AND GENETIC FACTORS AS DETERMINANTS OF RELIGIOUS FUNDAMENTALISM: A TWIN STUDY IN A POLISH SAMPLE

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Abstract: This study has sought to identify the determinants of religious fundamentalism. The following hypothetical determinants were tested: genetic influence, environmental influence, and such psychological variables as anxiety and assumptions about the nature of the social world. It was assumed that trait anxiety and assumptions about the social world are mediators of religious fundamentalism. The study was run on 112 participants (29 women and 83 men) aged from 18 to 28 years; the sample consisted of 19 monozygotic and 37 dizygotic pairs of twins reared together. The results of structural equation modeling showed that religious fundamentalism is mainly determined by environmental influences (38% heritable) whereas trait anxiety and assumptions about the nature of the social world are largely genetically determined (60% heritable). Correlation analysis revealed a positive relationship between trait anxiety and negative social world view but, contrary to the hypothesis, the results of multiple regression analysis suggest that trait anxiety is the only predictor of religious fundamentalism.

Key words: religious fundamentalism, heritability, anxiety, assumptions about the nature of the human world

INTRODUCTION

Religious fundamentalism is a term that can be difficult to define. Definitions include, for example: 1) orthodox elements of theological beliefs (see: the review by Kellstedt, Smidt, 1991; Waller, Kojetina, Bouchar, Lykken, Tellegen, 1990), 2) denominational affiliation (e.g., Danso, Hunsberger, Pratt, 1997; Kellstedt, Smidt,

1991; Medoff, Skov, 1992; Unnever, Cullen, 2006), 3) self-identification (e.g., Kellstedt, Smidt, 1991), 4) religious ethnocentrism (Altemeyer, Hunsberger, 2004; Schneider, 2002), 5) biblical literalism with a narrow-minded mode of thinking that is unable to consider different points of view (Laythe, Finkel, Kirkpatrick, 2001).

Differences in understanding the phenomenon of religious fundamentalism correspond with disagreement in explaining its determinants and psychosocial effects.

Researchers who study religious fundamentalism disagree as to which has the greater impact - genetic factors that operate via affect, personality and cognition, or

Acknowledgments: The research reported here has been partly supported by grant number BST 1340 - 01 - 2008 from the University of Warsaw (Faculty of Psychology) to Włodzimierz Oniszczenko.

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environmental factors (e.g., Altemeyer, 1996; Danso, Hunsberger, Pratt, 1997; Koenig, Bouchard, 2006; Olson et al., 2001). The view that all forms of expression of religious attitudes, including religious fundamentalism, are genetically determined has found empirical support. Waller, Kojetin, Bouchard, Lykken, and Tellegen (1990), for example, studied adult monozygotic (MZ) and dizygotic (DZ) twins in order to determine the contribution of the genetic factor to interest in religion and religious attitudes and values. They used several measures of religious attitudes including the Wiggins Religious Fundamentalism Scale. This scale has 12 items extracted from the MMPI and dealing with orthodox religious beliefs. They found that all the religious attitudes they assessed, including religious fundamentalism, have a large genetic component. About 50% of the variance of every measure of attitudes was genetically determined. The results of research on adult twins conducted by Martin, Eaves, Heath, Jardine, Feingold, and Eysenck and quoted in Waller et al. (1990) lead to similar conclusions: religious attitudes, as opposed to other social attitudes, have a large genetic component (cf. also Eysenck, 1954).

Bouchard, McGue, Lykken, and Tellegen (1999) studied two types of religiosity, intrinsic and extrinsic. Intrinsic religiosity has to do with religious experience, extrinsic religiosity has to do with the instrumental use of religion. These researchers, who used the method of MZ and DZ twins reared separately, demonstrated that the heritability of intrinsic religiosity was .43 whereas the heritability of extrinsic religiosity was lower and amounted to .39. Only the specific environment factor contributed to the variance of either of these attitudes. It accounted for 57% and 61% of explained variance respectively. Carver

and Udry (1997) obtained similar findings in an earlier study. In this twin study the studied factors accounted for the proportion of explained variance of religious attitudes as follows: genetic factors - 26%, common environment - 45% and specific environment - 29%. Other researchers have likewise demonstrated the heritability of religious attitudes. Winter, Kaprio, Viken, Karvonen, and Rose (1999) studied two samples of 16-year-old adolescents in Finland, one consisting of twins living in the more traditional, rural north and one living in the more urban and secular south. They found that heritability of religiosity measured by the Scale of Religious Fundamentalism was 11% of the explained variance for girls and 22% for boys. Common environment accounted for 60% (girls) and 45% (boys) of the variance, and specific environment accounted for 29% (girls) and 33% (boys). Interestingly enough, heritability can be demonstrated not only with respect to religious attitudes per se but also with respect to associated parareligious experiences such as self-transcendence, a form of spirituality which shows up in the questionnaire scores of Australians over 50 years of age. The heritability coefficients for self-transcendence were 41% for women and 37% for men (Kirk, Evans, Martin, 1999). A recent study by Jorm and Christensen (2004) revealed a curvilinear relationship between extreme religious attitudes and two EPQ-R personality traits, high Psychoticism and low Extraversion. General religiosity also related linearly to Extraversion, Agreeableness and Conscientiousness, although the correlation coefficients differ from study to study and are relatively low, from .09 to .22 (Saroglou, 2002).

The hypothesis that religious attitudes are genetically determined was also supported by an experimental study by Tesser (1993)

who found, for example, that subjects who are presented with religious stimuli react with shorter reaction times and are more resistant to their extinction. These response parameters suggest high attitude strength, a derivative of genetic determination. Environmentally determined attitudes are weaker. Individuals need to reflect on them before reacting and they are easier to modify.

The genetic contribution to religious attitudes was not confirmed in research on adopted and natural children and their adoptive or biological parents. Here similarity of religious attitudes in parents and their offspring was almost completely determined by the common family environment (Abrahamson, Baker, Caspi, 2002; Beer, Arnold, Loehlin, 1998). Many other findings of studies of teenage and younger twins, reviewed by Waller et al. (1990), lead to the same conclusion. However, the differences between results obtained for adult and young samples have been interpreted as meaning that young people's attitude expression is much more dependent on social influence than is that of older people. Because of the greater autonomy of opinion in older respondents, the genetic factor is easier to identify (Waller et al., 1990).

Altemeyer (1996) conducted a critical meta-analysis of findings supporting a major genetic contribution to religious fundamentalism. This analysis leads to the conclusion that data suggesting the genetic determination of religious fundamentalism may be an artefact resulting from neglect of differences in respondents' gender, the false assumption that monozygotic twins are reared in more homogeneous environments than dizygotic twins or the statistical calculation of the heritability coefficient. When Altemeyer made the appropriate corrections the new heritability coefficient

suggested a much weaker genetic contribution to the variance of fundamentalist attitudes than that made by environmental factors, particularly cross-generation transmission of religious values and attitudes (Altemeyer, 1996; cf. also Koenig and Bouchard, 2006). Socio-political crisis due to the collapse of the existing system (Tibi, 1995) and progressive globalization (Kinnvall, 2004) is another possible social factor. Reliance on religious dogmas and practices is a way of coping with ontological uncertainty, anxiety and threat (Kinnvall, 2004).

The hypothesis that religious fundamentalism is socially determined should find strong support in the Polish sample because the two basic environmental determinants of the formation of fundamentalist attitudes, i.e., culturally inherited Catholicism (according to sociological surveys, about 97% of Poles consider themselves to be religious believers) and socio-political crisis due to systemic transformation, are both present. When the breakdown of an existing system necessitates the implementation of a new system we have political trauma (Sztompka, 2000). Political trauma means that people have to make diametrical and rapid adjustments in their individual value systems, lifestyles, attitudes towards work, money and interpersonal relations (Adnanes, 2004; Sztompka, 2000). When this happens, it is quite natural that people are fearful and apprehensive about their very existence (cf. Adnanes, 2004). Assuming that religiosity has an adaptive function (cf. Koenig, Bouchard, 2006) we may hypothesize that in Poland the environmental contribution to religious fundamentalism will be larger than the genetic contribution.

According to psychoanalytic theory, religiosity is an effect of culture and protects the individual from experiencing existen-

tial anxiety (Gibbs, 2005; Stein, 2006). It reduces the feeling that the world is chaotic, disordered and meaningless and helps to make sense of it by introducing unambiguous rules of conduct and defining good and evil (Jones, 2006; Victor, 2004). Belonging to a fundamentalist religious denomination boosts the sense of security, empowerment and meaning (Kinnvall, 2004). Hence religiosity is adaptive and helps people adjust to their living conditions (Kirkpatrick, 2006; Koenig, Bouchard, 2006). Research suggesting that religious fundamentalists feel more psychologically comfortable than non-fundamentalists lends support to this view. The former are more optimistic, hopeful, have more trust in the future and are more inner-directed (Furham, 1982), less helpless and less prone to blame themselves for negative events (Seti, Seligman, 1993, 1994).

However, the adaptive function of religiosity has been questioned (Kirkpatrick, 2006). Religious fundamentalists' specific attitudes suggest that these men and women have difficulty adjusting to pluralist democratic society. For example, religious fundamentalists have a Manichaeic world view (Jones, 2006) and are prone to paranoid thinking (Schneider, 2002), intolerance and disrespect for others' freedom and autonomy (Badley, 2005; Tibi, 1995; Schneider, 2002), tend to impose their own religious principles on others (Tibi, 1995), use violence to resolve conflicts (Kinnvall, 2004; Tibi, 1995) and are aggressive, i.e., support strict punishment of criminal offences (Unnever, Cullen, 2006). These attitudes express social anxiety and hostility. Such empirically demonstrated cognitive traits as highly rightist authoritarianism (Altemeyer, 1996, 2005; Altemeyer, Hunsberger, 2005; Hunsberger, 1996; Hunsberger, Owusu, Duck, 1999), dogmatism (Heiser, 2005; Schneider, 2002), low

cognitive complexity (Edgington, Hitchinson, 1990; Heiser, 2005) or difficulty taking on another person's perspective (Schneider, 2002) are additional arguments in favor of the hypothesis that religious fundamentalists are highly anxious. The aforementioned cognitive traits serve to protect the individual from anxiety. They develop in response to anxiety-generating socialization experiences (Altemeyer, 1996; Rokeach, 1960) and/or may be generated in conditions of socio-political crisis (c.g., Duckitt, Fisher, 2003; Kinnvall, 2004).

Duckitt, Fisher (2003) have experimentally demonstrated that when anxiety is experienced in threatening situations this activates a negative social world view. Social reality is perceived as a ruthlessly competitive jungle in which the strong win and the weak lose. This experimental finding suggests that anxiety and its concomitant negative social world view beliefs can be seen as direct dispositions to adopt fundamentalist religious attitudes that help to cope with anxiety and put some order into a disorderly world but do not change negative beliefs about the nature of the social world. Religious fundamentalists believe that there is an ongoing, perpetual battle between good and evil and that evil is a powerful force that governs the world (cf. Jones, 2006).

According to the behavior genetic paradigm we may assume that the tendency to react to social events with anxiety is largely genetically determined. Research findings show that personality traits having an anxiety component and anxiety disorders are both biologically determined. For example, the genetic factor contributes strongly (about 50%) to neuroticism (Bouchard, Loehlin, 2001; Olson et al., 2001), sensitivity to anxiety-provoking stimuli (Stein, Jang, 1999), social anxiety

symptoms (Beatty et al., 2002), panic attacks, social phobia, and separation anxiety (Ogliari et al., 2006; Topolski, 1998). Meanwhile, the contribution of the genetic factor to generalized anxiety disorders is much smaller (about 15-20%; Hettema, Prescott, Kendler, 2001; Ogliari et al., 2006). This difference suggests that anxiety responses always have a significant genetic component although the actual strength of the genetic factor differs, depending on the modality of the anxiety response. So how strongly, may we ask, do genetic and environmental factors contribute to anxiety traits and the associated negative world view? It is important to answer to this question in accordance with our assumption that both anxiety and negative world view are mediators of religious fundamentalism.

METHOD

Participants

The study was conducted by mail. The test material was distributed to 500 pairs of MZ and DZ twins registered at the Interdisciplinary Center for Behavior Genetic research at the University of Warsaw. The data from 56 pairs of twins (19 MZ and 37 same-sex DZ), were analyzed. The sample consisted of 112 respondents (28 women and 84 men). Most respondents had university (53) or secondary education (50) and only nine had just primary education. Respondents' age ranged from 21 to 28 ($M = 25.1$, $SD = 2.05$).

Twin zygosity was diagnosed using the Physical Twin Resemblance Questionnaire (Oniszczenko, Rogucka, 1996). Pairs whose zygosity proved difficult to establish were excluded from the analysis. The validity of this instrument (94% correct twin pair classifications) has been con-

firmed many times in previous research (cf. e.g., Oniszczenko, 2003; Oniszczenko, Jakubowska, 2005; Spinath, 2001; Spinath et al., 2002). The twins were recruited from the general Polish population and not paid for their participation.

Measures

Religious fundamentalism was assessed with the revised 12-item Religious Fundamentalism Scale by Altemeyer and Hunsberger (2004).¹ This is an abbreviated version of the original 20-item scale (see: Altemeyer, Hunsberger, 1992, 2004). The scale measures religious fundamentalism understood in terms of a structure of religious attitudes. According to the authors' definition, religious fundamentalism is "the belief that there is one set of religious teachings that clearly contains the fundamental, basic, intrinsic, essential, inerrant truth about humanity and deity; that this essential truth is fundamentally opposed by forces of evil which must be vigorously fought; that this truth must be followed today according to the fundamental, unchangeable practices of the past; and that those who believe and follow these fundamental teachings have a special relationship with the deity" (Altemeyer, Hunsberger, 1992, p. 118). The scale includes such items as: *God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed, The basic cause of evil in the world is Satan, who is still constantly and ferociously fighting against God*. Each item is rated on an anchored scale from -4 (very strong disagreement) to +4 (very strong agreement) (see: Altemeyer, Hunsberger,

¹ We owe special thanks to Mark Zylinski for his valuable comments on the Polish adaptation of the Religious Fundamentalism Scale to our own research.

2004). The higher the score the higher the religious fundamentalism. The Religious Fundamentalism Scale is very reliable; alpha reliabilities were at least .85 and usually reached values of about .90 and more in the Canadian samples (Altemeyer, Hunsberger, 2004) and .80 in the Polish sample.

Trait anxiety was assessed with the Trait Anxiety Scale of the STAI (Spielberger, Gorsuch, Lushene, 1970). Respondents rate each item on a scale from 1 (hardly ever) to 4 (nearly always); the higher the score the higher the anxiety. Alpha reliability in our sample was .87.

Beliefs about the nature of the social world were assessed with the abbreviated version of the World Assumption Scale by Janoff-Bulman (1989) in its Polish adaptation by Kaniasty (2003). This version had eight items derived from two subscales of the original WAS; the first four items deal with assumptions about the benevolence of people (e.g., *People are basically kind and helpful*). The remaining items deal with assumptions about the benevolence of the impersonal world (e.g., *There is more good than evil in the world*) (see: Janoff-Bulman, 1989). Each item is rated on a scale from 1 (strongly disagree) to 4 (strongly agree) (see: Kaniasty, 2003). The higher the score the more benevolent the world assumption. Reliability of the scale was .82 in the Polish samples (Kaniasty, 2003) and .84 in the presented study.

RESULTS

Preliminary Analysis

Student's t-test was used to test whether gender had any significant differential effect on the level of religious fundamentalism, trait anxiety and beliefs about the nature of the social world.

For the purpose of statistical analysis the -4 to +4 rating scale was converted into a scale ranging from 1 to 9. Scores on the Religious Fundamentalism Scale can range, theoretically, from 12 to 108. The actual scores were in the 20 to 90 range. Men scored nonsignificantly higher than women on this scale, suggesting a trend. The respective means were $M = 64.73$ and 58.44 ($t = -1.84$, $p < .1$).

Scores on the remaining two measures, anxiety and beliefs about the nature of the social world, also spanned nearly the whole scale and ranged from 24 to 72 for anxiety and from 11 to 31 for beliefs. Men and women did not differ significantly as far as these two measures are concerned. ANOVA and Duncan's test were used to check whether education had a differential effect on the levels of religious fundamentalism, anxiety and beliefs about the nature of the social world. Only this last variable showed a statistically significant difference [$F(2,109) = 4.63$, $p < .001$]. Respondents who had a university education viewed the world more benevolently ($M = 21.53$) than respondents who had either secondary ($M = 20.32$) or vocational ($M = 18.11$) education.

The data were also submitted to Pearson's correlation analysis to test the hypothesis that anxiety, hostile attitude towards the world and religious fundamentalism correlate. Significant correlations emerged between anxiety and beliefs about the nature of the social world ($r = -.47$, $p < .0001$) and between anxiety and religious fundamentalism ($r = .28$, $p < .003$). A non-significant trend was found for religious fundamentalism and negative assumptions about the nature of the social world ($r = -.17$, $p < .1$).

Multiple regression analysis was applied to determine whether anxiety and beliefs about the nature of the social

world were predictors of religious fundamentalism. Only anxiety emerged as a significant predictor (beta = .281, $t = 3.06$, $p < .002$).

Model-Fitting Results

The statistical procedures employed in the study were based on the maximum-likelihood model fitting analysis. The parameters of particular components of the general variance were calculated on the basis of LISREL8 (Jöreskog, Sörbom, 1993) using the univariate genetic model. The impact of genetic and environmental sources of variability treated as latent variables was simultaneously assessed: additive (A) genetic factor, as well as shared (C) and nonshared (E) environmental factors. In accordance with the applied procedure, the following hypotheses were tested: 1) the data do not indicate any family resemblance (E model), 2) family resemblance is caused by the additive genetic factor (AE model), 3) family resemblance is caused by environmental factors common to both twins (CE model), and 4) family resemblance is due to the

additive genetic effect and shared environment (ACE model). The goodness-of-fit for each model was based on the χ^2 test as well as the AIC indicator.

The goodness-of-fit indices for the self-reports and the proportions of variance of the tested scales explained by the components of these models are presented in Table 1.

As we can see in Table 1, model ACE had the best goodness-of-fit as far as Fundamentalism is concerned, whereas model AE was more appropriate in terms of goodness-of-fit for Trait Anxiety and Social World View. Analysis of goodness-of-fit of the two models using the maximal probability method showed that the additive genetic factor accounts for 38 (Fundamentalism) to 60 percent (Trait Anxiety and Social World View) of the variance. Specific environment accounts for 16 to 40 percent of the variance of these scales. Common environment had a dominant effect on Fundamentalism only and accounts for 46 percent of the variance - more than the genetic factor and specific environment analyzed separately.

Table 1. Model-fitting results for the Fundamentalism, Trait Anxiety and Social World View Scales: The maximum-likelihood variance estimates and their 95% confidence intervals (in italics) and goodness-of-fit indices

Scale	A	C	E	χ^2	Df	P	GFI	AIC
Fundamentalism	.38 (.28-.48)	.46 (.36-.56)	.16 (.14-.18)	1.61	3	.65	.98	-4.39
Trait Anxiety	.60 (.55-.65)		.40 (.37-.43)	3.31	4	.50	.90	-4.69
Social World View	.60 (.56-.65)		.40 (.36-.43)	1.39	4	.84	.99	-6.61

Note: A = additive genetic factor, C = common environmental factor, E = nonshared environmental factor and measurement error. GFI = Goodness of Fit parameter; AIC - Akaike's Information Criterion

DISCUSSION

The hypothesis that religious fundamentalism in the Polish sample would be more strongly determined by social factors, i.e., family environment (46%) and specific environment (16%) than by the genetic factor was confirmed. We must remember, however, that the contribution of the genetic factor was relatively very large. This factor accounted for as much as 38% of the variance. The results of the Polish sample are similar to those obtained in culturally different Anglo-Saxon samples (cf. e.g., Bouchard et al., 1999; Carver, Udry, 1997), regardless of how different were the measures of religious fundamentalism and religious attitudes that were used. This means that all religious attitudes (as with other social attitudes) have a large genetic component with a heritability coefficient comparable to the heritability of personality traits (Plomin et al., 2001).

Genetic factors accounted for 60% of the variance of trait anxiety and beliefs about the nature of the social world. But we found that only anxiety is a significant predictor of religious fundamentalism. Thus, the level of fundamentalism partly depends on such biologically determined traits as anxiety, which predispose people to religiosity, but it depends above all on the social influence of the nearest environment (parents, siblings), which is probably responsible for the cultural transmission of religious norms and values (cf. Abrahamson et al., 2002; Altemeyer, 1996; Beer, Arnold, Lochlin, 1998) and authoritarian child-rearing style (cf. Danso, Hunsberger, Pratt, 1997).

Another factor that plays an important, even if heterogeneous, role in the variability of the three studied variables is specific environment. As far as fundamentalism is

concerned, this factor explains only 16% of the variance (compared with trait anxiety and social world view where specific environment accounts for 40% of the variance of each of these variables). This finding confirms the hypothesis that individual, unique personal experience acquired in the family as well as in peer groups, religious organisations etc., helps to shape the individual level of religious fundamentalism. Specific environment is a particularly important determinant of the variance of trait anxiety and negative social world view. High trait anxiety rooted in the interaction of genetic factors and personal anxiety-generating experiences may facilitate the development of religiosity as a form of adjustment to adverse conditions of life. This mechanism seems highly probable in the Polish reality.

The results of the correlation analysis supported the hypothesis that the more anxious one is and the more negative one's world-view, the more fundamentalist one's orientation will be. But the regression analysis revealed that anxiety is the only significant predictor of religious fundamentalism. Anxiety, as the foregoing discussion shows, is genetically determined to a considerable degree. Our results seem to confirm the claim that religiosity has an adaptive function. The present genetic analyses have demonstrated that a genetically determined propensity to activate anxiety responses rapidly predisposes one to endorse fundamentalist religious beliefs that provide one with clear rules with which to make sense of a threatening world (cf. the statistically significant correlation between anxiety and negative social world views). The regression analysis findings suggest, as other writers have also pointed out (cf. e.g., Jones, 2006; Schneider, 2002), that a negative social world view should be treated as an out-

come rather than a predictor of religious fundamentalism. Moreover, in the present studies negative assumptions about the nature of the social world were very weakly related to religious fundamentalism and the correlation was not significant ($p < .1$).

We found that education has a significant effect on social world-view. The most educated respondents in our study also had the most positive social world views. Thus our findings collected in a specific sample revealed the same trend as results obtained in representative American and Polish samples. Studies of a representative American sample (Gallo, Mathews, 2003) and Polish sample (Czapiński, 1998; Czapiński, Panek, 2004) have shown that the higher the level of education, the better the quality of life, as is manifested, for example, in the tendency to experience positive emotions. Trust in people and the tendency to assume that there is more good than evil in the world, also found in the studied sample using different measures, lend further support to this pattern (cf. Gallo, Mathews, 2003; Czapiński, 1998; Czapiński, Panek, 2004). Whether or not successful achievement of high position in the social structure (defined in terms of education and affluence) is conducive to more benevolent attitudes towards the social world is another matter, as is the question of whether the belief that people are helpful and the world is a friendly place helps people to achieve a high position in the social structure.

Received May 16, 2008

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OSOBNOSTNÉ, KOGNITÍVNE, ENVIRONMENTÁLNE A GENETICKÉ FAKTORY AKO DETERMINANTY NÁBOŽENSKÉHO FUNDAMENTALIZMU: VÝSKUM POĽSKÝCH DVOJÍČIEK

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Súhrn: Vo výskume sme sa pokúsili určiť determinanty náboženského fundamentalizmu. Overovali sme tieto hypotetické determinanty: vplyv genetiky, prostredia a psychologické premenné ako je anxieta a presvedčenia o povahe sveta spoločnosti. Predpokladali sme, že anxieta a presvedčenia o svete spoločnosti sú mediátormi náboženského fundamentalizmu. Výskumu sa zúčastnilo 112 participantov (29 žien a 83 mužov) vo veku od 18 do 28 rokov. Výber tvorilo 19 jednovaječných a 37 dvojvaječných dvojčiat, ktoré vyrastali spolu. Výsledky modelovania pomocou štruktúrálnej rovnice ukázali, že náboženský fundamentalizmus určujú najmä vplyvy prostredia (38% dedičnosť) na rozdiel od anxiety a presvedčeníach o svete spoločnosti, ktoré sú určované najmä genetickými vplyvmi (60% dedičnosť). Korelačná analýza odhalila pozitívny vzťah medzi anxieta a negatívnym spoločenským svetonázorom, no v rozpore s hypotézou výsledky viacnásobnej regresnej analýzy označili anxieta za jediný prediktor náboženského fundamentalizmu.