

The Inverse U-Shaped Religion–Health Connection Among Israeli Jews

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Abstract A growing body of evidence indicates an association between religion and health. However, few have studied the connection between the extent of an individual's religiosity and his health. Analysis of the 2004 Israel National Health Survey was performed. Religiosity was self-identified using five continuous categories, distinctive to Israeli Jews. Bivariate and multivariate analyses examined the relationship between the extent of Religious commitment and several health outcomes. The relationship took the shape of an inverse U function: Israeli Jews in the middle religiously have the worst physical and mental health status on both unadjusted and adjusted bases. Israeli Jews exhibit a non-trivial connection between religiosity and health whereby the most Secular and the most Religious individuals seem to be healthier than individuals in between.

Keywords Religion · Physical health · Mental health · Israel · Jew

Background

Religion and Health Status

A large and growing body of evidence indicates an association between religion and both physical and mental health (Levin 2001; Koenig et al. 2012). Overall, religion seems to

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have a positive impact although there is some evidence of a negative impact as well (Koenig et al. 2012; Pargament et al. 2001). Much less research, however, has been devoted to study the relationship between the *extent* of an individual's religiosity and his health outcomes, in particular outside of the context of formal denominations.

In 1998, an influential and oft-cited article called the religion–health connection was published (Ellison and Levin 1998). While many studies have built upon the issues identified in this article, most evidence is about Christians and Religious behavior, more specifically participation in a Religious community (Nicholson et al. 2009; Koenig et al. 2012).

Theoretical Framework

Religious communities can serve multiple social functions which are associated with improved health (Putnam 2000; Hirschman 2004; Ferlander 2007; Krause et al. 2016). In general, membership in a group and the concomitant increase in social resources that typically goes along with it are associated with improved health outcomes (Kawachi and Berkman 2000; Ferlander 2007). This is the case with attendance at churches and with other forms of group membership (Emmons 2000; Koenig et al. 2012). However, compared with other group memberships, the quantity of social resources may be larger in Religious communities because social resources such as social capital, cohesion and support seem to play an especially large role in such communities (Putnam 2000; Kawachi and Berkman 2000; Foley and Hoge 2007). There are consistent reports of protective associations between attendance at Religious services and better self-rated health (Koenig et al. 2012). However, existing data often do not include the social or individual extent of religiosity outside of affiliation or behavioral indicators.

Psychological mechanisms may also play a role in health. Religion can affect health status through Religious coping, such as the ability to cope with an illness (Idler et al. 2001; Siegel and Scrimshaw, 2002; Pargament et al. 2001). Furthermore, regular church attendance can be associated with optimism and positive emotions (Idler et al. 2001). Religiosity can be associated with reduced anxiety and depression (Shreve-Neiger and Edelstein 2004; Koenig et al. 2012). However, religion is not always associated with better mental health and may even be associated with negative outcomes (Shreve-Neiger and Edelstein 2004; Leurent et al. 2013; Weber and Pargament 2014).

In addition to social and psychological aspects, the specific content of a religion's beliefs matters such as attributing meaning to certain actions or prescribing specific rituals (Berger 1990; Stark and Finke 2001). Religious doctrines can lead to a perspective on human nature and society that elicits attitudes associated with better physical and mental health outcomes (Chatters 2000; Idler 2014).

Prior Research and Study Importance

Prior studies about religion and health have mainly focused on Christians (Koenig et al. 2012). The small body of research that has studied the relationship between religion and health among Israelis and/or Jews has produced some evidence of an association but inconsistent results depending on the religion and health measure used. A positive association between Jewish religiosity and health was found among older Israeli Jews (Levin 2012), when religiosity was measured by synagogue attendance, but the association was typically negative when measured by prayer. Another study also found synagogue attendance associated with lowered mortality among this population (Litwin 2007).

A study using some measures of self-reported health and quality of life found increased religiosity to be associated with poorer health (Shmueli and Tamir 2006; another study found that Religious Israeli Jews also generally have better results than less Religious Israeli Jews in terms of health behaviors and preventive screenings performed (Shmueli and Tamir 2007). A more recent study of Israeli Jews found generally, but not always, salutary results between measures of Religious behaviors and health and well-being outcomes (Levin 2013). Studies of US Jews have revealed a positive health impact of Religious identity and participation (Levin 2011, 2015); using American denominational categories, Orthodox Jews who attend synagogue typically were found to have better self-rated health status than Conservative, Reform and Reconstructionist Jews, even among those who attended synagogue.

In addition to having inconsistent results, these studies primarily focus on Religious behaviors for Israeli Jews, in particular synagogue attendance, or on denominational affiliation. However, to the best of our knowledge, there has been insufficient research on the topic in general and in studying the more specific question of the relationship between the *extent* of an individual's religiosity and his health outcomes. This question is the main focus of the present paper.

Methodology

Study Populations: The Israel National Health Survey

The study involved a cross-sectional secondary data analysis of a national survey of Israelis in 2004, the Israel National Health Survey (INHS), based on a representative sample from Israel's general population. The information was collected in face-to-face interviews at the respondents' homes, using the Composite International Diagnostic Interview developed for the World Health Organization world mental health survey initiative. Face-to-face interviews were conducted in Hebrew or Russian with adults aged 21 and above. The response rate was 72%. Respondents included 4057 Jewish Israelis. The survey included measures about physical and mental health status, physical and mental health utilization and demographics (Levinson et al. 2007). The main independent variable of interest, *religiosity*, was measured by self-identified categorization on the continuity of Religious identification. Respondents were asked to self-identify in one of five Religious categories: Secular, Traditional-not Religious, Traditional-religious, Religious and Haredi (sometimes translated as ultraorthodox). Although these are not formal denominations, most are commonly understood categories in Israel, each distinguished by variant sets of beliefs and practices. The one exception is that many surveys only have one category for Traditional, but this survey split the category into Traditional-religious and Traditional-not religious.

The five categories are ordered by what is commonly considered least Religious to most strictly Religious. Haredi Jews are typically considered to live a more insular and stricter Religious lifestyle with the highest percentages of them saying that religion is very important to them, they pray regularly, they have certainty about God and they study sacred texts regularly, with the percentages steadily decreasing for the Religious, Traditional and Secular groups, respectively (Pew 2016). It is also important to note that differences between groups are complex and are not merely a matter of observance Religious

groups are marked by theological differences as well, such as attitudes toward Zionism or science.

The Model and Method

In order to answer the research question, the following logistic regression model was estimated.

$$\hat{P}_j = \frac{1}{1 + \exp\{-(\alpha + \beta r_i + \gamma X_i)\}} \quad (1)$$

where P_j is the probability that individual i will have the health condition j .

Separate models were constructed for five health conditions $\{j = 1, \dots, 5\}$ using binomial logistic regression and controlling for Religious identity, $\{r = 1, \dots, 5\}$, and demographic and socioeconomic variables, X . For each logistic regression model, predicted probabilities were calculated (Eq. 1). Based on β , adjusted odds ratios (ORs) were calculated for each religiosity category r .

Our study aimed to measure both physical and mental health and, for each, included measures of both overall health and specific diseases or symptoms. In total, we had five dependent variables representing five health status variables: self-rated overall physical health, whether or not they had chronic disease, whether or not they had pain, overall mental health state, and whether or not they had depressive/anxiety emotional symptoms. For a fuller description of all variables in the analysis, see “[Appendix](#).” In each regression model, P values based on Wald Chi-square were produced so that level of statistical significance could be determined for categories within each variable for each Religious identity category relative to the reference category of Secular. Log-likelihood statistics were produced for each model to test for goodness of fit. Standard errors and confidence intervals were produced for all variables.

Findings

Descriptive Results

Frequencies for key demographic variables in the overall sample are presented in Table 1, and health status for the overall population is found in Table 2. About 6% of respondents identified themselves as Haredi (ultraorthodox) and almost 9% as Religious. About 12% categorized themselves as Traditional-religious and 26% as Traditional-not religious. Almost half the sample, 47%, self-identified as Secular. The Haredi population is by far the youngest, with only 23% over the age of 50, whereas the proportion was at least 36% for all the other groups. There were slightly more women than men in all the Religious groups except Haredi, where only 44% of the sample was female. The Haredi and Secular groups had the largest number of years of education, at 67 and 60% respectively; at the other extreme, only 25% of those in the Traditional-religious category received at least 13 years of education; it is important to note that education includes either Religious or Secular education.

Variations were also found in ethnicity and current region. For example, the Religious and the two Traditional groups were more likely to be from Asia and Africa, with over half their populations from these parts of the world, and the Haredi, Traditional-not religious

Table 1 Bivariate analyses for demographics by Religious group

Percentage for each category below by religious group	Overall	Haredi	Religious	Traditional-religious	Traditional-not religious	Secular	<i>P</i> value
Female	52.2	43.7	54.8	53.1	54.2	51.5	***
<i>Age</i>							
21–34	33.1	46.6	32.1	23.1	28.5	36.5	***
35–49	27.4	31.2	31.8	27.4	28.5	25.4	
50–64	22.1	17.4	15.3	24.9	21.9	23.4	
65–75	10.6	2.0	12.8	16.4	12.2	9.0	
75+	6.8	2.8	8.0	8.1	8.8	5.7	
<i>Ethnicity</i>							
Israel	15.1	29.2	14.0	6.0	10.1	18.4	***
Asia/Africa	39.1	33.2	52.6	73.2	51.5	22.2	
America/Europe/OC	30.8	33.4	30.1	14.6	21.7	39.5	
Former Soviet Union	15.0	3.2	3.4	6.2	16.8	20.0	
<i>Area</i>							
Tel Aviv	24.3	26.7	15.6	20.3	24.3	26.5	***
Central	27.9	15.8	37.4	25.6	27.4	28.7	
Other	47.2	57.5	47	54.1	48.3	45.8	
<i>Education</i>							
13+ years	50.0	66.7	52.4	24.9	38.8	59.7	***
Religious category	100	6.3	8.7	11.9	25.7	47.4	

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

Table 2 Bivariate analyses for health status outcomes by Religious category

	Overall	Haredi	Religious	Traditional-religious	Traditional-not religious	Secular	<i>P</i> value
Subjective physical health status: % less than very good	49.4	28.3	43.1	61.1	44.2	47.7	***
Subjective mental health status: % less than very good	33.9	14.7	27	43.4	39.7	32.1	***
Depressive/anxiety emotional symptoms in last month	27.2	16.5	26.1	39.3	33.7	22.2	***
At least one key chronic disease	45.4	41	48.2	48.7	45.9	45.9	***
Experiences pain	45.0	30.0	44.6	48.8	52.0	42.2	***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$ + $P < 0.10$

and Secular were more likely to live in Tel Aviv, with about a quarter of each group residing in that city. Those identifying as “Religious” had the largest proportion living in the central area.

The bivariate analyses for religion and health outcomes found statistically significant associations for every variable as well (Table 2). For subjective physical health status, the Haredi group was in the best health with only 28% of the subjects reporting being in less than very good overall health, while the Traditional-religious group by far reported the worst health, with 61% in less than very good health. Results for the other three groups were between 43 and 48%. For the chronic disease index, the results were similar. The Haredi group also had the lowest proportion with at least one chronic disease and the Traditional-religious group had the highest, but the range was much narrower, from 41 to 49%. The Haredi group also had by far the lowest proportion experiencing pain at 30%. The Traditional-not religious group had the highest proportion at 52%, with the Traditional-religious group next highest at 49%

For subjective mental health status, the Haredi group was in the best health, with only 15% of its members reporting being in less than very good mental health, while the Traditional-religious group reported the worst mental health, with 43% in less than very good mental health and the Traditional-not religious close behind at 39%. For the Secular and Religious groups, the results were 32 and 27%, respectively. Similar results were found for the proportion of those suffering from depressive/anxiety-related emotional symptoms, with 17% of the Haredi group reporting at least one symptom and at the other end 39% of the Traditional-religious group doing so.

Multivariate Results

The multivariate analysis involved examining the relationship between Religious identity and health outcomes independent of the effects of a number of other factors by using control variables; analyses were performed for each of the five health status outcome measures (Table 3). The model constructed for self-reported physical health status found that, when controlling for demographic and socioeconomic variables, those who identify as Haredi had the best overall physical health, with Haredi Israeli Jews only about half as likely to be in less than very good health as those in the Secular group, the reference category.

Those identifying as Traditional-religious were the most likely to report being in bad health, with odds of over 1.4 times as much compared to Secular Israeli Jews. The analysis for chronic disease incidence found that in the Haredi group only about two-thirds were as likely to report having at least one chronic disease as Secular Israeli Jews. In terms of experiencing pain, the Haredi group also had the best results, being only .58 as likely to report having pain as those in the Secular category. In addition, the Traditional-not religious group was 1.4 times as likely to have pain as the Secular group.

Similar results were found for self-reported mental health status as for physical health status (Table 3), with the Haredi group having the best results and the Traditional-religious group the worst. Haredi Israeli Jews were only 42% as likely as Secular Israeli Jews to have less than very good mental health. Those in the Traditional-religious group were 37% more likely and those in the Traditional-not religious group 22% more likely to be in suboptimal mental health compared to the Secular group. Both Traditional groups also had much higher depressive/anxiety-related emotional symptoms; compared to Secular Israeli Jews, those in the Traditional-religious group were almost twice as likely to experience a symptom and those in the Traditional-not religious group 57% more likely. Figure 1,

Table 3 Religious group and health status outcomes adjusted results

Dependent variable	Haredi OR (CI)	Religious OR (CI)	Traditional-religious OR (CI)	Traditional-not religious OR (CI)	Secular
Physical health status less than very good (− 2LL = 4477, nag $r^2 = .285$)	0.52* (0.38–0.72)	0.81 (0.6–1.1)	1.41* (1.1–1.8)	1.12 (0.9–1.3)	Ref 1.0
Chronic disease (− 2LL = 4619, nag $r^2 = 0.240$)	0.65** (0.47, 0.89)	0.87 (0.66, 1.15)	1.08 (0.84, 1.37)	1.15 (0.96, 1.37)	Ref 1.0
Pain (− 2LL = 5092, nag $r^2 = 0.094$)	0.58*** (0.43, 0.79)	1.11 (0.85, 1.43)	1.13 (0.90, 1.41)	1.40*** (1.18, 1.65)	Ref 1.0
Mental health status suboptimal (− 2LL = 4477, nag $r^2 = 0.285$)	0.42*** (0.28–0.63)	0.92 (0.68–1.24)	1.37* (1.08–1.76)	1.21* (1.01, 1.46)	Ref 1.0
Depressive/anxiety symptoms (− 2LL = 4361, nag $r^2 = 0.081$)	0.82 (0.57, 1.14)	1.18 (0.88, 1.58)	1.97*** (1.55, 2.49)	1.57*** (1.31, 1.88)	Ref 1.0

Controlling for demographic variables including age, gender, ethnicity, area of residence and education

Bold indicates statistically significant at $P < 0.05$

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001 + P < 0.10$

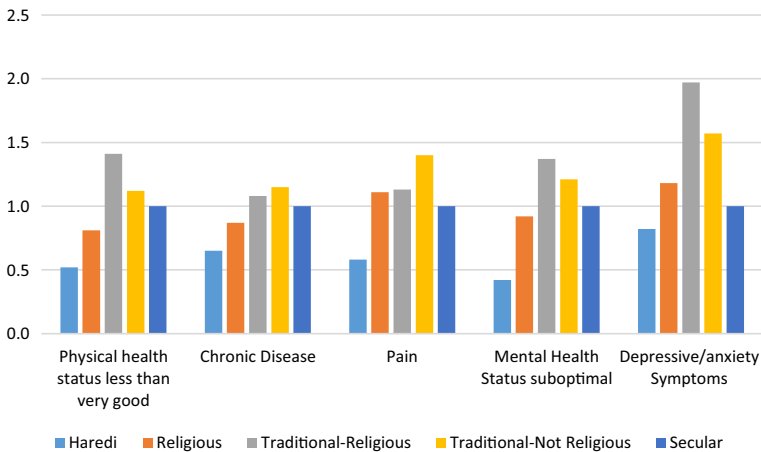


Fig. 1 Religious group and health status outcomes adjusted results (OR)

which illustrates the multivariate analysis results (presented in Table 3) graphically, shows the inverse U function of the relationship between extent of religiosity, as indicated by Religious identity, and health outcomes as well as the difference in concavity for the different health outcomes, although there are variations by measure.

Discussion

Summary of Major Findings

We found that the patterns of the relationship between self-rated Religious identity and health outcomes of Israeli Jews generally exhibit an inverse U function, after adjusting for factors such as age, gender, education and location. Israeli Jews, identifying themselves in the middle in terms of Religious commitment, are in the worst physical and mental health status on both an unadjusted and an adjusted basis, when compared to either extreme. The patterns vary for the other groups and health measures depending on the specific analysis, but, in general, the two edge groups have better health status and the Traditional groups have the worst outcomes.

Contributions of the Study

The research presented adds to the literature on the connection between religion and health. In addition to providing additional evidence that bears on differing results from prior studies (Shmueli and Tamir 2006; Levin 2013), this paper is among the few to study the relationship between Religious “degree” and health status. Use of five categories representing a continuum of religiosity from Secular to very devoutly Religious and analyzing them across a range of subjective and physical and mental health measures is, to our knowledge, uncommon and an important contribution to research about Israeli Jews and their health.

In addition, a seminal study by Kark et al. (1996) about kibbutzim in Israel established a connection between being a Religious Israeli Jew and having a longer lifespan compared to less Religious Jews as did a later study (Jaffe et al. 2005). Our study complements these studies as well as perhaps suggesting reasons for the lower mortality rates and highlights the need to examine variations in mortality by extent of religiosity, not just whether someone is Religious.

Our study is also unusual in the measure of religiosity used which is a strength of the study although also presents challenges in interpreting results. As opposed to many studies about religion and health, most of them about Christians, which measure behaviors such as congregational attendance or affiliation such as belonging to a church or synagogue of a specific denomination, we used a measure of self-identification which indicates extent of religiosity. The categories reflect several characteristics including lifestyle, worldview and level of commitment, all of which can affect health through certain attitudes and actions. It is also possible some of these Religious characteristics may cause respondents to react differently to questions about their health so there may be subjective as well as objective differences about their health status; both of these can have important implications such as decisions about when to seek care or how to improve health. However, the specific mechanisms by which the differing Religious categories affect health are not fully known and require further research.

This study was multidisciplinary involving a collaboration of health economists and a medical sociologist with expertise in the sociology of religion, all of them with training and/or experience in public health. The research involved a tango, or in this case we might better say a hora, of these researchers in different disciplines which we think resulted in a stronger study despite occasional challenges in melding different approaches during the process. We think that the example of how multiple methodological approaches

incorporated in this research process such as use of sociological theory or economic modeling while not losing sight of the study's implications for the public's health is an additional contribution of this paper.

Possible Reasons for Results

There are distinctive demographic characteristics of each group, related to their beliefs and attitudes. For example, more Religious Jews are likelier to be married, have large families, have low incomes and not have served in the army, all of which can be related to health status in differing ways (Koenig et al. 2012). There are differences among Religious groups in health-related behaviors such as differences in smoking, drinking, exercise and nutrition (Krause et al. 2016). Since each group has a distinctive set of demographic and behavioral characteristics, along with possible unmeasured confounding variables, the relationship between them can be complex.

Further, it has been established that social capital is connected with both religiosity (Putnam 2000; Smidt 2003) and generally positive health outcomes (Ferlander 2007; Idler 2014) and differing quantities of it may be related to our results. For example, the greater homogeneity of groups that are the most and least Religious may increase social capital relative to the more diverse groups in the middle. However, while these are all plausible explanations, determining the causes of the findings was beyond the scope of this study and further research is needed.

Policy Implications

This study can help policymakers leverage the fact that Religious leaders and communities can play an important role in people's lives. Faith-based programs can potentially help reduce health disparities (Trinitapoli et al. 2009; Kegler et al. 2010). Initiatives can be developed and implemented to take advantage of these opportunities in potentially improving the health status of Religious groups, especially those in the middle religiously who we found typically have worse health outcomes. Even those in the Traditional-religious category can potentially benefit from interventions built around their Religious community, even though their extent of religiosity is not as extreme as the Haredim. It is also noteworthy that Israelis often live in neighborhoods with others in the same Religious category. While faith-based interventions are understudied among Jewish groups, there is evidence of successful faith-based interventions among centrist Christians (Newlin et al. 2012; Johnston et al. 2017). As a result, not only the extremely Religious can benefit from faith-based interventions among Christians and we think the same would likely be true of Jews.

Although investigation is needed about the nature of the religion and health connection for Israeli Jews, certain faith-based interventions can be piloted. This study supports the idea that one size does not fit all among faith-based interventions (Campbell et al. 2007). There are variations by Religious category so programs should be appropriately adapted for each community. For example, smoking rates vary by Religious category, with traditional Jews smoking more than Religious or Haredi Jews (Kalter-Leibovici et al. 2016); tailored smoking cessation programs can be implemented in their synagogues or statements by senior Religious leaders in their communities can increase stigma of smoking.

Limitations

The data are self-report, which may limit the validity or reliability of responses, including the self-definition of religiosity. However, in this specific survey the interviews were conducted face-to-face with well-trained interviewers using the Composite International Diagnostic Interview developed for the World Health Organizations.

In the survey, the percentage of Haredi women and those over 65 is lower than that in the general population although there is not any evidence supporting any systematic bias. It also remains unclear to what extent the observed associations reflect actual differences in causality or are due to differing perceptions of health status by different groups. Nevertheless, given the magnitude of the findings, it is unlikely these issues will change the direction of the results. It is unclear to what extent these findings are generalizable to Jews in other countries or to residents of Israel who are not Jewish. Therefore, results should be interpreted with caution when applied to other populations.

It is possible that results could vary if more recent data were used; subsequent versions of the survey did not contain all the relevant questions so updated analyses could not be performed. However, the primary objective of the study was to understand the relative differences in the connection between religiosity and health outcomes among categories of Israeli Jews, rather than to measure precise prevalence of health outcomes. There is no theoretical reason to expect that the nature of these relationships would have changed substantially since the data were collected.

Conclusion

The relationship between health status and religiosity among Israeli Jews exhibits a non-trivial form where the most Religious individuals, as well as the most Secular, seem to be healthier than those individuals who are in between in extent of religiosity. This has potential implications for reducing health inequalities, but further analysis should be conducted to fully understand the sources of this phenomenon and its implications.

Compliance with Ethical Standards

Conflict of interest Authors declare that they have no conflicts of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Appendix: Description of the variables

Health condition $\{j = 1, \dots, 5\}$ variables (1) Self-rated overall physical health respondents were asked “In general, what is the state of your physical health?” excellent, very good, good, not good or not good at all. Responses were dichotomized as excellent/very good or good/not good/not good at all. (2) Chronic disease was dichotomized as whether or not they had at least one of the following key diseases: stroke, heart disease, hypertension, diabetes or high blood sugar, stomach ulcer, asthma, tuberculosis, chronic lung disease, thyroid disease, neurological disease, kidney disease, prostate disease or cancer. (3) Pain was defined as ever had either arthritis or rheumatism, chronic back or neck pains, strong headaches or other chronic pain. (4) Respondents were asked “In general, what is the state

of your mental health?” Excellent, very good, good, not good or not good at all. Responses were dichotomized as excellent/very good or good/not good/not good at all. (5) A variable for depressive/anxiety emotional symptoms was constructed, which had a value of 1 if any of the following were true in the past month: felt under strain, was unhappy, was depressed or felt life is not worth living or had sleeping problems or had lost self-confidence.

Religiosity ($r = 1, \dots, 5$), the main independent variable of interest, was measured by self-identified categorization, with the survey subdividing the Jewish population into separate categories of secularism and Religious identification. Respondents were asked to self-identify in one of five Religious categories: Secular, Traditional-not Religious, Traditional-religious, Religious and Haredi (sometimes translated as ultraorthodox). Although these are not formal denominations, most are commonly understood categories, each distinguished by variant sets of beliefs and practices. The one exception is that many surveys only have one category for Traditional. The five categories are ordered by what is commonly considered least Religious to most strictly Religious although this is not always the case for all Religious issues and Religious groups are marked by theological differences as well.

Control variables $\{X\}$ Demographic variables that on a theoretical basis are both useful for policymakers in objectively targeting populations and typically are not influenced extensively by Religious identity were included as control variables. These included age, gender, ethnicity, education level and area of residence.

Gender was either male or female, with the variable having a value of 1 if female. Age was dichotomized as above or below 50, with the variable having a value of 1 if the respondent was above the age of 50. Education was defined as years of schooling, whether Religious or Secular and dichotomized as whether or not respondents had at least 13 years, with the variable having a value of 1 if they did. Area of residence was categorized as the Tel Aviv area, Central Israel or other. Ethnicity was based on region of ancestry, with the following categories: North America/Europe/Oceania, Asia/Africa, Israel and the Former Soviet Union.

Summary of variables

Variable	Description
Religious identity	The Religious category with which they identify
Age	Age broken down into five categories
Gender	Male or female
Ethnicity	Geographic region of ancestry and/or nativity
Area of residence	Tel Aviv area, Central Israel or periphery/other
Education	Years of education (whether 13 years or more)

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