International Journal of Conflict and Violence

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Vol. 13/2019

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Suggested Citation: **APA:** Köse, T., Oymak, C. (2019).Exploring Health Effects of Terrorism: A Multi-Level Analysis for Turkey. 2019. *International Journal of Conflict and Violence*, *13, 1-23.* doi: 10.4119/UNIBI/ijcv.654
Harvard: Köse, Tekin, Oymak, Cansu. 2019. Exploring Health Effects of Terrorism: A Multi-Level Analysis for Turkey, 2019. *International Journal of Conflict and Violence 13: 1-23.* doi: 10.4119/UNIBI/ijcv.654

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ISSN: 1864-1385

Exploring Health Effects of Terrorism: A Multi-Level Analysis for Turkey

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Terrorism has the potential to affect population health through various pathways. Since the literature mostly analyzes tangible economic costs, there is dearth of evidence on health effects of terrorism. In an effort to address that gap, this article explores the relationship between terrorism and health satisfaction of Turkish citizens by combining province-level and individual-level data sets. In order to quantify determinants of health satisfaction, a multi-level modeling framework is employed. Empirical analysis suggests that individuals with higher exposure to terrorism are more likely to report lower health satisfaction in Turkey. Health satisfaction of individuals is significantly and positively correlated with individual-level covariates such as education level, marital status, employment status, household income, housing floor area per person, interest in health issues and becoming a parent within the past year. Age, being female and utilization of health services display negative associations with health satisfaction of individuals. Finally, province-level GDP per capita and schooling ratio exhibit significantly positive associations with individual health satisfaction in Turkey.

Keywords: terrorism, intangible costs, health satisfaction, multi-level model, Turkey

JEL codes: I10, D74, F50, O53, C20

Acknowledgements:
The authors would like to thank Julide Yildirim for her valuable support and suggestions, and Muserref Kucukbayrak for her contribution to the data collection process. The authors are also grateful to Hamza Suffian Abbasi and Esra Erzen for their comments on improving the exposition.

Terror activities pose a significant threat for many countries. Although Middle Eastern and African countries frequently experience terror incidents, European countries including France, Belgium and Germany also suffered occurrences of terrorism. The most prominent costs of terrorism are deemed to be psychological, economic, political and social. In this context, terrorism leads to inevitable costs for terror-targeted countries and their neighbors through spillover effects.

Terrorism has both tangible and intangible costs, which affect a country's economy through various channels. The short-run costs of terrorism consist of immediate losses of human and physical capital; increasing risks and uncertainties in decision-making processes of consumers and investors; and health problems of victims (Schneider et al. 2011). The long-term costs of terrorism include distortions in various types of economic activity and reductions in productivity (Abadie and Gardeazabal 2003; Schneider et al. 2011). The tangible costs of terrorism include declines in economic growth, national investment and national income (Blomberg et al. 2004; Gaibulloev and Sandler 2011; Eckstein and Tsiddon 2004; Fielding 2003; Bilgel and Karahasan 2017; Ocal and Yildirim 2010); increases in unemployment due to firm closures; and rising military and security expenditures (Greenbaum et al. 2006; Goldstein 2005; Omay et al. 2013). A terror-targeted country bears the economic costs not only within its domestic borders but also in its international engagements. Terror incidents reduce tourism revenues (Eisinger 2004; Frey et al. 2007; Drakos and

Kutan 2003; Feridun 2016) and foreign direct investment inflows (Enders and Sandler 1993; Omay et al. 2013) and increase transaction costs in bilateral trade (Frey et al. 2007; Mirza and Verdier 2008).

Intangible costs of terrorism include, but are not limited to, reduced standard of living, increased level of stress, and emotional harm. Intangible costs include loss of individual well-being, which is measured by various specifications. Mitchell et al. (2005) define well-being as the difference between all sources of satisfaction and all sources of apprehension. Therefore, well-being may be defined in the context of individual satisfaction, which could be affected by terrorism. One branch of literature discusses the relationship between life satisfaction and terrorism. The findings indicate that incidences of terror directly lead individuals to state lower levels of life satisfaction in terror-targeted countries (Frey et al. 2007; Vorsina et al. 2017; Romanov et al. 2012). Recently, Yildirim et al. (2016) report that terrorism is detrimental to individual happiness of Turkish citizens and that individual happiness levels are lower in the eastern and southeastern provinces of Turkey. Moreover, terrorism has adverse impacts on life quality by worsening health outcomes. For instance, researchers found that mental health outcomes and stress levels of United States citizens were affected by the September 11, 2001, terrorism events (Richman et al. 2008; Galea et al. 2002; Schuster et al. 2001). Similarly, Bleich et al. (2003) found that individuals who were exposed to a terror incident exhibited at least one of the symptoms of depression in Israel.

Although the tangible costs of terrorism are frequently analyzed, analysis of intangible costs would provide fruitful information. This article focuses on the well-being costs of terrorism at the individual level by constructing a link between terrorism and health outcomes of individuals in Turkey. Terrorism has been a persistent issue in Turkey for decades, with both domestic and international-level attacks.[1] According to the Institute for Economics and Peace (IEP) (2017), Turkey has the highest number of deaths from terrorism among members of the Organization for Economic Cooperation and Development (OECD) in the past decade. The Syrian civil war caused a turmoil in the Middle East and there was an increase in terrorist attacks in Turkey. These events created major difficulties in daily life and negatively affected the mental health of Turkish citizens. Increasing level of fear and stress, inconsistent sleep and work hours, and problems in accessing education, health and transportation services significantly affect the well-being of individuals in the country. This research sets out to explore the association of terrorism with health satisfaction levels of Turkish citizens. Being a crucial component of well-being, health outcomes are highly likely to be affected by terrorism.

In the aftermath of a terror incident, observing the well-being of the society or the region affected by an attack is vital for drawing robust conclusions about its health outcomes. Thus, analysis of "health outcomes of terrorism" at the individual level would provide crucial insights for policy-making processes. Country-level impacts comprise a combination of the terrorist attack's direct effects on primary victims – who profoundly experience the effects of an attack – and its indirect effects on collateral victims in society at large. Public health policies of governments include programs for "preparedness against terrorism" in order to deal with short and long-term health implications. Threat of terror causes significant changes in both policy making and budget allocation decisions of governments. For instance, the United States made significant changes in federal budget allocation after the September 11 World Trade Center terrorist attack (Sidel and Levy 2003). Given that even the possibility of a future terrorist attack leads to changes in resource allocation, establishment of public medical organizations, and budget planning by governments, it should be acknowledged that presence of terrorism affects public health and economic policies of terror-targeted countries.

In addition to policy-making and resource allocation costs in the short run, terrorism potentially causes long-term economic costs related to formation of human capital and intergenerational transfers. In this regard, terrorism creates additional economic costs through its adverse impacts on individual-level health and educational outcomes. Researchers have found that the presence of conflict and violence leads to lower birth weights (Camacho 2008); lower fertility rates (Berrebi and Ostwald 2014); worsening of mental

[1] Ocal and Yildirim (2010) provide an excellent review of the history of terrorism in Turkey.

health (Bleich et al. 2003); lower educational attainment and resources (Black et al. 2007); and lower educational performance (Kibris 2015; Bruck et al. 2014; Shany 2016). These adverse effects of terrorism on early life outcomes and educational performance measures have repercussions on later life outcomes such as labor market performance at individual level and human capital formation at aggregate level. Even though the literature provides evidence for associations between terrorism and individual-level mental health outcomes and country-level macroeconomic indicators, research on the indirect impacts of terrorism on economic well-being through the link between health and economic outcomes of individuals is sparse. Hence, this study sets out to complement prior research by exploring health effects of terrorism for Turkish case.

A substantial body of literature focuses on determinants of objective and subjective health outcomes for individuals. The findings suggest that socioeconomic conditions and demographics such as income, education, employment status, gender, race, and age are significantly correlated with health outcomes (Gächter et al. 2012; Idler and Benyamini 1997; Denton and Walters 1999; Marmot et al. 1997; Case and Deaton 2005; Soytas and Köse 2014; Williams et al. 1997). Another branch of literature investigates the determinants of life satisfaction in Turkey and finds that income level, employment status, demographics, trust in public institutions, relative income level, relative consumption level, future expectations, and terrorism are significantly associated with life satisfaction of Turkish citizens (Selim 2008; Ekici and Koydemir 2014; Dumludag 2013; Caner 2014; Yildirim et al. 2016). Although the literature offers many determinants for self-rated health and life satisfaction levels, there is a lack of research focusing on the health effects of terrorism. This study combines an individual-level and a province-level data set to conduct an empirical analysis of the association between self-rated health satisfaction and exposure to terror incidents in Turkey.

The individual-level data set for this research is obtained from the 2013 Life Satisfaction Survey (LSS) conducted by the Turkish Statistical Institute (TSI). Province-level data were constructed for eighty-one provinces using the Global Terrorism Database (GTD) for terror measures and TSI regional statistics for province-level measures. Given the nested structure of the data at individual and province levels, a multilevel ordered logit estimation framework is employed on account of the ordered nature of the health satisfaction measure as the dependent variable. Empirical results indicate that exposure to terrorism is associated with lower health satisfaction of Turkish individuals. In addition, demographics, household-level, and province-level variables are significantly correlated with health satisfaction. Females and older people are less likely to be satisfied with their health status. On the other hand, education level, income level and being employed are positively correlated with health satisfaction. Additional factors such as new parenthood in the last year and being interested in health-related issues have positive correlations with health satisfaction of Turkish citizens. Any increase in the housing floor area per person is positively associated with level of health satisfaction. Regarding province-level variables, individuals living in provinces with higher school attendance and higher per capita GDP are more likely to report higher health satisfaction. The findings of the present research suggest that terrorism has a significant relationship with health outcomes of individuals; which in the longer term would be reflected in economic decision-making processes of households and overall economic activity of the society.

1. Theoretical Background

Terrorism may have an impact on health satisfaction of individuals both through physical damage and psychological effects on the society. Since terrorist attacks use lethal weapons, explosives, chemical substances, and incendiaries, they may have irremediable consequences for individuals' health status such as fatalities, non-fatal injuries and other diseases. Prior research finds that disaster-related physical and mental symptoms (including cancer, embolism, asthma, other respiratory diseases, gastroesophageal reflux, depression, emotional distress, post-traumatic stress disorder [PTSD], and behavior disorder) can last five to ten years after the date of event (North et al. 1999; Pfefferbaum et al. 2001; Stellman et al. 2008; Brackbill et al. 2009).

Economic impacts of terrorism can be also explained through its intergenerational health effects on human

capital accumulation. After considering labor market performance measures and health outcomes in later stages of life, previous research finds that birth-weight is a significant predictor. Low birth-weight causes not only type II diabetes, heart and lung diseases (Almond et al. 2005) but also results in lower cognitive abilities, lower intelligence quotient and learning disorders (Couzin 2002). Regarding sources of low birth-weight, statistical evidence illustrates that exposure to violence and conflicts during the first trimester of pregnancy diminishes birth-weight due to increased stress hormone in the mother's body (Camacho 2008). Hence, long-run impacts of terrorism are associated with human capital formation and future labor market outcomes. Poor health status, psychological stress and welfare concerns due to exogenous shocks are found to be significant determinants of individuals' decisions to get married, to have children, and to migrate for job opportunities (Blanc 2004; Woldemicael 2008; Guha-Sapir and D'Aoust 2011). Existing research indicates an association between fertility levels and social conflicts. Considering terrorism as an exogenous shock for societies, Berrebi and Ostwald (2014) suggest that terrorism first reduces female labor force participation rates and then constitutes a psychological stress leading to lower levels of fertility. Thus, both current and future formation of human capital level and labor market conditions are affected by terror incidents.

As a crucial component of human capital formation and other individual economic decision-making processes, educational outcomes are also affected by terrorist attacks. For instance, Black et al. (2007) show that in Israel lower levels of schooling attainment, increases in alcohol consumption, cigarette smoking and cannabis use are directly correlated with terror attacks. Kibris (2015) finds that university entrance exam scores of Turkish students living in provinces where the intensity of Turkish-Kurdish conflict is high are negatively affected by those events. On the other hand, evidence on the second Intifada period in Israel shows that terror attacks reduce not only school attendance rates due to fear, but also lower the probability of passing final high school exams for enrolling at a university (Bruck et al. 2014; Shany 2016). These studies emphasize that violence and conflicts lead to impairments in academic performance through two channels: serious deteriorations in psychological well-being of students resulting in lower educational attainment, and reduced education quality stemming from difficulties in attracting teaching staff and resources for particular regions.

There is also well-established relationship between health status and education level of individuals. Considering the fact that future economic outcomes depend on early life conditions, researchers argue that increasing levels of mental health disorder, safety concerns, and greater poverty in conflict-affected populations lead to reductions in access to education and affect long-term human capital stock (Lai and Thyne 2007; Gates et al. 2012; Poirier 2012; Shields and Paulson 2015). The presence of terrorism may interact with this relationship in the Turkish case, in the sense that exposure to terrorism can indirectly affect health outcomes and income levels making individuals unable to meet the cost of education or making them feel too anxious to attend educational institutions.

Demographic variables are associated with health status of individuals. Due to deterioration of health over time, older people are more likely to face health issues. Existing research finds an inverse association between age and health outcomes for several countries (Hu et al., 2016; Deeks et al. 2009). Growing older may thus be considered a natural fact of life that makes individuals less satisfied with their health outcomes. On the other hand, there are significant gender differences in health outcomes (Gächter et al. 2012; Soytas and Köse 2014). Terrorism may also cause women to report higher levels of dissatisfaction with their health outcomes. In addition to reduced fertility levels and lower birth weights stemming from terrorism-related stress hormones (Wadhwa et al. 1993; Rondo et al. 2003; Camacho 2008), some studies suggest that parental desire to protect daughters from social conflict may result in girls dropping out of school due to fear of rape, abduction, and rebellion (Shemyakina 2011; Singh and Shemyakina 2016; Buvini et al. 2014). Hence, health satisfaction of Turkish females may be related to job losses, lower income levels, and lower educational attainment associated with conflict and violence in parts of the country.

Previous studies reveal that married individuals are more likely to be both mentally and physically healthy (Kiecolt-Glaser and Newton 2001; Robles and

Kiecolt-Glaser 2003). Employment status is associated with health outcomes (Ross and Mirowsky 1995; Case and Deaton 2005). Employed individuals are more likely to have health insurance and access to health services. Health literacy of individuals is positively related with health outcomes (Berkman et al. 2011; DeWalt and Hink 2009). Moreover, research indicates that parents and non-parents have different health outcomes (Umberson 1987) and that subjective health status is inversely correlated with use of medical services (Miilunpalo et al. 1997). Household resources, such as household income level, have significant associations with health outcomes of individuals (Smith 1999; Ettner 1996). The literature also discusses impacts of changing family size on health outcomes (Lundborg et al. 2014; Solari and Mare 2012). Smaller house size may cause individuals to live with other family members in an overcrowded and unhygienic setting. Crowded housing conditions may lead to spread of infectious diseases and worse health outcomes (Krieger and Higgins 2002).

In addition to quantifying level of terrorism and health satisfaction of individuals, this study therefore considers control variables at individual level, household level, and province level. Variables of interest and details of corresponding data are presented in the next section.

2. Data and Empirical Approach

This article exploits individual-level survey data from the 2013 Life Satisfaction Survey conducted by the Turkish Statistical Institute. Unlike previous surveys, this version of the data set provides province-level information on current location of participants and includes a significantly higher number of participants. Other versions of the data set have fewer participants and do not release location information, thus precluding panel data analysis at province level. The survey was conducted with adults aged 18 or older. It gathered data from 196,203 individuals in 125,720 households throughout Turkey. The questionnaire included 312 questions; 239 at individual level and 73 concerning household characteristics. Face-to-face interviews were conducted with individuals in participating households.

As the main focus of this study is health outcome of individuals, self-reported health satisfaction is the dependent variable for empirical analysis. In the survey, health satisfaction of individuals is measured on a Likert scale of 1 to 5, with 1 indicating "very satisfied" and 5 indicating "not satisfied at all." For ease of interpretation, and following the related literature, coding of the dependent variable is reversed, with 1 indicating "not satisfied at all" and 5 indicating "very satisfied." In order to analyze the relationship between terrorism and self-reported health, terrorism indexes were constructed for 81 provinces in Turkey using the Global Terrorism Database (GTD). The GTD provides detailed information on terrorism events throughout the world. This study considers four indicators of terrorism to establish terrorism indexes by province and year: (1) number of terror incidents, (2) number of fatalities, (3) number of injuries, and (4) occurrence of property damage. Detailed descriptions of these variables are provided in the Appendix, Table A1.

Table 1: Terrorism statistics in Turkey

	2011	2012	2013
Number of incidents	51	184	41
Number of fatalities	25	248	83
Number of injuries	110	490	192
Presence of property damages	24	61	25
Number of provinces	20	24	13

Source: The Global Terrorism Database (GTD 2016).

Table 1 shows terrorism indicators for Turkey across three years. There was a rise in the level of terrorism in Turkey in 2012, with 184 incidents in 24 provinces resulting in 248 deaths and 490 injuries. 2011 and 2013 saw relatively lower number of incidents, 51 and 41 respectively. The figures for fatalities, injuries and property damages are also relatively lower in 2011 and 2013.

Province-level terrorism indexes for 2011, 2012, and 2013 were constructed using principal component factor analysis. Table 2 presents corresponding eigenvalues and factor loadings for terrorism indexes. For all years, the factor solutions with the highest eigenvalues were retained for construction of terrorism indexes. These factor solutions account for 64, 84 and 66 percent of variation in terrorism indicators for 2011, 2012 and 2013 respectively. Additionally, all factor

Table 2: Principal factor component analysis for terrorism indexes

	2011	2012	2013
	Eigenvalues	*Eigenvalues*	*Eigenvalues*
Factor 1	2.56026	3.38851	2.65778
Factor 2	0.98404	0.41263	1.22567
Factor 3	0.36112	0.16858	0.10013
Factor 4	0.09458	0.03027	0.01643
	Factor loadings	*Factor loadings*	*Factor loadings*
Number of incidents	0.8831	0.9678	0.7746
Number of fatalities	0.5763	0.9301	0.8346
Number of injuries	0.8382	0.8833	0.8408
Presence of property damages	0.8635	0.8981	0.8090
Cronbach's alpha	**0.8038**	**0.9394**	**0.8313**

Source: The Global Terrorism Database (GTD 2016).

loadings are greater than 0.57 and satisfy reliability conditions suggested by the literature (Hair et al. 1998; Stevens 2012; Tabachnick and Fidell 2007). Finally, Cronbach's Alpha values, given in Table 2, are higher than 0.80 indicating that the constructed measures of terrorism demonstrate high levels of reliability and internal consistency. The calculated terrorism indexes are rescaled between 1 (lowest level of terrorism) and 10 (highest level of terrorism). Thus, a higher terrorism index indicates higher exposure to terrorism in the corresponding province. In order to account for cumulative and longer-lasting effects of terrorism, this paper considers empirical models with terrorism indexes for 2011, 2012 and 2013. Moreover, additional estimates are provided with an average terrorism index which is the simple average of terrorism indexes for the corresponding years. Empirical results indicate that association of terrorism with health satisfaction is robust with respect to choice of the year for terrorism index.

In addition to the main variables of interest, the empirical approach of this study considers control variables at individual level, household level and province level. Individual-level control variables include age, gender, education level, marital status, employment status, interest in health issues, and utilization of health services. Household income and housing floor area per person are household-level measures. Province-level controls for economic conditions, education services and health services include variables such as GDP per capita, schooling ratio, hospital beds per capita, and population per family doctor. Detailed descriptions and summary statistics of all variables used in the analysis are summarized in the Appendix (Table A1 and Table A2).

Table 3 presents the distribution of respondents across all levels of health satisfaction for a selection of explanatory variables. The mean age in the sample is 44.29 with a minimum of 18 and a maximum of 99. The mean health satisfaction score is 3.57 with a standard deviation of 0.89. 62.96 percent of survey participants report that they are "satisfied" with their health while 13.83% are "not satisfied." Females constitute 57.66 percent of the sample. 58.75 percent of females state that they are "satisfied" with their health status whereas 16.63 percent are "not satisfied". Similarly, 68.69 percent of males indicate that they are "satisfied" and 10.01 percent are "not satisfied". Frequency distributions of health satisfaction categories are different across categories. 62.97 percent of married respondents report that they are "satisfied" and 13.97 percent of are "not satisfied". 72.81 percent of never married respondents are "satisfied" and 6.26 percent are "not satisfied". 45.35 percent of widowed respondents are "satisfied" and 26.16 percent are "not satisfied". Moreover, individual health satisfaction and education level are correlated. 72.82 percent of respondents with graduate degree report being "satisfied" and 5.10 percent are "not satisfied". However, 25.54 percent of respondents with no educational qualifications are "not satisfied" with their health status. Employment status is also associated with health satisfaction. 70.78 percent of employed respondents report that they are "satisfied" with their health status while 59.39 percent of unemployed respondents state that they are "satisfied". The distributions of health satis-

Table 3: Frequency distribution of health satisfaction (%)

	Not satisfied at all	Not satisfied	Moderate	Satisfied	Very satisfied	Total	N
Total	2.45	13.83	14.13	62.96	6.63	100	196,200
Gender							
Female	3.07	16.63	16.15	58.75	5.41	100	113,126
Male	1.61	10.01	11.39	68.69	8.30	100	83,074
Marital status							
Never married	1.05	6.26	8.50	72.81	11.38	100	28,303
Married	2.32	13.97	14.58	62.97	6.16	100	149,506
Divorced	4.11	18.51	17.65	55.13	4.59	100	4,424
Widowed	6.23	26.16	19.55	45.35	2.71	100	13,967
Education level							
No diploma	5.86	25.54	15.82	49.10	3.69	100	39,026
Primary school	2.29	14.39	15.73	62.12	5.46	100	77,360
Middle school	1.33	8.58	11.43	69.58	9.09	100	24,143
High school	0.93	7.63	11.49	70.71	9.24	100	31,783
Two-year degree	0.72	6.97	12.77	70.48	9.05	100	8,574
Undergraduate degree	0.49	6.23	12.18	71.63	9.46	100	13,412
Graduate degree	0.32	5.10	12.93	72.82	8.83	100	1,902
Employment status							
Employed	0.96	7.92	11.36	70.78	8.98	100	61,408
Unemployed	3.13	16.52	15.39	59.39	5.56	100	134,792
Interest in Health							
Interested	2.44	13.93	13.75	63.11	6.78	100	143,009
Moderately interested	1.79	12.10	16.24	63.51	6.35	100	29,924
Not interested	2.99	14.55	13.40	62.72	6.34	100	21,306
Parenthood within last year							
Had a child	0.88	6.44	9.70	73.23	9.74	100	9,155
Did not have a child	2.53	14.19	14.35	62.46	6.48	100	187,045
Used health services in 2013							
Yes	2.95	16.42	15.86	59.05	5.72	100	135,311
No	1.35	8.07	10.29	71.65	8.65	100	60,889
Household income level							
0–1080 TL	3.58	17.70	14.29	59.11	5.32	100	90,014
1081–1550 TL	2.02	12.66	14.47	63.92	6.93	100	34,045
1551–2170 TL	1.56	11.12	13.93	65.98	7.41	100	29,733
2171–3180 TL	1.25	9.20	14.01	67.04	8.49	100	24,673
3181 TL +	0.71	7.36	13.18	69.93	8.82	100	17,735

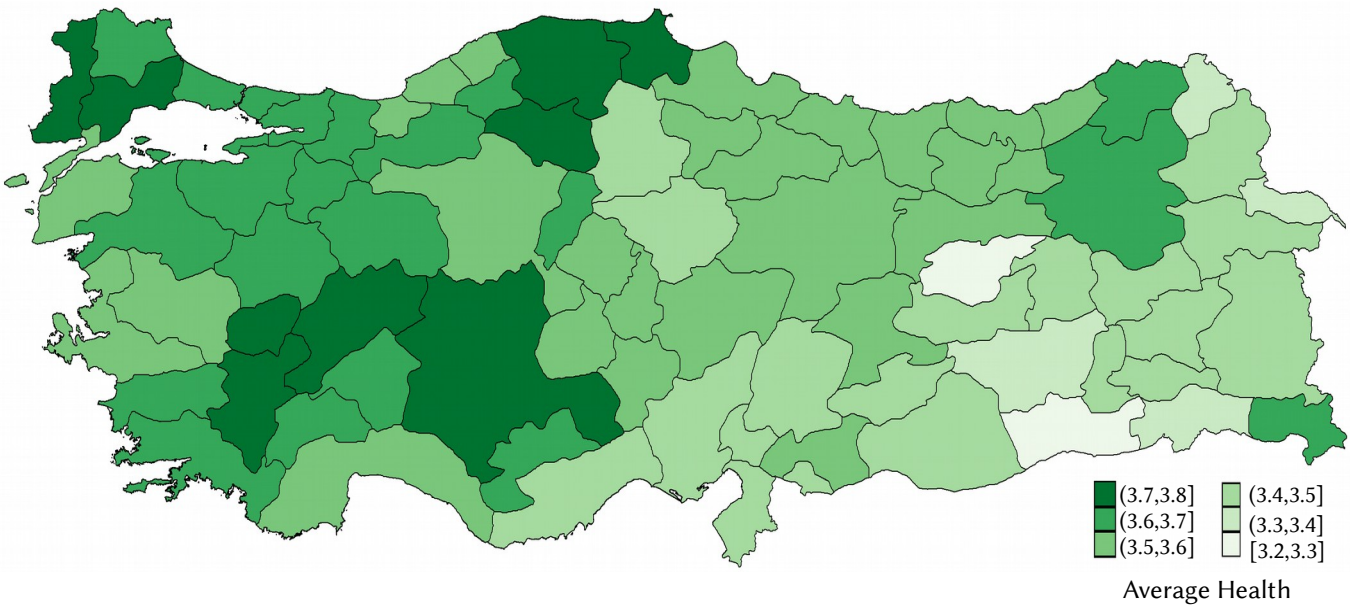
Source: 2013 Life-Satisfaction Survey of Turkish Statistical Institute (TSI 2014).

faction categories are similar across levels of individual's interest in health-related issues. Respondents who became parents in the previous year are more likely to report better health satisfaction levels. Finally, individuals who used health services within the survey year were more likely to report lower health satisfaction levels.

Considering household-level variables, the proportion of individuals reporting higher levels of health satisfaction increases with household income. The average housing floor area per person for the sample is 35.17 m^2 with a minimum of 1.11 m^2 and a maximum of 500 m^2.

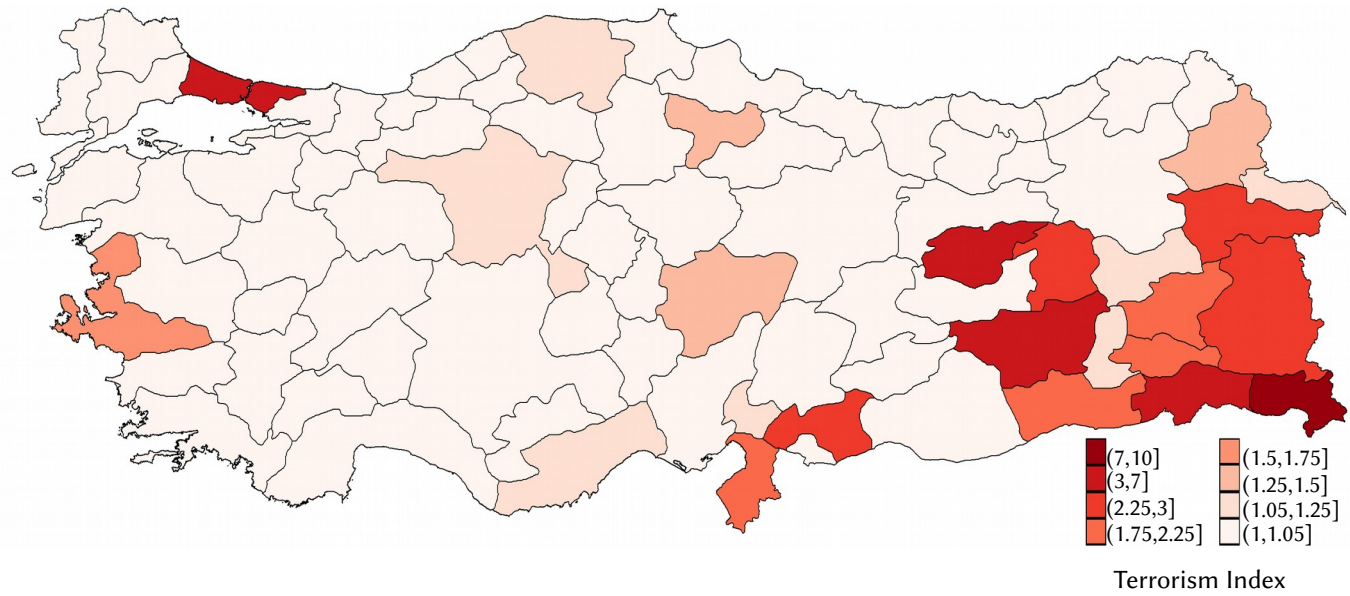
Figure 1 illustrates spatial distribution of average health satisfaction levels for provinces in Turkey. The higher satisfaction scores are observed in provinces located in the middle of Black Sea territory, the East of Aegean area, and the West of Marmara region. At province level, Sinop has the highest average health

Figure 1: Spatial distribution of average health-satisfaction (2013)



Source: 2013 Life-Satisfaction Survey of Turkish Statistical Institute (TSI 2014), Global Administrative Areas Database (GADM), Data Version 3.6.

Figure 2: Spatial distribution of terrorism index (2012)



Source: The Global Terrorism Database (GTD 2016), Global Administrative Areas Database (GADM), Data Version 3.6.

satisfaction with a score of 3.752. The following best scores belong to Cankırı, Tekirdağ, Denizli and Kastamonu with average health satisfaction scores of 3.750, 3.715, 3.706, and 3.705, respectively. Lower health satisfaction scores are observed in the Eastern Anatolia, Southeastern Anatolia, and East Mediterranean regions. Tunceli has the lowest average health satisfaction with a score of 3.276. Mardin, Diyarbakır, Ardahan, and Iğdır follow with average scores of 3.293, 3.315, 3.339 and 3.376, respectively.

As Figure 2 shows terror attacks causing injuries and fatalities are more frequent in the Eastern and South-Eastern regions. The terrorism index at province level is the highest for Hakkari with a score of 10, followed by Şırnak (6.39), İstanbul (4.55), and Diyarbakır (3.21). Terror attacks target not only the Eastern and South-Eastern provinces but also the bigger provinces. For instance, İstanbul is the largest metropolitan province, and ranks third with respect to terrorism index.

Within an ordinal dependent variable, model estimation using Ordinary Least Square (OLS) would result in biased results. OLS requires a continuous dependent variable. The presence of an ordinal response variable violates the fundamental assumption. By ignoring ordered nature of the dependent variable, OLS estimation treats the difference between "not satisfied at all" and "not satisfied" in the same way as the difference between "satisfied" and "very satisfied". Hence, ordered choice frameworks need to be used for estimation, where the response variable is both categorical and ordinal. Moreover, since this paper combines both individual-level and province-level variables, the data exhibit a nested structure. Thus, multi-level treatment of the data with hierarchical models would produce more robust empirical results. In this research, a multi-level ordered logistic regression model is used for empirical analysis. Accounting for nested nature of individual-level and province-level variables, the multi-level ordered logistic framework is more appropriate than a conventional ordered logistic model. Stata 15 was used for data analysis and to estimate random intercept multi-level ordered logit models for health satisfaction in Turkey (StataCorp 2017). Empirical results are presented and discussed in the next section.

3. Empirical Results

Empirical findings are presented in Table 4, in the form of odds ratios for different models. The corresponding coefficients and multi-level ordered logit model statistics are given in the Appendix, Table A3. First, results of likelihood ratio (LR) tests imply that multi-level modeling should be preferred to standard ordered choice models. Wald tests indicate that all models are overall significant. Individual significance levels of estimated coefficients indicate that all individual-level explanatory variables have significant correlations with health satisfaction. At the province level, terrorism index, GDP per capita, and schooling ratio demonstrate significant associations with health satisfaction. Indicators of variance inflation factors (from a corresponding linear model) reveal that there are no serious multicollinearity issues in the empirical models. Furthermore, additional models which account for household-level hierarchy are also estimated for a robustness check of the empirical findings. Estimation results for these models (see Appendix Table A7) are very similar to empirical results provided by Table 4.

Odds ratios from multi-level ordered logistic models are presented in Table 4. All empirical models exhibit a significantly negative relationship between terrorism and health satisfaction in Turkey. Model 1 employs the terrorism index for 2011 and reveals that an instantaneous change in the terrorism index is associated with a 6 percent decline in the odds of reporting a higher level of health satisfaction. Similarly, a unit increase in terrorism index for 2012 is related to a 3.9 percent reduction in the odds of reporting a higher level of health status. A unit rise in the terrorism index for 2013 is correlated with 5.7 percent decline in the odds of reporting higher levels of health satisfaction. Additionally, a change in the average terrorism index over the three-year period is associated with a decrease of 9.99 percent in the odds of reporting better health levels. These findings imply that terrorism has long-lasting impacts on well-being of the society. Consistent with earlier findings (Bleich et al. 2003; Galea et al. 2002; Richman et al. 2008; Schuster et al. 2001), the empirical results of this study show exposure to terrorism to be correlated with health status at the individual level. The findings of this study thus complement the prior research by demonstrating that

Table 4: Multi-level models of health status and terrorism in Turkey: odds ratios

Dependent variable: ***health satisfaction***	***Model 1***	***Model 2***	***Model 3***	***Model 4***
Individual-level variables	*Odds ratio*	*Odds ratio*	*Odds ratio*	*Odds ratio*
Age	0.970***	0.970***	0.970***	0.970***
Female	0.610***	0.610***	0.610***	0.610***
Education	1.058***	1.058***	1.058***	1.058***
Marital status				
Never married	1.120***	1.120***	1.120***	1.120***
Married (base category)	-	-	-	-
Divorced	0.644***	0.644***	0.644***	0.644***
Widowed	0.937***	0.937***	0.937***	0.937***
Employed	1.067***	1.067***	1.067***	1.067***
Parenthood within last year	1.521***	1.520***	1.520***	1.520***
Interest in health	1.070***	1.070***	1.070***	1.070***
Household income	1.109***	1.109***	1.109***	1.109***
Housing floor area per capita	1.003***	1.003***	1.003***	1.003***
Used health services in 2013	0.499***	0.499***	0.499***	0.499***
Province-level variables				
Terrorism index (2011)	**0.940*** **			
Terrorism index (2012)		**0.961#**		
Terrorism index (2013)			**0.943****	
Average terrorism index (2011-2012-2013)				**0.901*** **
(High) schooling ratio	1.002	1.004**	1.004**	1.003*
GDP per capita (in thousands)	1.019*	1.007	1.010	1.014
Hospital beds per thousand capita	1.004	1.003	1.003	1.003
Population per family doctor (in thousands)	0.981	1.016	1.008	1.093

Notes: *** p<0.01, ** p<0.05, * p<0.1, #p<0.15. Source: 2013 Life-Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

individual satisfaction with health status is negatively correlated with exposure to terrorism.

Considering demographics, all the multi-level models provide similar results for individual-level determinants of health satisfaction. Older people are more likely to report lower health status, with a unit increase in age associated with a 3 percent decline in the odds of reporting a higher level of health satisfaction. Consistent with the literature (Gächter et al. 2012; Soytas and Köse 2014), this study finds that Turkish females are 39 percent less likely than Turkish males to report higher levels of health satisfaction. The gender gap in self-rated health status thus extends to health satisfaction at individual level.

In line with the literature (DeWalt et al. 2004), empirical findings of the study show that an increase in years of education is positively correlated with the odds of reporting higher levels of health satisfaction: possessing a higher level of education is associated with a 5.8 percent increase in likelihood of reporting a higher level of health satisfaction. Moreover, consistent with previous studies (Ross and Mirowsky 1995; Case and Deaton 2005), employed respondents are 6.7 percent more likely to report higher levels of health status. The empirical findings indicate that married individuals report lower levels of health satisfaction than "never married" individuals. However, married

respondents report higher levels of health satisfaction than "divorced" and "widowed" individuals.

Individual-level control variables such as becoming a parent and using health services also demonstrate significant associations with health satisfaction. Becoming a parent within the past year correlates positively with health satisfaction whereas using health services in the survey year shows a significant negative relationship with health level. One should note that both relationships are highly likely to suffer from reverse causality. Individuals with less health satisfaction are more likely to employ health services, while healthy individuals are more likely to become parents. Respondents who became parents within the past year, are 52 percent more likely to report higher levels of health status. Respondents who used health services within the survey year are 50.1 percent less likely to have higher levels of health satisfaction. These findings are consistent with the literature (Umberson 1987; Miilunpalo et al. 1997). Moreover, individual interest in health issues is shown to be significantly and positively related to health satisfaction. The greater the individual's interest in health issues, the more likely they are to report higher levels of health satisfaction. This finding supports the findings of prior research that health literacy of individuals is significantly related to health outcomes (Berkman et al. 2011; DeWalt and Hink 2009).

Household conditions are significantly associated with health outcomes. As in the literature (Smith 1999; Ettner 1996), the empirical findings of this study indicate that the odds of reporting higher levels of health status increase by 10.9 percent if there is an increase in income level of the household. Ultimately, higher housing floor area per person correlates positively with the odds of reporting better levels of health satisfaction. Thus, the findings of the current paper support the notion that better housing conditions improve health outcomes.

Province-level conditions are not significantly associated with health satisfaction of individuals, with the exception of terrorism, GDP per capita, and education services. In light of previous literature (Ross and Wu 1995; Cutler and Lleras-Muney 2006; Borgonovi and Pokropek 2016), which provides evidence of a positive relationship between health outcomes and education, the present empirical analysis includes a proxy variable to control for the variation in education at province level. A high schooling ratio is significantly related to health satisfaction of individuals. If an individual lives in a province with a higher schooling rate, they are 0.4 percent more likely to report higher categories of health satisfaction on average. Results for the relationship between health satisfaction and province-level GDP per capita are consistent with the literature (Subramanian et al. 2002) and indicate that lower GDP per capita is associated with lower health satisfaction for 2011. Prior research indicates that higher government health expenditures and services are significantly related to better health outcomes (Bokhari et al. 2007; Bradley et al. 2011). The present empirical results, however, indicate that province-level indicators for health services and government expenditures such as hospital beds per thousand capita and availability of government financed family doctors show no significant relationship with health satisfaction of individuals.

Sensitivity of sub-groups to terrorism is analyzed using a regression model that includes interactions of average terrorism index with individual-level variables. Estimation results of the corresponding model are presented in the Appendix, Table A4. Empirical analysis indicates that older people are more sensitive to terrorism. The level of health satisfaction declines with interaction of age and terrorism index. The findings indicate that the relationship between terrorism and health satisfaction is different for females and males. As exposure to terrorism rises, females tend to report lower health satisfaction compared to males. Health satisfaction of widowed individuals is influenced by exposure to terrorism. As the level of terrorism rises, widowed individuals are more likely to report lower levels of health satisfaction compared to married individuals. Lastly, results show that the poor are more sensitive to terrorism than the rich.

Finally, impacts of continuous exposure to terrorism on health satisfaction of individuals are estimated by additional empirical models. Initially, a sub-sample of provinces which experienced terrorism incidents for three consecutive years (2011, 2012 and 2013) is considered. Empirical findings, reported in the Appendix, Table A5, indicate that only the terrorism index of 2013 is significantly and negatively correlated with health satisfaction of individuals. Health satisfaction

of individuals who repeatedly experience terrorism respond only to the latest incidents. Moreover, sub-samples of individuals who experienced terrorism incidents only in one year are considered for analysis of rare events on health satisfaction. The estimation results (see Appendix Table A6) show that exposure to terrorism only in 2011 is not significantly correlated with health satisfaction in 2013. Additionally, individuals who experienced terrorism incidents only in 2012 report lower health satisfaction in 2013 than those who did not experience terrorism in 2012. These findings are in line with earlier results (Yechiam et al. 2005) and imply that behavioral responses to rare terrorism incidents are different than responses to repeated incidents.

Combined with findings of Yildirim et al. (2016), this study implies that terrorism has significantly negative correlations with both life satisfaction and health satisfaction. It thus confirms the findings of earlier research by providing additional evidence for a significantly negative relationship between terrorism and measures of welfare at the individual level (Frey et al. 2007; Vorsina et al. 2017; Romanov et al. 2012). Overall, the findings of this study expand knowledge on the indirect costs of terrorism for society both in the shorter and the longer term. Researchers and policy-makers should therefore not only account for the indirect costs of terrorism but also focus on its consequences over time.

4. Conclusion

Terrorism has devastating effects on tangible and intangible values. These human-caused incidents spread harmfully and their impacts are not limited to victims and survivors who experience the event directly. Given that terror attacks are unforeseen events, individuals are unconsciously exposed to anxiety, fear and anger in their daily lives. Terrorism may have substantial effects on different dimensions of life. Prior empirical research agrees that terrorism has a variety of inevitable costs, including economic, political and psychological impacts. Turkey, as a country targeted by terror for many years, has been enduring the costs of terrorism.

This paper explores health effects of terrorism in Turkey by combining micro-data at individual level and macro-data at province level. The empirical strategy focuses on quantifying the relationship between health satisfaction of individuals and a province-level terrorism index. Although macro-level effects of terrorism are well-documented, individual-level analysis of health outcomes is limited. This article adds to the literature on measuring the costs of terrorism by providing evidence on intangible costs and complements studies seeking to establish a link between terrorism and life satisfaction as a measure of welfare.

Due to the hierarchical structure of the data and the ordered nature of the self-reported health satisfaction measure, multi-level ordered choice models were employed for empirical estimation. The empirical results of a multi-level ordered logistic model show that terrorism is negatively associated with health satisfaction. Furthermore, consistent with the literature, demographics and household-level variables demonstrate significant correlations with health status. Women and older people are less likely to be satisfied with their health status. Employed respondents are more likely to be satisfied, and marital status significantly correlates with health satisfaction. Education level, being a new parent, and level of interest in health issues are positively associated with health satisfaction. Individuals who used health services within the survey year are more likely to have lower satisfaction levels. Household income and housing floor area per person exhibit positive correlations with individual health satisfaction. Moreover, province-level indicators for education and GDP per capita are significantly and positively associated with individual-level health satisfaction. However, number of hospital beds capita and number of family doctors per capita are not related to health satisfaction.

Overall, this study demonstrates that terrorism has indirect effects on economic well-being through the link between health and economic outcomes of individuals. Since exposure to terrorism has repercussions on health outcomes, these effects would be reflected in human capital formation through intergenerational transfers and educational outcomes of current and future generations. This research suggests that in addition to its economic costs, terrorism has health-related costs for society. Thus, policy-makers should pay greater attention to organizing individual-based policies to tackle adverse effects of terrorism both in the short run and in the long run.

Finally, this study is not without limitations and its findings should be interpreted accordingly. First, health outcomes of individuals are measured by self-reported health satisfaction levels rather than objective measures of health. By the nature of survey data, this study may be subject to reporting biases of individuals. Moreover, the survey data used in this study is not able to account for lives lost, and thus underestimates the health effects. Based on a cross-sectional data set, this study is not able to account for changes in health satisfaction over time. Findings of the current study display correlations among variables of interest. Exploration of causal mechanisms for associations of health satisfaction with terrorism and other variables is beyond the scope of this study. Further research is needed for identification of causality frameworks. Future studies may also focus on panel data and analyze the time dimension of changes in health satisfaction with respect to terrorism.

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Appendix Tables

Table A1: Description of variables

Variable	Description
Individual-level variables	
Health satisfaction	Measures the respondent's satisfaction from his/her health level by a self-rated Likert scale. 1="Not satisfied at all"; 2="Not satisfied"; 3="Moderate"; 4="Satisfied" and 5="Very satisfied".
Age	Age reported by respondents, 18 or older.
Female	1=Female; 0=Male.
Education level	No diploma=0; Primary school=1; Middle school=2; High school=3; Two-year degree / Associate degree=4; Undergraduate / college degree=5; Graduate degree=6
Marital status	Categorically measures marital status. 1=Single; 2=Married; 3=Divorced; 4=Widowed
Employed	1=Employed, 0=Other
Parenthood within last year	1=If the respondent had a child within the last year; 0=Other
Interest in health	Measures the respondent's interest in health related issues. 1=Not interested, 2=Moderately interested, 3=Interested
Household income	Monthly household income measured in following categories: Level 1: 0–1080 TL; Level 2: 1081–1550 TL; Level 3: 1551–2170 TL; Level 4: 2171–3180 TL; Level 5: 3181 TL +
Housing floor area per capita	Per capita housing area is the ratio of house size (measured in m^2) to household size (measured by number of individuals living in house).
Used health services in 2013	1=If the respondent used a health service in 2013; 0=Other
Province-level variables	
Terrorism index	Terrorism index is constructed by principal component analysis. It includes four variables: number of terror incidents, number of fatalities, number of injuries and presence of property damage, in each province for the given year. Average terrorism index is calculated as simple average of terrorism indexes across the corresponding years. Terrorism index is rescaled between 1 (lowest level) and 10 (highest level).
Number of incidents	Measures total number of terrorist incidents in the province during a given year.
Number of fatalities	Measures total number of all confirmed victims and attackers who died as a direct result of the incident.
Number of injuries	Measures the number of confirmed non-fatal injuries to both perpetrators and victims.
Presence of property damages	Measures the presence of property damage from the incident. 1 = The incident led to property damage. 0 = The incident did not lead to property damage.
(High) schooling ratio	Ratio of number of high school students to high school–age population.
GDP per capita	GDP per capita for the province is nominally measured in thousand dollars.
Hospital beds per thousand capita	Measured by the ratio of total hospital beds in the province to population of province in thousand units.
Population per family doctor	Measured by ratio of total province population in thousands to number of family doctors in province.

Source: 2013 Life-Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

Table A2: Descriptive statistics

Variable	N	Mean	Standard deviation	Min.	Max.
Individual-level variables					
Health satisfaction	196,200	3.57	0.89	1	5
Age	196,200	44.29	16.38	18	99
Female	196,200	0.58	0.49	0	1
Never married	196,200	0.144	0.35	0	1
Married	196,200	0.762	0.43	0	1
Divorced	196,200	0.023	0.15	0	1
Widowed	196,200	0.071	0.26	0	1
Education level	196,200	1.70	1.49	0	6
Employed	196,200	0.31	0.46	0	1
Parenthood within last year	196,202	0.05	0.21	0	1
Interest in health	194,239	2.63	0.67	1	3
Household income	196,200	2.22	1.37	1	5
Housing floor area per capita	196,200	35.17	22.27	1.11	500
Used health services in 2013	196,200	0.69	0.46	0	1
Province-level variables					
Terrorism ındex_2011	81	1.79	1.89	1.00	10.00
Terrorism ındex_2012	81	1.44	1.29	1.00	10.00
Terrorism ındex_2013	81	1.35	1.21	1.00	10.00
(High) schooling ratio	81	42.00	23.52	2.00	82.00
GDP per capita (in thousands)	81	9.48	3.34	4.11	20.73
Hospital beds per thousand capita	81	26.01	8.54	12.40	51.20
Population per family doctor (in thousands)	81	3.50	0.23	2.91	4.27

Source: 2013 Life-Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

Table A3: Multilevel models of health status and terrorism in Turkey: coefficients

Dependent variable: ***health satisfaction***	***Model 1***	***Model 2***	***Model 3***	***Model 4***
Individual-level variables	*Coefficient*	*Coefficient*	*Coefficient*	*Coefficient*
Age	−0.0304***	−0.0304***	−0.0304***	−0.0304***
	(0.000417)	(0.000417)	(0.000417)	(0.000417)
Female	−0.495***	−0.495***	−0.495***	−0.495***
	(0.0113)	(0.0113)	(0.0113)	(0.0113)
Education	0.0565***	0.0566***	0.0566***	0.0566***
	(0.00445)	(0.00445)	(0.00445)	(0.00445)
Marital status				
Never married	0.1136***	0.1135***	0.1134***	0.1137***
	(0.0166)	(0.0166)	(0.0166)	(0.0166)
Married (base category)	-	-	-	-
Divorced	−0.4397***	−0.4398***	−0.4397***	−0.4398***
	(0.0306)	(0.0306)	(0.0306)	(0.0306)
Widowed	−0.0651***	−0.0651***	−0.0652***	−0.0651***
	(0.0195)	(0.0195)	(0.0195)	(0.0195)
Employed	0.0644***	0.0646***	0.0646***	0.0644***
	(0.0123)	(0.0123)	(0.0123)	(0.0123)
Parenthood within last year	0.4191***	0.419***	0.419***	0.419***
	(0.0243)	(0.0243)	(0.0243)	(0.0243)
Interest in health	0.0678***	0.0678***	0.0678***	0.0678***
	(0.00713)	(0.00713)	(0.00713)	(0.00713)
Household income	0.1035***	0.1034***	0.1034***	0.1035***
	(0.00415)	(0.00415)	(0.00415)	(0.00415)
Housing floor area per capita	0.00306***	0.00305***	0.00306***	0.00305***
	(0.000238)	(0.000237)	(0.000237)	(0.000237)
Used health services in 2013	−0.695***	−0.695***	−0.695***	−0.695***
	(0.0109)	(0.0109)	(0.0109)	(0.0109)
Province-level variables				
Terrorism index (2011)	**−0.0615*** (0.0150)**			
Terrorism index (2012)		**−0.0397# (0.0251)**		
Terrorism index (2013)			**−0.0583** (0.0239)**	
Average terrorism index (2011-2012-2013)				**−0.1034*** (0.0262)**
(High) schooling ratio	0.00238	0.00432**	0.00437**	0.00301*
	(0.00177)	(0.00183)	(0.00179)	(0.00174)
GDP per capita (in thousands)	0.0192*	0.00746	0.0098	0.0139
	(0.0107)	(0.0113)	(0.0111)	(0.0106)
Hospital beds per ten thousand capita	0.0043	0.00325	0.00331	0.00346
	(0.00344)	(0.00372)	(0.00364)	(0.00346)
Population per family doctor (in thousands)	−0.019	0.0236	0.0080	0.0891
	(0.130)	(0.152)	(0.142)	(0.137)
Number of observations (N)	194,239	194,239	194,239	194,239
Number of provinces	81	81	81	81
LR test (vs. ordered logit model)	1,740.49***	2,148.05***	2,026.38***	1,841.65***
Wald χ^2	23,408.69***	23,398.96***	23,399.81***	23,408.64***
Maximum VIF	2.52	2.27	2.14	2.38

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, #p<0.15. Source: 2013 Life Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016). Variance Inflation Factors (VIF) are based on the corresponding linear model.

Table A4: Multilevel model of health status and terrorism in Turkey: model with ınteraction effects

Dependent variable: ***health satisfaction***	***Model 1***
Individual-level variables	*Odds ratio*
Age	0.974***
Female	0.629***
Education	1.068***
Marital status	
Never married	1.144***
Married (base category)	-
Divorced	0.617***
Widowed	1.016
Employed	1.064***
Parenthood within last year	1.558***
Interest in health	1.055***
Household income	1.097***
Housing floor area per capita	1.003***
Used health services in 2013	0.490***
Interaction terms	
Average terrorism index*Age	0.998***
Average terrorism index*Female	0.983**
Average terrorism index*Education	0.996
Average terrorism index*Never married	0.984
Average terrorism index*Divorced	1.026
Average terrorism index*Widowed	0.949***
Average terrorism index*Employed	1.002
Average terrorism ındex*Parenthood within last year	0.984
Average terrorism index*Interest in health	1.008
Average terrorism index*Household income	1.006**
Average terrorism index*Housing floor area per capita	1.0001
Average terrorism ındex*Used health services in 2013	1.011
Province-level variables	
Average terrorism index (2011-2012-2013)	0.975
(High) schooling ratio	1.003*
GDP per capita (in thousands)	1.014
Hospital beds per thousand capita	1.003
Population per family doctor (in thousands)	1.090
Number of observations (N)	194,239
Number of provinces	81
LR test (vs. ordered logit model)	1,771.21***
Wald χ^2	23,539.83***

Notes: *** p<0.01, ** p<0.05, * p<0.1 Source: 2013 Life Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

Table A5: Multilevel model of health status and terrorism in Turkey: cities exposed to terrorism for three consecutive years (2011-2012-2013)****

Dependent variable: ***health satisfaction***	***Model 1***	***Model 2***	***Model 3***
Individual-level variables	*Odds ratio*	*Odds ratio*	*Odds ratio*
Age	0.965***	0.965***	0.965***
Female	0.607***	0.607***	0.607***
Education	1.056***	1.056***	1.056***
Marital status			
Never married	1.065*	1.065*	1.065*
Married (base category)	-	-	-
Divorced	0.670***	0.671***	0.670***
Widowed	0.841***	0.841***	0.842***
Employed	1.048*	1.048*	1.047*
Parenthood within last year	1.406***	1.405***	1.406***
Interest in health	1.084***	1.085***	1.084***
Household income	1.122***	1.123***	1.123***
Housing floor area per capita	1.003***	1.003***	1.003***
Used health services in 2013	0.512***	0.512***	0.512***
Province-level variables			
Terrorism index (2011)	0.966	-	-
Terrorism index (2012)	-	1.048	-
Terrorism index (2013)	-	-	0.811***
(High) schooling ratio	0.992	0.995	0.9995
GDP per capita (in thousands)	1.043*	1.034	1.012
Hospital beds per thousand capita	1.022	1.025*	1.023**
Population per family doctor (in thousands)	1.051	1.016	2.285***
Number of observations (N)	39,269	39,269	39,269
Number of provinces	11	11	11
LR test (vs. ordered logit model)	248.97***	261.95***	81.93***
Wald χ^2	5337.89***	5338.12***	5356.78***

Notes: *** p<0.01, ** p<0.05, * p<0.1 Source: 2013 Life Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

Eleven provinces experienced terrorism incidents in all three years (2011, 2012 and 2013): Ankara, Bingöl, Bitlis, Diyarbakır, Hakkari, Mardin, Siirt, Tunceli, İstanbul, İzmir, Şırnak.

****Few provinces experienced terror incidents in two consecutive years only. Three provinces (Batman, Mersin and Van) had terror incidents in only 2011 and 2012. Two provinces (Ağrı and Hatay) had terror incidents in only 2012 and 2013. Due to low levels of variation in data, models for two consecutive years are not estimated.

Table A6: Multilevel model of health status and terrorism in Turkey: cities exposed to terrorism for only one year

Dependent variable: ***health satisfaction***	***Model 1 (2011)***	***Model 2 (2012)***	***Model 3**** (2013)***
Individual-level variables	*Odds ratio*	*Odds ratio*	*Odds ratio*
Age	0.968***	0.967***	-
Female	0.575***	0.572***	-
Education	1.081***	1.033**	-
Marital status			
Never married	1.041	1.139**	-
Married (base category)	-	-	-
Divorced	0.611***	0.601***	-
Widowed	0.837***	0.963	-
Employed	1.103**	0.947	-
Parenthood within last year	1.352***	1.541***	-
Interest in health	1.064***	1.002	-
Household income	1.122***	1.141***	-
House area per capita	1.003***	1.002***	-
Used health services in 2013	0.500***	0.563***	-
Province-level variables			
Terrorism index (2011)	0.972	-	-
Terrorism index (2012)	-	0.830***	-
Terrorism index (2013)	-	-	-
(High) schooling ratio	1.014***	1.018***	-
GDP per capita (in thousands)	0.977**	0.899***	-
Hospital beds per thousand capita	0.983***	1.038***	-
Population per family doctor (in thousands)	1.239	4.046***	-
Number of observations (N)	18,699	15,107	-
Number of provinces	6	8	-
LR test (vs. ordered logit model)	0.00⁂	0.00⁂	-
Wald χ^2	2603.15***	2104.63***	-

Notes: *** p<0.01, ** p<0.05, * p<0.1 Source: 2013 Life Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).

****No provinces experienced terrorism incidents only in 2013.

Eight provinces experienced terrorism incidents only in 2012: Amasya, Gaziantep, Iğdır, Kars, Kastamonu, Kayseri, Muş, Osmaniye.

Six provinces experienced terrorism incidents only in 2011: Adana, Antalya, Elazığ, Kocaeli, Kırıkkale, Şanlıurfa.

⁂ Due to low variation in number of provinces, multi-level models are equivalent to linear models. Thus, estimation results for province-level variables should be interpreted cautiously.

Table A7: Multilevel models of health status and terrorism in Turkey: Odds ratios with household level-hierarchy

Dependent variable: ***health satisfaction***	***Model 1***	***Model 2***	***Model 3***	***Model 4***
Individual-level variables	*Odds ratio*	*Odds ratio*	*Odds ratio*	*Odds ratio*
Age	0.967***	0.967***	0.967***	0.967***
Female	0.584***	0.584***	0.584***	0.584***
Education	1.064***	1.064***	1.064***	1.064***
Marital status				
Never married	1.130***	1.130***	1.130***	1.130***
Married (base category)	-	-	-	-
Divorced	0.626***	0.626***	0.626***	0.626***
Widowed	0.935***	0.935***	0.935***	0.936***
Employed	1.071***	1.072***	1.072***	1.071***
Parenthood within last year	1.580***	1.579***	1.579***	1.580***
Interest in health	1.072***	1.072***	1.072***	1.072***
Household income	1.122***	1.122***	1.122***	1.122***
Housing floor area per capita	1.003***	1.003***	1.003***	1.003***
Used health services in 2013	0.472***	0.472***	0.472***	0.472***
Province-level variables				
Terrorism index (2011)	**0.933*** **			
Terrorism index (2012)		**0.956#**		
Terrorism index (2013)			**0.937****	
Average terrorism index (2011-2012-2013)				**0.890*** **
(High) schooling ratio	1.003	1.005**	1.005**	1.003*
GDP per capita (in thousands)	1.022*	1.008	1.011	1.016
Hospital beds per thousand capita	1.005	1.003	1.004	1.004
Population per family doctors (in thousands)	0.989	1.03	1.02	1.116
Number of observations (N)	194,239	194,239	194,239	194,239
Number of provinces	81	81	81	81
Number of households	102,620	102,620	102,620	102,620
LR test (vs. ordered logit model)	3307.74***	3714.92***	3593.31***	3407.92***
Wald χ^2	20 780.42***	20 772.93***	20 773.60***	20 780.45***

Notes: *** p<0.01, ** p<0.05, * p<0.1, #p<0.15. Source: 2013 Life Satisfaction Survey of Turkish Statistical Institute (TSI 2014); Regional Statistics of Turkish Statistical Institute (TSI 2017); The Global Terrorism Database (GTD 2016).