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**Article — Published Version**

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Constitutional Political Economy

**Provided in Cooperation with:**

Springer Nature

*Suggested Citation:* Farzanegan, Mohammad Reza; Gholipour, Hassan F. (2023) : Does satisfaction with amenities and environment influence the taste for revolt in the middle east?, Constitutional Political Economy, ISSN 1572-9966, Springer US, New York, NY, pp. 1-43, <https://doi.org/10.1007/s10602-023-09422-z>

This Version is available at:

<https://hdl.handle.net/10419/306392>

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# Does satisfaction with amenities and environment influence the taste for revolt in the middle east?

Mohammad Reza Farzanegan<sup>1,2,3</sup> · Hassan F. Gholipour<sup>4</sup>

Accepted: 19 November 2023  
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## Abstract

The purpose of this study is to explore the relationship between individuals' satisfaction with amenities and environmental quality and taste for revolt in the Middle East. Using recent World Value Survey data (WVS7, 2017–2021) from Egypt and Iraq (which have been experiencing severe environmental degradation and inadequate and mismanagement of public infrastructure) and applying Probit regressions, our results show that satisfaction with amenities and environmental quality indicators are negatively and statistically related to individuals' inclination towards revolt in both countries. This finding is more pronounced in urban areas, particularly in large cities. We also find that individuals' satisfaction with amenities and environmental quality affect the taste of revolt through the individual's life satisfaction and satisfaction with the government's provision of utilities. The analysis for Egypt suggests that satisfaction with public transportation systems, roads and highways, air quality, and housing quality are significantly and negatively associated with support for revolutionary action. For the Iraq sample, we find that dissatisfaction with roads and highways, water quality, school quality, and the physical settings of cities lead to a higher probability of support for uprising.

**Keywords** Amenities · Air quality · Middle east · Environment · Pollution · Revolution · Satisfaction

**JEL Classification** D74 · H54 · Q53

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# 1 Introduction

The purpose of this research is to investigate the relationship between individuals' satisfaction with amenities and environmental quality indicators and their preference for revolt in two Middle Eastern countries, Egypt and Iraq. These countries have experienced several social uprisings and revolutions over the past century (e.g., The Egyptian Revolution of 1919; The Egyptian Revolution of 1952; The Egyptian "bread riots" of 1977; The 2011 Egyptian revolution; The 1920 Iraqi Revolt; The 1935–1936 Iraqi Shia revolts; The 1958 Iraqi coup d'état). The latest one was the "Arab Spring" experienced by several Arab countries in 2011 (Ferrero, 2018). During and after the "Arab Spring," several researchers and political commentators have attempted to explain the determinants of individuals' support for revolution in these countries (e.g., Ianchovichina et al., 2015; Verme et al., 2014).

While existing conceptual studies provide valuable insights on the determinants of uprisings in Arab countries, there is a lack of empirical work on individuals' inclination towards revolts in the Middle East region using recent data. In this study, we focus on a specific determinant of people's preferences for radical change: satisfaction with amenities and environmental quality. Specifically, we attempt to understand whether the taste for revolt is lower (higher) for individuals who are more satisfied (dissatisfied) with public services (such as healthcare, the physical beauty of cities, transportation systems, and schools), environmental quality (air and water quality), and housing quality.<sup>1</sup>

Environmental degradation, especially air and water pollution, as well as inadequate and mismanaged public infrastructure, have been key challenges for most Middle Eastern and North African (MENA) countries over the past decades (Farzanegan & Markwardt, 2018; Farzanegan et al., 2021, 2023; Gholipour & Farzanegan, 2018). In a recent report by the World Bank, Heger et al. (2022) provide evidence that living standards, including incomes, human capital, and infrastructure, have improved in MENA countries over the past three decades, but at significant costs to natural capital deterioration. They show that emissions, marine pollution, ocean acidification, and water stress due to unsustainable water management have increased. Additionally, terrestrial and marine ecosystems have deteriorated and natural habitats have been destroyed. The average urban resident in the MENA region breathes air that exceeds safe levels of pollutants by more than ten times. In terms of economic costs, the environmental degradation of the skies and seas is estimated to cost more than 3% of the gross domestic product (GDP) in some of the region's economies. In addition to economic and health costs, environmental degradation, especially due to water shortages and excessive water pollution, have caused violent and non-violent protests in some MENA countries, such as Iraq (Human Right Watch, 2019) and Egypt (Climate Diplomacy, 2022).

The recent individual-level survey data collected by the World Value Survey Wave 7 (WVS7) from Egypt and Iraq in 2018 make it possible to explore the link

<sup>1</sup> For a theoretical analysis of the revolution process in non-democratic contexts, see Apolte (2016).

between citizen satisfaction with amenities, environmental quality, and preference for revolution. In WVS7, there are specific questions for the Middle Eastern countries that measure the respondents' level of satisfaction with public and social services, living environment, and quality of housing. These questions were not asked in other countries. The survey also measures preference for revolutionary action. Controlling for other drivers of the taste for revolt and applying Probit regressions, we find evidence that individuals who have a higher level of satisfaction with amenities and environmental quality are less likely to support revolutionary action in Egypt and Iraq.

Our study contributes to the literature in three ways. First, while several studies have examined the impact of aggregate economic and political variables (e.g., income inequality, GDP per capita, growth in GDP, type of government in power, civil, economic, and political freedom) as well as individual socioeconomic characteristics (including gender, age, income, marital status, education, and religiosity) on support for radical change (e.g., François et al., 2021; MacCulloch, 2003; MacCulloch, 2004; MacCulloch, 2005; MacCulloch & Pezzini, 2007; MacCulloch & Pezzini, 2010; Maimone Ansaldo Patti et al., 2021), to the best of our knowledge, no empirical research has examined the link between individual satisfaction with amenities, environmental quality, and taste for revolt using recent data. Second, the present study provides insights into differences between resource-dependent economies (Iraq) and non-resource-dependent economies (Egypt) in terms of the determinants of individuals' preference for revolutionary action. Third, our paper contributes to the literature on the effect of satisfaction with amenities and environmental quality on various social and behavioral variables. While Nakamura and Managi (2020) and others have examined the impact of amenity quality (and/or satisfaction with amenities) on life satisfaction, internal conflicts, protests, marital stability, aggressive and violent disputes, investigation into the link between different types of amenities and environmental quality indicators and individuals' taste for revolt has received relatively little attention from existing studies. We address these gaps in the literature.

Understanding citizens' taste for revolt is crucial to anticipate/prevent revolution/uprising in two major economies in the Middle East region, given their geopolitical location and importance in the global energy markets. As shown by Maimone Ansaldo Patti et al. (2021) and MacCulloch and Pezzini (2010), there is a strong correlation between individual taste for revolt and different types of violence in various countries.

## 2 Review of literature

### 2.1 Prior literature on determinants of individuals' taste for revolt

These studies examine the impact of various socio-economic and demographic characteristics, as well as aggregate economic and political variables, on individuals' preference for revolutionary action. It is important to note that our focus is on people's inclination towards revolutionary action rather than on actual episodes of

internal conflict. Therefore, we only review the determinants of individuals' support for revolutionary action, and not the determinants of intrastate war or internal conflicts.

Using individual-level data from 12 European countries between 1976 and 1990, MacCulloch (2003) found that the probability of supporting revolt was higher among males, the unemployed, those with low income, and younger people. He also demonstrated that being married, religious, and having right-wing political ideology reduced the chance of having revolutionary tendencies. His Probit regressions also indicated that a decrease in the level of GDP per capita, more income inequality, and a right-wing government in power were associated with a stronger preference for radical action.

In a subsequent study, MacCulloch (2004) showed that the probability of supporting revolt was significantly lower in countries with a higher level of GDP per capita and among individuals with higher income. Controlling for a set of personal characteristics and country and year fixed effects, MacCulloch (2005) found that lower levels of personal income and greater income inequality (measured by the Gini coefficient) had a positive and significant effect on increasing the chance that an individual supports revolt. His results also indicated that employed, female, married or widowed, and older individuals were less likely to support revolutionary actions. MacCulloch and Pezzini (2007), using survey data from 61 countries between 1981 and 1997, showed that individuals' income and religiosity, as well as economic growth, reduced revolutionary support. In a subsequent study, MacCulloch and Pezzini (2010), using a similar data set, found that higher levels of freedom (including civil liberties and democratic freedoms), higher economic growth, higher levels of international trade, and religiosity have negative and significant effects on individuals' revolutionary support. Regarding freedom, Maimone Ansaldo Patti et al. (2021) provided evidence that individuals with less subjective freedom and living in more fragmented countries (more diverse societies) are more inclined towards revolts, by using WVS individual-level data collected from 51 countries between 1990 and 2003. Their results also indicated that freedom could moderate the impact of social diversity on individuals' preferences for revolutionary action. They also found that economic and political freedom negatively affect individual preferences for revolutionary action. François et al. (2021) showed that majority rule, periodic elections, and power-sharing institutions in democratic systems decreased revolutionary attitudes.

## 2.2 The impact of satisfaction with amenity and environmental quality on individuals' quality of life

The other strand of literature closely related to our work is the relationship between satisfaction with amenities, environmental quality, and individuals' life satisfaction (or happiness, subjective well-being, and quality of life).<sup>2</sup> The

<sup>2</sup> We use these terms interchangeably.

majority of these studies have shown that well-developed public services, higher environmental quality, and favorable climatic factors improve citizens' mental wellbeing and life satisfaction.

For example, using large-scale survey data from municipalities in Japan, Nakamura and Managi (2020) found that citizens' satisfaction with overall municipal services has a positive impact on life satisfaction. They also showed that social aspects (e.g., adequate quality of housing, adequacy of education services) of municipal services have a stronger impact on life satisfaction than economic (e.g., tax revenues) and environmental (e.g., quality of air and water) aspects.

Regarding environmental quality and quality of life, Silva et al. (2012) found that a higher level of air pollution (measured in terms of PM10 concentrations) has a negative impact on individuals' satisfaction with air quality, which leads to a lower level of subjective well-being in both OECD and non-OECD countries. MacKerron and Mourato (2013) showed that individuals in the UK are significantly and substantially happier when outdoors in all green or natural habitat types than they are in urban environments. They provide three reasons for the positive link between the experiences of natural environments and happiness: (1) exposure to natural environments affects the nervous system, reducing stress and restoring attention (Wilson, 1993, p.31), (2) noise and air pollution are higher in urban areas (than in natural environments) and have adverse impacts on physical health (e.g., Gouveia & Maisonet, 2005), which, in turn, reduces an individual's happiness, and (3) experiences of natural environments may increase life satisfaction by facilitating and encouraging behaviors that are physically and mentally beneficial, including physical exercise, recreation, and social interaction (e.g., Morris, 2003).

In a similar study, MacKerron and Mourato (2009) showed that both perceived and measured air pollution levels are significantly negatively associated with the life satisfaction of survey respondents in London. The relationship between environmental quality, climatic factors, and life satisfaction has also been found in Australia (Carroll et al., 2009), Ireland (Brereton et al., 2008), and across countries (Rehdanz & Maddison, 2008). Brereton et al. (2008) provide evidence that amenities such as climate, environmental, and urban conditions (e.g., wind speed, temperature, access to major transport routes, and proximity to the coast and waste facilities) are important determinants of an individual's life satisfaction in Ireland.

Ambrey and Fleming (2014) found that higher levels of public greenspace are associated with higher levels of welfare for residents of Australia's capital cities. Using data from Guangzhou, China, Su et al. (2022) showed that an increase in temperature during the winter, lower noise levels, and lower PM2.5 can improve individuals' momentary happiness. Winters and Li (2017) also found that higher temperatures in winters have a significant positive impact on self-reported life-satisfaction in the US. In terms of housing, using data from the 2006 Chinese General Social Survey, Zhang et al. (2018) showed that housing satisfaction and homeownership are significant determinants of people's overall life satisfaction in urban China.

### 2.3 Satisfaction with amenity & environmental quality and individuals' taste for revolt

In this section, we conceptualize the link between satisfaction with amenity & environmental quality and individuals' preference for revolt in Egypt and Iraq and then develop our hypotheses.

In Sect. 2.2, we show that efficient public services, housing quality, environmental quality, and favorable climatic factors enhance the subjective well-being of citizens. However, the reduction in life satisfaction caused by a polluted environment, inefficient public services, and poor quality of housing is not the end of the story in the majority of MENA countries, where the citizens of most of these countries are among the angriest people in the world (Gallup, 2020).

According to Gallup (2020), the top six countries in terms of people's anger are Iraq, Turkey, Lebanon, Egypt, Tunisia, and Iran. In these countries, dissatisfaction with amenities and environmental quality can easily turn into anger and aggression, which often leads to violent and hostile behavior. For example, Feizi et al. (2019) showed that rainfall shortage and precipitation scarcity had a significant impact on violent conflicts and tensions across provinces in Iran over the period of 2007–2014. They argued that this is because "water is a reserve with no replacement and consistent, and instant need. The struggle to get access to its scarce resource might lead people to show non-cooperative, and even hostile and violent behaviors." In addition, "precipitation deficiency might give an income shock, make people nervous, and make them violent" (p. 890–91). Ianchovichina et al. (2015) and Verme et al. (2014) also noted that the outburst of popular anger in the MENA region during the "Arab Spring" was rooted in individual perceptions of falling living standards, poor public services, and the lack of government accountability (Maimone Ansaldo Patti et al., 2021).

We hypothesize that citizens living in environments where public services are perceived as undesirable and inefficient and the quality of air, water, and housing is unsatisfactory may feel frustrated and are likely to be less satisfied with their lives, which, in turn, can lead to higher levels of anger (Coccia, 2018) and a preference for radical change in government. This is, to some extent, in line with the view that preferences for revolt stem from a sense of grievance associated with feelings of social injustice, unfairness, or exploitation of a group of people (MacCulloch & Pezzini, 2007; Hirshleifer, 1995). MacCulloch (2004) also argued that individuals' feelings of extreme frustration (and discontent) positively contribute to the decision to participate in mass rebellious actions. Similarly, Finkel and Muller (1998) showed that dissatisfaction with public or collective goods is one of the key determinants of individuals' participation in collective protest. Kassino (2012) also argued that anger plays a useful part in social movements, for example, for equality for Black people, the elderly, and women. Gurr (1971) noted that the failure to gain the expected benefits from modernization by particular groups in society can lead to frustration and revolt.

Based on the above discussion, our general hypothesis is:

**Hypothesis** Individuals at higher levels of dissatisfaction with amenities and environmental quality indicators tend to support more radical change in societies, *ceteris paribus*.

### 3 Data and methodology

#### 3.1 Data

To test our hypotheses, we rely on unique survey data collected by the WVS Wave 7 in Egypt and Iraq (Haerpfer et al., 2022). The survey questionnaire included specific questions that were only asked of respondents from a number of Middle Eastern countries. The survey responses were collected from 1200 Egyptians and 1200 Iraqis in 2018. These two countries were selected for analysis not only due to data availability but also for their geopolitical location and importance in the global energy markets. Approximately 10% of global proven crude oil reserves and about 17% of Middle Eastern crude oil proved reserves are in Iraq (OPEC, 2023). Egypt has a strategic position in the Middle East, operating the Suez Canal and the Suez-Mediterranean Pipeline, which are important to the transportation infrastructure of international energy markets (EIA, 2022). Any major political changes in these countries may have contagion effects on other countries in the region, which was seen during the Arab Spring.

#### 3.2 Dependent variable

The dependent variable in our study is individuals' support for revolutionary action. In the "Social Values, Attitudes; Stereotypes" section of the WVS Wave 7 survey, there is a question that asks respondents about their attitudes towards the society they live in. Specifically, respondents are asked:

"On this card, there are three basic kinds of attitudes concerning the society we live in. Please choose the one which best describes your own opinion. (Please code only one option from the list below):

- (1) The entire way our society is organized must be radically changed by revolutionary action
- (2) Our society must be gradually improved by reforms
- (3) Our present society must be valiantly defended against all subversive forces."

Following MacCulloch (2004), the dependent variable in our study is a binary variable that equals 1 if the respondent agrees that "The entire way our society is organized must be radically changed by revolutionary action" and 0 otherwise. For the regression analyses, we removed 66 cases from the Egypt sample because they either had missing or multiple answers or responded as "don't know." There were no missing or multiple answers or "don't know" responses for the Iraq sample. We



**Table 1** Descriptive statistics (after polishing the data)

Variables	Egypt				Iraq			
	Frequency (%)	Mean	Std. dev	Obs	Frequency (%)	Mean	Std. dev	Obs
Support for revolutionary action	24.07			1134	20.25			1200
Satisfaction with amenities and environmental quality indicators								
The public transportation systems		2.32	0.85	1185		na	na	na
The roads and highways		2.37	0.86	1192		2.15	1.04	1197
The schools		2.21	0.85	1177		2.2	0.98	1195
The quality of air		2.59	0.88	1192		2.21	1.006	1193
The quality of water		2.28	0.96	1193		2.06	0.98	1195
The quality of health care		1.94	0.86	1195		1.93	0.93	1195
The quality of housing		2.53	0.88	1197		2.26	1	1193
Beauty construction		na	na	na		2.22	1	1192
The beauty of physical setting of city		2.3	0.82	1195		2.23	1.02	1191
Average of amenities and environmental quality indicators		2.32	0.65	1165		2.16	0.73	1180
Average of amenities		2.282	0.653	1167		2.174	0.763	1182
Average of environmental quality indicators		2.438	0.83	1191		2.141	0.887	1193
Age		39.69	13.44	1200		36.6	13.4	1200
Sex (male = 1)	51.75			1200	50.67			1200
Income scales (1 = lowest income group; 10 highest income group)		4.99	1.39	1114		4.45	1.82	1200
Marital status (married = 1)	69.42			1200	72.08			1200
Education (tertiary education = 1)	21			1200	25.9			1197
Employment status (base group: retired/pensioned, housewife, student and others)				1199				
Full time employee	27.44				22.77			
Part time employee	12.68				8.24			

**Table 1** (continued)

Variables	Egypt				Iraq			
	Frequency (%)	Mean	Std. dev	Obs	Frequency (%)	Mean	Std. dev	Obs
Self employed	9.67				12.49			
Unemployed	4.59				10.28			
Number of children		2.17	1.65	1200		2.43	2.23	1200
Religious person	73.6				76.72			1121
Political actions		0.12	0.43	1161		0.39	0.82	1122
Free choice and control over lives (1–10 scale)		6.53	2.25	1177		6.78	2.29	1200
Believe in income equality (1–10 scale)		4.25	2.99	1192		6.27	3.14	1200

“na” indicates that this question was not asked of the survey respondents in the country

followed the same procedures with other variables. Table 1 presents the descriptive statistics for all variables.

### 3.3 Explanatory variable of interest

In the Middle East regional module, the WVS7 includes a question regarding individuals' satisfaction with amenities and environmental quality. The question asks respondents, "In the city or area where you live, are you satisfied or dissatisfied with the quality of the following?" The items listed are public transportation systems, roads and highways, schools, air quality, water quality, healthcare quality, housing quality, beauty of construction, and beauty of physical setting. Respondents are asked to choose from the options of (1) very satisfied, (2) fairly satisfied, (3) fairly dissatisfied, and (4) very dissatisfied. To facilitate the interpretation of the measure, scores have been reversed (1: very dissatisfied... 4: very satisfied). It should be noted that the Egypt sample does not include the question on the "beauty of construction," but includes a question about the "public transportation systems." The Iraq sample, on the other hand, does not include the question on "public transportation systems," but includes the "beauty of construction" in the WVS7 questionnaire.

In addition to the indicators mentioned above, we also compute the averages of all satisfaction indicators, amenity-related variables, and environmental quality indicators. For the average of satisfaction with amenity-related indicators, we use all indicators except for satisfaction with the quality of air and water, which are used for calculating the average of environmental quality indicators.

We include satisfaction with amenities and environmental quality indicators separately in the regressions, as there is a significant correlation between some of them. For example, in the case of Egypt, the correlation coefficient between schools and the quality of healthcare is 0.60 ( $p < 0.05$ ). In the Iraq sample, the correlation coefficient between the quality of housing and the beauty of the physical setting of the city is 0.50 ( $p < 0.05$ ).

### 3.4 Control variables

In addition to the variables of interest, namely satisfaction with amenities and environmental quality, we also include other important determinants of individuals' support for revolution in our estimations. Our selection of control variables is primarily based on the works of MacCulloch (2003), MacCulloch (2004), MacCulloch (2005), MacCulloch and Pezzini (2007), MacCulloch and Pezzini (2010), and Maimone Ansaldo Patti (2021). However, unlike these studies, we do not incorporate aggregate-level variables (e.g., GDP per capita, income inequality, political freedom) into the model, as our study focuses on individuals within a country. We also consider the availability of data for variables in the WVS when selecting control variables for the model specification. It is important to note that our primary results on the variables of interest remain statistically significant regardless of the inclusion of certain control variables. The following is an outline of the control variables: respondents' self-reported age, gender, income scale, marital status, tertiary education,

employment status, number of children, religiosity, political action, subjective freedom, and preference for income equality.

### 3.5 Estimation method

Given that the dependent variable of this study is binary, with values of 0 and 1, we apply the Probit regression following MacCulloch (2005) and MacCulloch and Pezzini (2007) with robust standard errors that correct the standard errors for heteroscedasticity.

The regression model estimated is as follows:

$$\text{Support of Revolution}_i = \alpha + b \text{ Satisfaction}_i + c \text{ Control} + \varepsilon_i \quad (1)$$

Here, the dependent variable is *Support of Revolution*, which takes a value of 1 when respondent *i* believes that "The entire way our society is organized must be radically changed by revolutionary action." Satisfaction represents the key explanatory variables of interest, such as satisfaction with amenities and environmental quality indicators. Control represents the control variables and  $\varepsilon$  is an error term.

## 4 Results

### 4.1 Main analyses

Tables 2 and 3 present the results of the Probit regressions for Egypt and Iraq, respectively. The results show that Egyptian respondents with higher levels of satisfaction with public transportation systems, roads and highways, air quality, and housing quality have a lower tendency towards revolutionary action. The coefficients of these four indicators are negative and statistically significant in columns 1, 2, 4, and 7 of Table 2. Additionally, the estimation results indicate that the other four indicators of satisfaction with amenities and environmental quality have the expected negative signs but are insignificant at conventional levels (see columns 3, 5, 6, and 9 of Table 2). The average of nine indicators in column 10 of Table 2 is negatively and significantly associated with support for revolutionary action in Egypt. In general, these findings support our hypothesis that satisfaction with amenities and environmental quality plays an important role in shaping people's preferences for revolutionary action in Egypt.

The regression results also show that the preference for revolutionary action is higher among Egyptian respondents with lower income, university education, and lower religiosity (see columns 1–10 of Table 2). Additionally, we discovered that those who place a greater value on income equality tend to have a stronger inclination towards revolution. Lastly, the results from the Egypt sample imply that individuals who perceive more freedom in their life have a lower probability of supporting revolutionary action. Age, gender, marital status, employment status, number of

**Table 2** Results of probit regressions for Egypt (full sample)

	Dependent variable: support for revolutionary action											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Satisfaction with amenities and environmental quality indicators</i>												
The public transportation systems	-.108** (.055)											
The roads and high-ways		-.109** (.054)										
The schools			-.036 (.055)									
The quality of air				-.119** (.054)								
The quality of water					-.072 (.047)							
The quality of health care						-.074 (.052)						
The quality of housing							-.103* (.053)					
Beauty construction								na				
The beauty of physical setting of city									-.029 (.058)			

**Table 2** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of amenities and environmental quality indicators										-.151** (.068)		
Average of amenities											-.134* (.069)	
Average of environmental quality indicators												-.117** (.054)
Age	-.002 (.004)	-.002 (.004)	-.001 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)	-.002 (.004)		-.002 (.004)	-.001 (.004)	-.001 (.004)	-.002 (.004)
Sex (male = 1)	.117 (.132)	.104 (.132)	.119 (.133)	.130 (.134)	.119 (.133)	.116 (.133)	.108 (.133)		.114 (.133)	.129 (.134)	.121 (.134)	.127 (.134)
Income scales (1 = lowest income group; 10 = highest income group)	-.101*** (.038)	-.102*** (.038)	-.109*** (.038)	-.106*** (.038)	-.106*** (.038)	-.109*** (.038)	-.104*** (.038)		-.109*** (.038)	-.102*** (.038)	-.103*** (.038)	-.106*** (.038)

Table 2 (continued)

Dependent variable: support for revolutionary action											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Marital status (married = 1)	-.026 (.119)	-.034 (.119)	-.055 (.120)	-.028 (.119)	-.034 (.119)	-.022 (.119)		-.036 (.119)	-.045 (.121)	-.047 (.121)	-.047 (.121)
Education (tertiary education = 1)	.239** (.121)	.232* (.122)	.249** (.121)	.245** (.121)	.248** (.121)	.243** (.121)		.250** (.121)	.239** (.122)	.241** (.122)	.241** (.122)
<i>Employment status (base group: retired/pensioned, housewife, student and others)</i>											
Full time employee	-.039 (.146)	-.013 (.146)	-.023 (.147)	-.040 (.148)	-.015 (.148)	-.021 (.147)		-.018 (.147)	-.048 (.149)	-.038 (.148)	-.038 (.148)
Part time employee	.046 (.182)	.064 (.181)	.062 (.182)	.043 (.182)	.062 (.182)	.050 (.183)		.050 (.182)	.052 (.184)	.060 (.183)	.060 (.183)
Self employed	-.174 (.196)	-.150 (.194)	-.144 (.196)	-.171 (.197)	-.153 (.195)	-.162 (.194)		-.147 (.195)	-.183 (.196)	-.173 (.196)	-.173 (.196)
Unemployed	-.294 (.257)	-.277 (.257)	-.245 (.259)	-.288 (.254)	-.291 (.256)	-.280 (.254)		-.267 (.257)	-.264 (.257)	-.258 (.258)	-.258 (.258)
Number of children	.024 (.037)	.024 (.037)	.034 (.037)	.029 (.037)	.026 (.037)	.025 (.037)		.026 (.037)	.031 (.037)	.031 (.037)	.031 (.037)
Religious person	-.249** (.106)	-.237** (.106)	-.248** (.107)	-.230** (.106)	-.238** (.105)	-.234** (.106)		-.247** (.106)	-.249** (.107)	-.251** (.107)	-.251** (.107)
Political actions	-.095 (.122)	-.097 (.121)	-.085 (.123)	-.099 (.122)	-.086 (.124)	-.084 (.122)		-.087 (.123)	-.084 (.122)	-.083 (.122)	-.083 (.122)

**Table 2** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Free choice and control over lives (1–10 scale)	-.105*** (.022)	-.108*** (.022)	-.111*** (.022)	-.104*** (.022)	-.107*** (.022)	-.107*** (.022)	-.107*** (.021)	-.110*** (.022)	-.105*** (.022)	-.106*** (.022)	-.106*** (.022)	-.106*** (.022)
Believe in income equality (1–10 scale)	.063*** (.016)	.062*** (.016)	.062*** (.016)	.062*** (.016)	.062*** (.016)	.064*** (.016)	.063*** (.016)	.063*** (.016)	.062*** (.016)	.063*** (.016)	.063*** (.016)	.063*** (.016)
Constant	.481* (.287)	.502* (.291)	.361 (.294)	.551* (.286)	.422 (.285)	.405 (.287)	.502* (.290)	.356 (.292)	.571* (.299)	.540* (.301)	.540* (.301)	.540* (.301)
Number of observations	963	968	959	967	967	966	968	968	951	952	952	952
Wald chi2	76.41	79.55	72.38	77.37	72.73	73.29	74.64	72.47	76.88	76.36	76.36	76.36

Robust standard errors in parentheses

“na” indicates that this question was not asked of the survey respondents in the country

\* $p < 0.10$ \*\* $p < 0.05$ \*\*\* $p < 0.01$



**Table 3** Results of probit regressions for Iraq (full sample)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Satisfaction with amenities and environmental quality indicators												
The public na												
transportation systems												
The roads and high-ways		-.099** (.043)										
The schools			-.095** (.044)									
The quality of air				-.039 (.044)								
The quality of water					-.120*** (.046)							
The quality of health care						-.057 (.046)						
The quality of housing							-.065 (.045)					
Beauty construction								-.088* (.046)				
The beauty of physical setting of city									-.091** (.046)			

**Table 3** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of amenities and environmental quality indicators										-.154** (.061)		
Average of amenities											-.147** (.059)	
Average of environmental quality indicators												-.095* (.050)
Age	-.0009 (.003)		-.0009 (.003)	-.0007 (.003)	-.0007 (.003)	-.0009 (.003)	-.0007 (.003)	-.0006 (.003)	-.001 (.003)	-.0005 (.003)	-.0008 (.003)	-.0005 (.003)
Sex (male = 1)	.007 (.118)		.002 (.116)	.001 (.116)	.006 (.118)	.011 (.117)	.007 (.117)	.003 (.118)	.014 (.118)	-.019 (.118)	-.002 (.118)	-.004 (.117)
Income scales (1 = lowest income group; 10 = highest income group)	-.053** (.026)		-.054** (.026)	-.00013	-.0001248	-.0001326	-.0001377	-.000135	-.0001248	-.0001118	-.0001222	-.0001222

Table 3 (continued)

Dependent variable: support for revolutionary action											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Marital status (married = 1)	.112 (.123)	.100 (.124)	.121 (.123)	.125 (.124)	.108 (.123)	.106 (.123)	.104 (.124)	.093 (.124)	.087 (.124)	.085 (.124)	.119 (.124)
Education (tertiary education = 1)	-.044 (.108)	-.035 (.108)	-.028 (.108)	-.036 (.108)	-.028 (.108)	-.028 (.108)	-.034 (.109)	-.027 (.109)	-.033 (.109)	-.033 (.109)	-.036 (.108)
<i>Employment status (base group: retired/pensioned, housewife, student and others)</i>											
Full time employee	.085 (.142)	.095 (.141)	.091 (.141)	.105 (.143)	.097 (.141)	.098 (.142)	.100 (.142)	.110 (.143)	.124 (.143)	.114 (.143)	.100 (.142)
Part time employee	.376** (.173)	.391*** (.173)	.387** (.172)	.412** (.175)	.373** (.172)	.370** (.172)	.390** (.174)	.389** (.174)	.423** (.174)	.402** (.174)	.409** (.174)
Self employed	.089 (.163)	.095 (.162)	.094 (.162)	.088 (.163)	.090 (.162)	.098 (.163)	.096 (.163)	.101 (.163)	.116 (.164)	.107 (.164)	.094 (.162)
Unemployed	.129 (.182)	.157 (.182)	.152 (.181)	.153 (.182)	.122 (.183)	.116 (.183)	.106 (.183)	.120 (.184)	.138 (.184)	.123 (.184)	.156 (.182)
Number of children	-.032 (.025)	-.034 (.025)	-.035 (.025)	-.036 (.025)	-.031 (.025)	-.031 (.025)	-.032 (.025)	-.029 (.025)	-.033 (.025)	-.030 (.025)	-.036 (.025)
Religious person	-.017 (.115)	-.014 (.115)	-.021 (.115)	-.019 (.115)	-.015 (.115)	-.001 (.116)	-.003 (.116)	.024 (.117)	.005 (.117)	.013 (.117)	-.021 (.115)
Political actions	.007 (.056)	.008 (.056)	.014 (.056)	.013 (.056)	.014 (.056)	.013 (.056)	.012 (.056)	.014 (.056)	.012 (.056)	.010 (.056)	.014 (.056)

**Table 3** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Free choice and control over lives (1–10 scale)		.029 (.021)	.028 (.021)	.026 (.021)	.026 (.021)	.028 (.021)	.029 (.021)	.030 (.021)	.028 (.021)	.027 (.021)	.029 (.021)	.026 (.021)
Believe in income equality (1–10 scale)		.017 (.014)	.015 (.015)	.019 (.0149)	.017 (.014)	.018 (.015)	.018 (.014)	.016 (.014)	.017 (.015)	.016 (.014)	.015 (.015)	.018 (.015)
Constant		–.804*** (.261)	–.786*** (.264)	–.947*** (.256)	–.790*** (.254)	–.921*** (.260)	–.911*** (.254)	–.853*** (.260)	–.863*** (.254)	–.738*** (.268)	–.738*** (.268)	–.843*** (.256)
Number of observations		1,034	1,033	1,033	1,034	1,033	1,032	1,032	1,029	1,025	1,026	1,033
Wald chi2		21.18	19.5	16.13	21.95	16.26	17.1	19.19	18.32	21.32	21.12	18.99

Robust standard errors in parentheses

\* $p < 0.10$ \*\* $p < 0.05$ \*\*\* $p < 0.01$

children, and political actions are not significant determinants of respondents' preference for revolution (refer to columns 1–10 of Table 2).<sup>3</sup>

For the full Iraq sample, similar to the results in Egypt, we observe that the coefficient of average of amenities and environmental quality indicators are negatively and significantly associated with support for revolutionary action (see column 10 of Table 3).<sup>4</sup> We also find that the taste for revolt is significantly lower among Iraqi respondents who are more satisfied with the roads and highways, schools, quality of water, and physical setting of cities in Iraq (see columns 2, 3, 5, 8, and 9 of Table 3).

## 4.2 Sub-sample analyses

Given the fact that most revolutions began in urban areas and large cities, which is a major contributor to political change (Glaeser & Steinberg, 2017), we check if the results of the full sample analyses are driven by respondents in urban areas and large cities. Glaeser and Steinberg (2017) provide historical and empirical evidence that urbanization and large cities can have an important impact on political change processes, mainly because "cities facilitate coordinated public action and enhance the effectiveness of uprisings" (p. 58).

Tables 4 and 5 present the results for Egypt when we run separate regressions for urban areas (Panel A of Table 4), rural areas (Panel B of Table 4), large cities (Panel A of Table 5), and small cities and rural areas (Panel B of Table 5). As evident from the estimations, the association between individuals' satisfaction with amenities and environmental quality and the taste of revolt only exists for the urban areas and large cities of Egypt.<sup>5</sup>

Tables 6 and 7 present the results for Iraq when we run separate regressions for urban areas (Panel A of Table 6), rural areas (Panel B of Table 6), large cities (Panel A of Table 7), and small cities and rural areas (Panel B of Table 7). Similar to the findings for Egypt, we find that the relationship between satisfaction with amenities and environmental quality indicators and the taste of revolt is statistically significant only in the large cities and urban areas of Iraq.<sup>6</sup>

<sup>3</sup> We have also estimated the average marginal effect (available upon request). The results show that satisfaction with quality of air, for example, has the largest effect. A one-unit increase in this aspect of satisfaction reduces the support for revolutionary actions by 3.1 percentage points (pp), controlling for other factors. The decreasing effect in other statistically significant satisfaction dimensions are also close to 3 pp. Also, a one-unit increase in average of amenities and environmental quality indicators is associated with a reduction of 3.9 pp in demand for revolutionary actions. Thus, a move from very dissatisfied (score of 1) to very satisfied (score of 4) is associated with about 12 pp decline in predicted probability of supporting revolutionary actions in Egypt.

<sup>4</sup> Based on the average marginal effects results (available upon request), a one-unit increase in this index is associated with a decline of 4 pp in the taste for revolution among Iraqis, which is comparable to the results from Egypt.

<sup>5</sup> For example, based on average marginal effects results (available upon request), a one-unit increase in satisfaction with average of amenities and environmental quality indicators is associated with a decline of 7.5 pp in support of revolutionary actions in urban areas of Egypt.

<sup>6</sup> A one-unit increase in satisfaction with average of amenities and environmental quality indicators is associated with a decline of 4.2 pp in predicted probability of supporting revolution in urban areas of Iraq.

**Table 4** Results of Probit regressions for Egypt (urban vs. rural areas)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: urban areas of Egypt												
The public transportation systems	-.255*** (.079)											
The roads and high-ways		-.219*** (.080)										
The schools			-.088 (.079)									
The quality of air				-.187** (.081)								
The quality of water					-.088 (.069)							
The quality of health care						-.146* (.079)						
The quality of housing							-.159*** (.081)					
Beauty construction								na				
The beauty of physical setting of city									-.121 (.082)			

**Table 4** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of amenities and environmental quality indicators										-.301*** (.103)		
Average of amenities											.304*** (.104)	
Average of environmental quality indicators												-.167** (.081)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	440	443	437	442	443	441	443	na	443	432	432	442
Wald chi2	35.06	35.8	26.63	32.11	27.53	29.37	28.36	na	27.86	34.58	34.04	30.96
Panel B: rural areas of Egypt												
The public transportation systems	.051 (.078)											
The roads and highways		.004 (.078)										

**Table 4** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The schools			-.012 (.078)									
The quality of air				-.048 (.074)								
The quality of water					-.076 (.065)							
The quality of health care						-.007 (.072)						
The quality of housing							-.043 (.074)					
Beauty construction								na				
The beauty of physical setting of city									.092 (.085)			
Average of amenities and environmental quality indicators										-.010 (.097)		
Average of amenities											.029 (.099)	



**Table 4** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of environ- mental quality indicators												-.077 (.075)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observa- tions	523	525	522	525	524	525	525	na	525	519	520	524
Wald chi2	69.24	69.04	69.9	69.41	68.86	69.05	69.4	na	68.23	69.44	69.57	69.16

Robust standard errors in parentheses

\* $p < 0.10$

\*\* $p < 0.05$

\*\*\* $p < 0.01$

**Table 5** Results of probit regressions for Egypt (large cities vs. others)

Dependent variable: Support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: large cities												
The public transportation systems	-.249*** (.077)											
The roads and high-ways		-.230*** (.078)										
The schools			-.080 (.079)									
The quality of air				-.201** (.080)								
The quality of water					-.088 (.068)							
The quality of health care						-.121 (.077)						
The quality of housing							-.180** (.080)					
Beauty construction								na				
The beauty of physical setting of city									-.157* (.081)			

**Table 5** (continued)

Dependent variable: Support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of amenities and environmental quality indicators										-.315*** (.102)		
Average of amenities											-.314*** (.103)	
Average of environmental quality indicators												-.177** (.080)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	459	462	456	461	462	460	462	na	462	451	451	461
Wald chi2	38.63	42.14	29.74	35.82	31.12	31.14	32.3	na	32.9	38.99	38.31	34.75
Panel B: others												
The public transportation systems	.041 (.079)											
The roads and highways		.006 (.080)										

**Table 5** (continued)

Dependent variable: Support for revolutionary action											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The schools		-.024 (.078)									
The quality of air			-.037 (.074)								
The quality of water				-.076 (.065)							
The quality of health care					-.029 (.072)						
The quality of housing						-.029 (.075)					
Beauty construction							na				
The beauty of physical setting of city								.137 (.084)			
Average of amenities and environmental quality indicators									-.006 (.096)		
Average of amenities										.032 (.099)	

**Table 5** (continued)

Dependent variable: Support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of environmental quality indicators												-.071 (.075)
Control variables	Included	Included	Included	Included	Included	Included	Included	na	Included	Included	Included	Included
Number of observations	504	506	503	506	505	506	506	na	506	500	501	505
Wald chi2	65.46	64.86	65.53	65.08	64.56	65.09	65.14	na	66.76	65.5	65.81	

Robust standard errors in parentheses

\* $p < 0.10$ \*\* $p < 0.05$ \*\*\* $p < 0.01$

**Table 6** Results of probit regressions for Iraq (urban vs. rural areas)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: urban areas of Iraq												
The public na												
transportation systems												
The roads and highways		-.097* (.051)										
The schools			-.129** (.053)									
The quality of air				-.024 (.051)								
The quality of water					-.111** (.056)							
The quality of health care						-.076 (.055)						
The quality of housing							-.056 (.055)					
Beauty construction								-.076 (.054)				
The beauty of physical setting of city									-.121** (.053)			



**Table 6** (continued)

Dependent variable: support for revolutionary action											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The schools		-.031 (.082)									
The quality of air			-.111 (.090)								
The quality of water				-.140 (.089)							
The quality of health care					-.004 (.094)						
The quality of housing						-.095 (.085)					
Beauty construction							-.132 (.097)				
The beauty of physical setting of city								-.043 (.097)			
Average of amenities and environmental quality indicators									-.152 (.122)		
Average of amenities										-.117 (.120)	



**Table 6** (continued)

Dependent variable: support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of environmental quality indicators												-.161* (.098)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	293	293	292	293	293	293	292	293	293	291	293	293
Wald chi2	19.99	19.99	19.51	22.01	21.99	19.15	21.3	23.97	19.16	22.16	23.27	23.27

Robust standard errors in parentheses

\* $p < 0.10$

\*\* $p < 0.05$

**Table 7** Results of Probit regressions for Iraq (large cities vs. others)

Dependent variable: Support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: large cities												
The public transportation systems		na										
The roads and highways		-0.097* (0.051)										
The schools			-0.129* (0.053)									
The quality of air				-0.024 (0.051)								
The quality of water					-0.111** (0.056)							
The quality of health care						-0.076 (0.055)						
The quality of housing							-0.056 (0.055)					
Beauty construction								-0.076 (0.054)				
The beauty of physical setting of city									-0.121** (0.053)			

Table 7 (continued)

Dependent variable: Support for revolutionary action												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Average of amenities and environmental quality indicators												
Average of amenities									-0.162** (0.072)			
Average of environmental quality indicators										-0.164** (0.070)	-0.079 (0.060)	
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	
Number of observations	na	741	740	741	740	740	739	736	734	735	740	
Wald chi2	na	20.60	21.49	16.01	20.02	16.84	16.54	17.14	20.23	21.11	21.30	
Panel B: others												
The public transportation systems	na											
The roads and highways		-0.079 (0.086)										

**Table 7** (continued)

Dependent variable: Support for revolutionary action											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
The schools		-0.031 (0.082)									
The quality of air			-0.111 (0.090)								
The quality of water				-0.140 (0.089)							
The quality of health care					-0.004 (0.094)						
The quality of housing						-0.095 (0.085)					
Beauty construction							-0.132 (0.097)				
The beauty of physical setting of city								-0.043 (0.097)			
Average of amenities and environmental quality indicators									-0.152 (0.122)		
Average of amenities										-0.117 (0.120)	

Table 7 (continued)

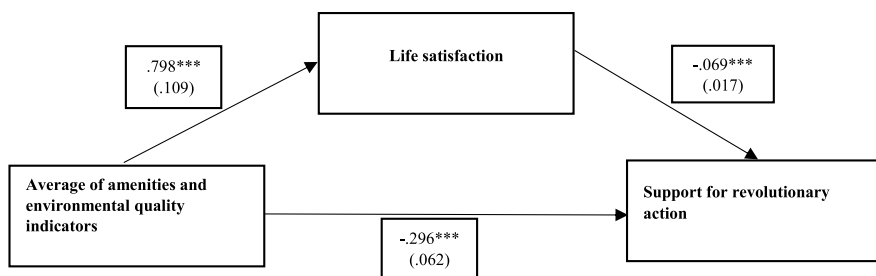
Dependent variable: Support for revolutionary action												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average of environmental quality indicators												-0.161* (0.098)
Control variables	na	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	na	293	292	293	293	293	292	293	293	291	291	293
Wald chi2	na	19.99	19.51	22.01	21.99	19.15	21.30	23.97	19.16	22.16	21.35	23.27

Robust standard errors in parentheses

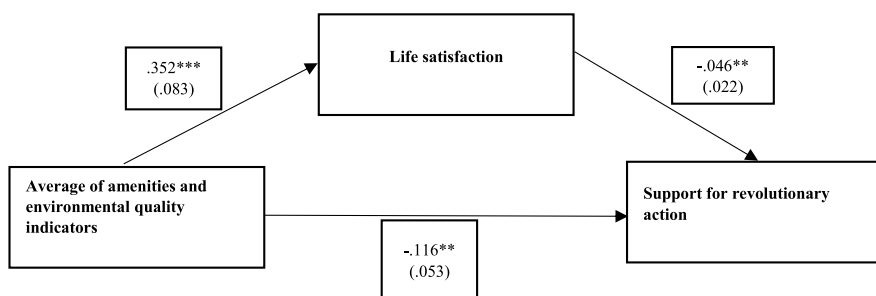
\* $p < 0.10$

\*\* $p < 0.05$

## A. Mediation analysis: Egypt



## B. Mediation analysis: Iraq



**Fig. 1** Mediation effect: life satisfaction as a mediating variable. *Note* Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The links between "average of amenities and environmental quality indicators" and "Life satisfaction" is estimated by OLS with robust standard errors. The links between "Average of amenities and environmental quality indicators" and "life satisfaction" and "support for revolutionary action" is estimated by probit regression with robust standard errors

#### 4.3 The mediating role of life satisfaction on the link between satisfaction with amenities and environmental quality indicators and preference of revolt

In the hypothesis development section, we argue that satisfaction with amenities and environmental quality indicators may affect support for revolution through individuals' life satisfaction. In this subsection, we examine whether individuals' life satisfaction mediates the relationship between satisfaction with amenities and environmental quality indicators and preference for revolt.

Panels A and B of Fig. 1 show the mediator models for Egypt and Iraq, respectively. For both countries, there is a negative and significant relationship between the "Average of amenities and environmental quality indicators" and "Support for revolutionary action." Additionally, the "Average of amenities and environmental quality indicators" and "Life satisfaction" are positively correlated, as expected. Finally, the coefficient of "Life satisfaction" is negative and significant when we use "Support for revolutionary action" as a dependent variable.

Therefore, we can conclude that there is partial mediation, meaning that the relationship between satisfaction with amenities and environmental quality indicators and support for revolutionary action is mediated by life satisfaction. In terms of the type of mediation, our results clearly show that complementary mediation occurs because the product of the direct effect and indirect effect (multiplication of three coefficients) is positive (Hair et al., 2021).

#### **4.4 The mediating role of satisfaction with the government on the link between satisfaction with amenities and environmental quality indicators and preference for revolt**

In sub-Sect. 4.3, we examine the mediating role of life satisfaction on the relationship between satisfaction with amenities and environmental quality indicators and support for revolution. However, it can be argued that satisfaction with amenities and environmental quality indicators first affects satisfaction with the government, which then affects preference for revolt. To test this hypothesis, we use the following question in the WVS survey: “I am going to ask a number of questions related to the current government’s performance. How would you evaluate the performance of the current government in... [The way the government performs its duties in national office]”. Respondents are asked to choose from the options of (1) Completely dissatisfied, (2) Rather dissatisfied, (3) Rather satisfied, and (4) Completely satisfied. Panels C and D of Fig. 1 present the mediator models for Egypt and Iraq, respectively.

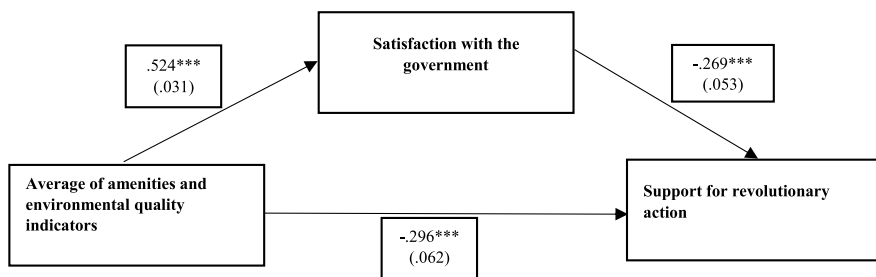
The results for Egypt show that satisfaction with amenities and environmental quality indicators affects support for revolutionary action through satisfaction with the government (see Panel C of Fig. 2). Given the findings shown in Panel A of Fig. 1, it can be concluded that life satisfaction and satisfaction with the government play mediating roles in Egypt’s case.

However, in the case of Iraq (see Panel D of Fig. 2), the analyses suggest that satisfaction with the government does not mediate the link between the “Average of amenities and environmental quality indicators” and “Support for revolutionary action”. Given the findings shown in Panel B of Fig. 1, we can conclude that only life satisfaction plays a mediating role in the Iraq sample.

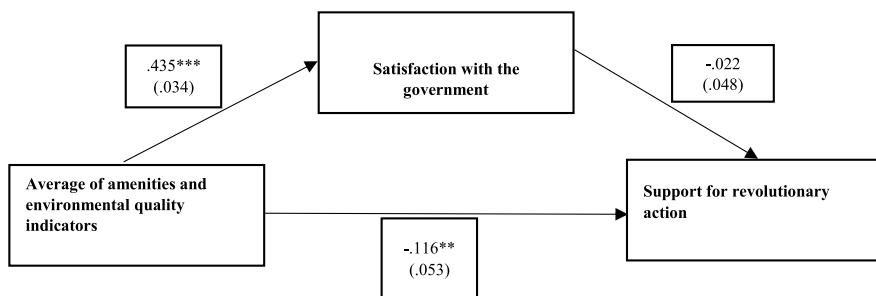
#### **4.5 The mediating role of satisfaction with government provision of utilities (fuel, water, electricity, gas, sanitation) on the link between satisfaction with amenities and environmental quality indicators and preference for revolt**

In addition to analyzing the mediating role of satisfaction with the government, we also test if satisfaction with government provision of utilities can explain the association between individuals’ satisfaction with amenities and environmental quality and support for revolutionary action. This measure may capture the satisfaction with government performance more precisely, as far as the amenities and environmental quality are concerned. We use the following question in the WVS survey: “I am going to ask a number of questions related to the current government’s performance. How would you evaluate the performance of the current government in... [Provision

## C. Mediation analysis: Egypt



## D. Mediation analysis: Iraq



**Fig. 2** Mediation effect: satisfaction with the government as a mediating variable. *Note* Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The link between “Average of amenities and environmental quality indicators” and “satisfaction with government” is estimated by OLS with robust standard errors. The links between “average of amenities and environmental quality indicators” and “satisfaction with government” and “support for revolutionary action” is estimated by probit regression with robust standard errors

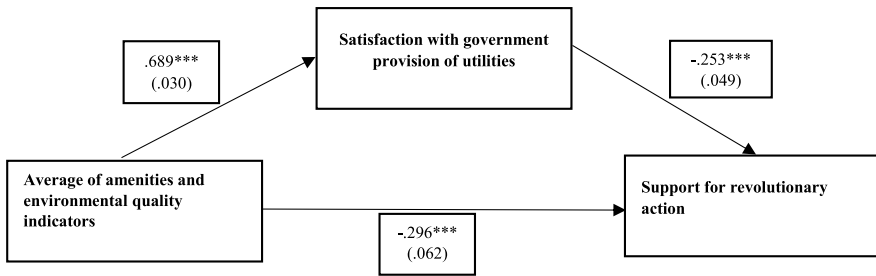
of utilities (fuel, water, electricity, gas, sanitation)]”. Respondents are asked to choose from the options of (1) Completely dissatisfied, (2) Rather dissatisfied, (3) Rather satisfied, and (4) Completely satisfied. Panels E and F of Fig. 3 present the mediator models for Egypt and Iraq, respectively.

## 5 Conclusion

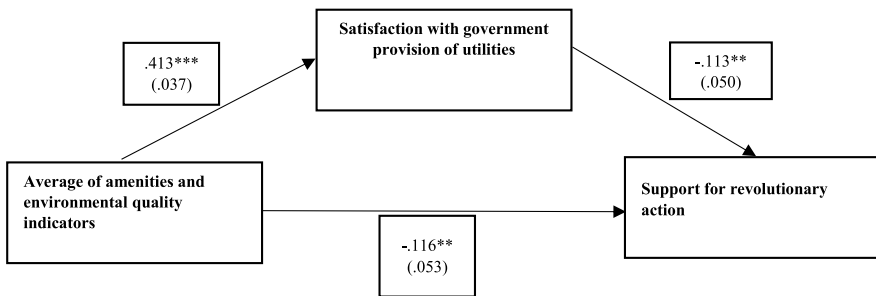
Using recent WVS7 data and Probit regressions, we find that individuals who are more dissatisfied with amenities and environmental quality tend to have a stronger inclination toward revolution in in Egypt and Iraq. This result is particularly evident in urban areas, especially in large cities, compared to rural areas and small cities in both countries. In Egypt, dissatisfaction with public transportation systems, roads and highways, air quality, and housing quality are positively and significantly associated with individuals’ preference for revolution. In Iraq,



## E. Mediation analysis: Egypt



## F. Mediation analysis: Iraq



**Fig. 3** Mediation effect: satisfaction with government provision of utilities as a mediating variable. *Note:* Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The links between “Average of amenities and environmental quality indicators” and “satisfaction with government’s provision of utilities” is estimated by OLS with robust standard errors. The links between “average of amenities and environmental quality indicators” and “satisfaction with government’s provision of utilities” and “support for revolutionary action” is estimated by probit regression with robust standard errors

individuals dissatisfied with roads and highways, water quality, school quality, and the physical setting of cities tend to prefer revolutionary actions.

Our findings can inform policymakers on how to reduce the likelihood of revolutionary actions by their citizens. For example, traffic congestion is a significant problem in the Greater Cairo Metropolitan Area (GCMA), which is home to over 20 million people (approximately 1/5 of Egypt’s population). According to the World Bank (2014), traffic congestion has a considerable and negative impact on the economy and citizens’ quality of life by decreasing labor productivity, increasing fuel consumption and wear and tear on vehicles, emitting harmful pollutants, decreasing air quality, raising transportation costs for businesses, and making the GCMA an unappealing location for businesses and industry. The World Bank (2014) suggests that the government can overcome traffic challenges by implementing corridor management schemes, strengthening the GCMA regulatory authority’s capacity and authority, introducing traffic-related charges (to rationalize traveling behavior), and investing more to expand the transit network.

**Acknowledgements** We appreciate the helpful comments and suggestions of the editor and anonymous reviewer. We also acknowledge the comments received by refereeing committee of the ERF 30th Annual Conference.

**Author contributions** All authors have contributed equally.

**Funding** Open Access funding enabled and organized by Projekt DEAL.

## Declarations

**Conflict of interest** The authors declare no Conflict of interest.

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