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The Day After the Bomb: Well-Being Effects of Terrorist Attacks in Europe

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Abstract
We study the non-monetary costs of terrorist attacks in France, Belgium and Germany between 2010 and 2017. Using four waves of the European Social Survey, we find that individual well-being is significantly reduced in the aftermath of a terrorist attack. We explore possible mechanisms, finding that terrorist attacks are negatively correlated with generalized trust, institutional trust, satisfaction with democracy and satisfaction with the government. Terrorist attacks are also found to be positively correlated with negative attitudes towards migrants and perceived discrimination. Contrary to expectations, the negative relationship between terrorism and well-being is less strong for Muslim immigrants. We interpret this finding as an indication that immigrants benefit more than natives from the institutional reaction following terrorist attacks.

Keywords Terrorism · Well-being · Happiness · Democracy · Trust

JEL Classification H56 · I31

1 Introduction

Terrorism implies significant costs in terms of casualties and human lives (Gaibulloev & Sandler, 2019). However, the main aim of terrorism, far beyond its direct damages, is to disrupt the ordinary life of all individuals, even if not directly affected by the attacks.

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Terrorist attacks generate a generalized perception of potential danger. The climate of fear that the attacks provoke is inflated by the media coverage (Powell, 2011; Ruigrok and van Atteveldt 2007), and leads the public to react as if responding to an outbreak of a contagious disease (Becker & Rubinstein, 2011). Although the probability of being directly involved in a terrorist attack is very small, individuals suffer from the potential threat and respond to fear, rather than to actual risk, by modifying their behavior in several respects.

The literature shows that terrorist attacks crucially influence, among other things, individuals' risk assessment and their willingness to trade-off security for liberties (Bozzoli & Müller, 2011). This increased perception of risk affects trust in other people, governments, and other institutions that were supposed to prevent terrorist attacks from happening (Blomberg et al., 2011), generally resulting in increased support for right-wing parties (Berrebi & Klor, 2008). Most importantly, terrorism significantly affects the way people view other groups, especially the groups to which the terrorists belong to (Bar-Tal & Labin, 2001; Huddy et al., 2005; Echebarria-Echabe & Fernández-Guede, 2006).

In this paper, we study the effects on well-being of the terrorist attacks that occurred in France, Belgium and Germany between 2010 and 2017, by using four waves of the European Social Surveys. Our contribution to the existing literature is twofold. First, we study the relationship between terrorist attacks and subjective well-being, focusing on the role played by trust and satisfaction with institutions as potential transmission mechanisms. Second, we focus on the effects on the well-being of immigrants and, more specifically, Muslim immigrants. Following the attacks, Europe was generally pervaded by a public sentiment against Muslim immigrants, fuelled by the anti-immigrant rhetoric of most right-wing parties, who claimed the need to close borders as a way to protect citizens from the threat of terrorism.[1] We thus explore the hypothesis that the negative link between terrorist attacks and well-being is stronger for minorities associated with the attacks, i.e., Muslim immigrants.

In line with the existing literature on the topic, our results indicate that terrorist attacks significantly reduce self-reported well-being, as measured by either life satisfaction or happiness. As for the potential transmission channels, terrorist attacks are found to be negatively associated to generalized and institutional trust, and satisfaction with democracy and the government. As expected, terrorist attacks are found to be positively associated to negative attitudes towards migrants and perceived discrimination. However, contrary to expectations, in the aftermath of a terrorist attack the reduction in well-being experienced by Muslim immigrants is less strong than the one experienced by natives.

In order to interpret this finding, we show that the reduction in satisfaction for government or democracy that natives experience following a terrorist attack is stronger than that experienced by Muslim immigrants. This is consistent with the instrumental perspective on political support, that posits that immigrants support democracy for its tangible benefits (Rogowski, 1974), including better protection, rights and freedoms for its citizens, by continuing to employ—at least in the short run—their country of origin as a reference group (Stark, 1991). More specifically, we interpret our results as an indication that immigrants positively value the reaction of democratic institutions in the host country following terrorist attacks. This reaction includes lack of retaliation and certainty of being protected, despite a growing perception of discrimination and increased xenophobia. On the contrary, natives negatively value the reaction of the

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[1] Data from the Pew Research center (https://www.pewglobal.org) indicate that the immigration wave and the terrorist threat have been, and still are, closely related to one another in the opinion of Europeans.

institutions that were supposed to protect their citizens against terrorism, and react to anger by reducing their support for democracy (Valentino et al., 2011).

The remainder of the paper is structured as follows. Section 2 provides the conceptual background by discussing the related literature. Section 3 illustrates the data and methods used in the empirical analysis. Section 4 presents the results. Section 5 concludes.

2 Background

Terrorism has relevant economic consequences, as it negatively affects growth (Abadie & Gardeazabal, 2003; Blomberg et al. 2004; Gaibulloev & Sandler, 2008; Meierrieks & Gries, 2013), capital markets (Chen & Siems, 2004) and trade (Bandyopadhyay et al., 2018). Attempts to estimate the economic costs of terrorism generally consider both direct costs (loss of lives, severity of injuries, value of damaged structures, etc.) and indirect costs (higher insurance premia, increased security costs, loss of future trade). However, the consequences of terrorism go far beyond its economic costs (Frey et al., 2007; Frey & Stutzer, 2009), as they include the psychological and social effects caused by the climate of fear that the attacks generate. In turn, these effects change the social perception of terrorism and the political attitudes of societies (Vergani, 2018).

2.1 Terrorism and Well-Being

A growing body of literature has studied the negative effects of terrorism on well-being. Metcalfe et al., (2011) exploit the timing of the London bombings in 2001, within a quasi-experimental framework, to show that the attacks resulted in lower levels of subjective well-being for those interviewed after the bombings. These results are largely confirmed by Clark et al., (2019), who focus on the US and exploit the timing of the Boston marathon bombing in a regression-discontinuity design. This study finds that the bombing significantly reduced the well-being of women and residents of the States close to Boston, while it did not affect labor supply and time use. Coupe, (2016) focuses on the 2015 Charlie Hebdo attacks in Paris, finding a reduction in optimism, an increase in trust in the national government but no effects in terms of life satisfaction or political orientation.

Evidence from Pakistan suggests that continuous exposure to terrorism reduces subjective financial well-being, with the effect being stronger for the less-educated and those living in urban areas (Gaibulloev et al., 2018). Evidence from the exact time and place of terrorist-related incidents in Northern Ireland, linked to individual-level data on happiness and anxiety, shows that terrorism has a significant effect on individuals' short-lived happiness and anxiety levels. This effect, however, is largely confined to incidents that led to the death of victims and incidents within a twenty-kilometre radius (Bryson et al., 2018). Guedalia-Ephrat, (2016), using individual-level survey data from Israel, find that terrorism negatively affects the subjective well-being of secular people, while positively affects the subjective well-being of religious people. This puzzling finding is interpreted as indicating that religion could act as a coping strategy in the aftermath of terrorist attacks.

2.2 Terrorism and Social Capital

Terrorism has been show to generally affect trust, and more specifically trust in governments and institutions (Blomberg et al., 2011; Arvanitidis et al., 2016).[2] If the reduction in trust derives from the fact that terrorist attacks, especially in Europe, have often been perpetrated by second generation immigrants, therefore by people born and raised in the same state that suffered the attack, the reduction in confidence in governments and in institutions is usually supported by the claim that they have not done enough. This reduced satisfaction and confidence in institutions might translate into an increased engagement in politics through voting, a mechanism usually called "blind voting".

Evidence from the UK suggests that the 2005 London suicide bombings reduced generalized trust (Giordano & Lindström, 2016). Evidence from Spain shows that both lethal and non-lethal terrorist attacks significantly increased individuals' willingness to take part in future democratic elections (Balcells & Torrats-Espinosa, 2018) and that terrorism is associated with a positive probability that the incumbent government is replaced (Gassebner et al., 2008). These results are consistent with those for the United States, where families and neighbors of victims of the September 11 attack were found to be significantly more active in politics and to support the Republican party (Hersh, 2013). They are also consistent with additional evidence from Spain, where the terrorist attacks of March 11, 2004 in Madrid have impacted on the results of the elections that took place few days later by negatively affecting the incumbent (conservative) party while favouring the opposing (socialist) party (Montalvo, 2011). Evidence from Israel (Berrebi & Klor, 2008; Getmansky & Zeitzoff, 2014) suggests that terrorism is associated with increased support for right-wing parties.

Trust, whether general, institutional or particular, together with networks, social and political participation, are among the components of social capital, one of the buffers against low psychological well-being. A reduction in generalized or institutional trust – as a reaction to a dissatisfaction with the way democratic institutions work – might, therefore, be a mechanism through which terrorism negatively affects well-being.

2.3 Terrorism and Immigrants

Abundant empirical evidence supports the idea that terrorist attacks are likely to induce a backlash against minorities, a rise in their costs of assimilation, with possible resulting effects in terms of their health outcomes and economic prospects. Legewie, (2013) uses a quasi-experimental research design by exploiting the fact that the terrorist attack in Bali on October 12, 2002, occurred during the fieldwork period of the European Social Survey. The findings from this natural experiment show that there are considerable variations in both the magnitude of the effect and its temporal duration. In three out of nine European countries (Portugal, Poland, and Finland) the estimated causal effect is strongly significant and large. In Finland, however, the effect disappears after the first week. A further analysis based on the 2004 Madrid bombing confirms the conclusions of this study.

The effect of terrorism on attitudes towards immigrants can be influenced by the migration context (Nussio et al., 2019). Gould and Klor, (2015) use data from US

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[2] Notice that those effects are not usually universal across all samples and countries, and are generally short-lived (Arvanitidis et al., 2016).

municipalities to estimate the long term effects of the 9/11 terrorist attack in terms of assimilation of Muslim immigrants. They show that the increased backlash against the Muslim community brought about by the attack caused a reduction in Muslim immigrants' assimilation, measured as an increase in same ethnicity marriages and in fertility, and a reduction in female labor force participation and English proficiency. Evidence from Sweden, however, shows that, following 9/11, attitudes towards Muslim immigrants have worsened, while this has not translated into actual discrimination in the labour market for Muslim minorities (Åslund & Rooth, 2005). In the Netherlands, house prices have declined in neighborhoods where more than 25% of the population belong to ethnic minorities from Muslim countries (Gautier et al., 2009), while in the UK the increased perceived discrimination post 9/11 has resulted in worse subjective and objective health outcomes for Muslim minorities (Johnston & Lordan, 2012), and in an increase in hate crimes (Hanes & Machin, 2014). In Germany, the 9/11 attacks negatively affected earnings, but only for low-skilled Muslim workers employed in small and medium-sized firms (Cornelissen & Jirjahn, 2012).

Following Gould and Klor, (2015), it can be expected that Islamic terrorism increases the perceived discrimination of the Islamic community in the targeted country. This translates into a stronger reduction of well-being for Muslim immigrants, with potential long lasting effects in terms of integration in the host country. In fact, in the aftermath of terrorist attacks, people are loath to make social connections, especially with people belonging, or being supposed to belong, to the group of the "unknown enemy". This, in turn, increases social fragmentation and reduces well-being.

Relatively few papers, to date, have attempted to study this issue. Hole and Ratcliffe, (2015) exploit the timing of the London bombings to identify the impact of a rapid increase in racism on the well-being of young Muslims. Their results suggest that while the well-being of Muslim teenage girls declines after the bombings, no effects are found for Muslim teenage boys. Zorlu and Frijters, (2018) make use of six rounds of the European Social Survey (ESS) to examine happiness levels of Muslims living in European countries following the terrorist attacks on 11 September 2001. They show that happiness among the general Muslim migrant population declines and subsequently returns to average relative to others after 9/11, with the exception of Muslim young males coming from the Middle East, who report a permanently lower level of subjective well-being.

3 Methods and Data

Against the background described above, our analysis aims at testing the following three main hypotheses:

H1 Terrorist attacks have a negative effect on well-being.

H2 Terrorist attacks negatively affect trust and satisfaction with institutions.

H3 The well-being effects of terrorism are stronger for minorities associated with the attacks.

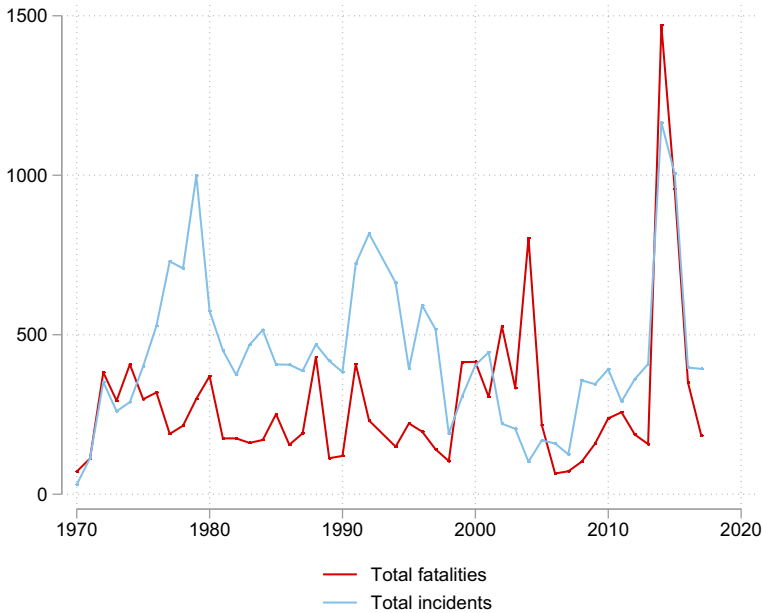The empirical strategy is based on the following specification:

Fig. 1 Fatalities and incidents for terrorist attacks in Europe (1970–2018). *Source*: Authors' elaboration from the Global Terrorism Database (https://www.start.umd.edu/gtd/). The Global Terrorism Database defines a terrorist attack as: the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation. Data does not include acts of state terrorism. Total number of fatalities represents the number of total confirmed fatalities for the incident. This includes all victims and attackers who died as a direct result of the incident

$$SWB_{ijt} = \alpha + \beta_1 TA_{jt} + \beta_2 X_{ijt} + \beta_3 TA_{jt} \times x_{ijt} + \beta_4 T_t + \epsilon_{ijt} \tag{1}$$

where SWB_{ijt} denotes an indicator of subjective well-being (life satisfaction or happiness) for individual i in country j at time t, TA_{jt} is a dummy variable ("post terrorist attack") taking value of 0 for observations before the day of the attack and 1 thereafter, X_{ijt} is a vector of individual-specific characteristics, $TA \times x$ is the (possible) interaction term between the *post-attack* dummy and specific individual characteristics (e.g., immigrant status), while T_t denotes survey fixed-effects.

Regarding the data set, Europe has witnessed a long history of terrorism. The use of terrorism to promote a political cause has accelerated after World War II, and has often been linked to separatist movements (such as the Irish Republican Army in the United Kingdom, or the ETA separatist group in Spain), or to political extremism (such as the far-right or far-left extremism, and anarchism in Italy in the 1970s). As such, terrorist incidents were initially concentrated in relatively few areas. This picture changed dramatically in the first decade of the new millennium. Since the Madrid train bombings in 2004, the deadliest Islamic attack ever occurred in Europe in which 193 civilians were killed, Islamic terrorism has started to hit Europe, particularly France,[3] reaching a peak between 2014 and

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[3] In particular, a series of coordinated terrorist attacks occurred in Paris on November 13 2015, when 130 people were killed and 368 injured outside the *Stade de France* in Saint-Denis during a football match, and in a mass shooting during a concert at the Bataclan theatre.

2016, when the number of people killed by Islamic terrorist attacks was greater than that of all previous years combined, as shown in Fig. 1.

Within Europe, our analysis focuses on countries that were the object of terrorist attacks between 2010 and 2017. We further restrict the sample to countries for which the timing of the interviews for the individual-level survey data (described below) included the date of the terrorist attack, thus allowing us to conduct a pre-post analysis. As a consequence, we analyze individual-level data for France, Belgium and Germany, focusing on the following events: the Charlie Hebdo attack in Paris in January 2015,[4] the Brussels airport attack in March 2016,[5] and the Christmas market attack in Berlin in December 2016.[6]

Individual-level data on subjective well-being and other characteristics were obtained from different waves of the European Social Survey (ESS), a biennial general social survey, available since 2002, designed to map values and attitudes of the European population regarding the most relevant social issues. This survey, conducted with face-to-face interviews, provides cross-sectional probability samples that are representative of all persons aged 15 and over resident within private households in each country.

The ESS contains detailed information about respondents' characteristics, such as age, sex, family background, religion, nationality, level of education, employment status and level of income (expressed in income deciles). In addition, the survey contains information about individuals' social attitudes, such as their level of trust, satisfaction with institutions and, most importantly, subjective well-being (both life satisfaction and happiness). For our purposes, a crucial element of the ESS is the availability of the date of the interview, that allows us to conduct a pre-post analysis.

The application of the criteria described above left us with a sample of 46,649 individuals. Table 1 reports summary statistics for the variables used in the analysis. Life satisfaction and happiness, our key dependent variables, are discrete variables on a scale between 0 and 10. Our main explanatory variable, "post-attack", is a dummy variable that takes value 1 following the terrorist attack in the given country (about 16% of the observations in the sample). As a robustness check, we also considered a discrete variable for the number of days elapsed from the attack.

4 Results

This section reports the results of the empirical analysis.[7] We start by documenting the relationship between terrorist attacks and subjective well-being overall. We then focus on possible explanations of this relationship. We then examine how the impact of terrorism

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[4] On January 7, 2015, in Paris, two brothers entered the offices of a French satirical weekly newspaper, *Charlie Hebdo*, killed 12 people and injured 11 others. The attack was claimed by Al-Qaeda. The *Charlie Hebdo* attack was followed by several related attacks around Paris, including an attack to a kosher supermarket where a terrorist held 19 hostages, four of whom died.

[5] On March 22, 2016, in Brussels, two coordinated suicide bombings occurred in Brussels, one at the Brussels Airport in Zaventem, and one at the Maalbeek metro station. The attacks provoked 35 victims and more than 300 injured. The attack was claimed by the Islamic State of Iraq and the Levant (ISIL).

[6] On 19 December 2016, in Berlin, a truck broke into a Christmas market, leaving 12 people dead and 56 injured. The perpetrator was an asylum seeker. The attack was claimed by The Islamic State of Iraq and the Levant (ISIL).

[7] Notice that complete case analysis, i.e., listwise deletion, has been used. The results are indeed qualitatively unchanged when either removing income (the variable with most missing values) from the set of control variables, or applying a Full Information Maximum Likelihood Estimation.

Table 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Post attack	0.19	0.39	0	1	46649
Time elapsed from the attack (in days)	80.76	206.04	0	793	46649
How satisfied with life as a whole	7.03	2.16	0	10	46587
How happy are you	7.45	1.76	0	10	46572
General trust	4.87	2.23	0	10	46618
Trust in politicians	3.63	2.21	0	10	46343
Trust in Parliament	4.57	2.35	0	10	45951
Trust in the European Parliament	4.35	2.38	0	10	44762
How satisfied with the way democracy works in country	5.2	2.4	0	10	46116
How satisfied with the national government	4.15	2.26	0	10	45742
Immigration bad or good for country's economy	5.04	2.39	0	10	45949
Country's cultural life undermined or enriched by immigrants	5.72	2.49	0	10	46122
Immigrants make country worse or better place to live	4.91	2.21	0	10	46013
Discrimination of respondent's group: colour or race	0.01	0.11	0	1	46649
Discrimination of respondent's group: nationality	0.01	0.12	0	1	46649
Discrimination of respondent's group: religion	0.01	0.12	0	1	46649
Muslim immigrant	0.02	0.14	0	1	46648
Immigrant	0.09	0.28	0	1	46648
Male	0.49	0.5	0	1	46649
Age	48.66	18.6	14	105	46541
unemployed	0.04	0.2	0	1	46649
Higher tertiary education, > = MA level	0.13	0.33	0	1	46430
Lower tertiary education, BA level	0.1	0.3	0	1	46430
Advanced vocational, sub-degree	0.14	0.35	0	1	46430
Upper tier upper secondary	0.13	0.34	0	1	46430
Lower tier upper secondary	0.28	0.45	0	1	46430
Lower secondary	0.13	0.34	0	1	46430
Less than lower secondary	0.1	0.29	0	1	46430
Household's total net income, all sources (decile)	5.52	2.74	1	10	35548
Not in a relationship	0.37	0.48	0	1	46549
In a relationship	0.58	0.49	0	1	46549
Separated/Divorced	0.03	0.17	0	1	46549
Widowed/civil partner died	0.02	0.14	0	1	46549
Catholic	0.31	0.46	0	1	46390
Protestant	0.13	0.33	0	1	46390
Islamic	0.04	0.19	0	1	46390
Other	0.03	0.16	0	1	46390

on well-being differs for immigrants and, more specifically, for the sub-group of Muslim immigrants.

Table 2 Terrorist attacks and well-being

	Life satisfaction (1)	Happiness (2)
Post attack	− 0.271***	− 0.116**
	(0.044)	(0.037)
Immigrant	0.059	0.034
	(0.050)	(0.041)
Male	− 0.022	− 0.065**
	(0.025)	(0.020)
Age	− 0.107***	− 0.079***
	(0.004)	(0.003)
Age squared	0.001***	0.001***
	(0.000)	(0.000)
Unemployed	− 1.043***	− 0.645***
	(0.079)	(0.067)
Higher tertiary education, >= MA level	0.669***	0.191***
	(0.061)	(0.048)
Lower tertiary education, BA level	0.700***	0.277***
	(0.062)	(0.049)
Advanced vocational, sub-degree	0.492***	0.161***
	(0.062)	(0.049)
Upper tier upper secondary	0.418***	0.142**
	(0.062)	(0.048)
Lower tier upper secondary	0.382***	0.099*
	(0.059)	(0.046)
Lower secondary	0.309***	0.027
	(0.063)	(0.052)
Household income, all sources (decile)	0.175***	0.121***
	(0.006)	(0.005)
Catholic	0.161***	0.100***
	(0.028)	(0.023)
Protestant	0.414***	0.154***
	(0.040)	(0.034)
Islamic	0.130	0.189**
	(0.078)	(0.061)
Other	0.276***	0.109
	(0.076)	(0.064)
In a relationship	0.384***	0.665***
	(0.033)	(0.027)
Separated/Divorced	− 0.190*	0.078
	(0.074)	(0.064)
Widowed/civil partner died	− 0.077	− 0.120
	(0.098)	(0.099)
N.	35237	35235

Dependent variable as in column heading. OLS estimates. Covariates as described in equation (1) and Table 1. Robust standard error reported in brackets. *$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 3 Terrorism: possible mechanisms

	Trust				Satisfaction with	
	General	Politicians	**Parliament**	EU Parl.	Democracy	Government
Post attack	− 0.230***	− 0.567***	− 0.627***	− 0.237***	− 0.684***	− 0.877***
	(0.050)	(0.052)	(0.054)	(0.053)	(0.054)	(0.049)
N.	35240	35093	34892	34168	34972	34771

OLS regression coefficients for equation (1), using each of the variables in the column heading as dependent variable. Covariates as described in equation (1) and Table 1. Robust standard error reported in brackets. *$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 4 Attitudes towards immigrants, perceived discrimination

	Immigrants good for			Discrimination		
	Economy	Culture	Better place	Colour	Nationality	Religion
	(1)	(2)	(3)	(4)	(5)	(6)
Post attack	− 0.636***	− 0.201***	− 0.101*	0.055***	0.086***	0.046*
	(0.050)	(0.052)	(0.047)	(0.015)	(0.018)	(0.018)
N.	34903	35005	34928	3172	3172	3172

Dependent variable as in column heading. OLS estimates. Covariates as described in equation (1) and Table 1. Robust standard error reported in brackets. *$p<0.05$, **$p<0.01$, *** $p<0.001$

4.1 Terrorist Attacks and Well-Being

Table 2 reports OLS estimates for Eq. (1). Self-reported life satisfaction falls significantly in the aftermath of a terrorist attack, with an estimated reduction of 0.271 on a scale between 0 and 10. The size of the effect is relevant, as it is about one quarter the coefficient for being unemployed (-1.043), and well above the coefficients for being separated/divorced or widowed (-0.190 and -0.077, respectively). The results are virtually unchanged when focusing on self-reported happiness. In the aftermath of a terrorist attack, happiness is significantly lower, with an estimated effect of -0.116 on a scale between 0 and 10. Focusing on the control variables, no significant difference in well-being is found for immigrants. Subjective well-being is found to be positively related to age, education level and income, consistently with the results in the existing literature.[8]

What mechanisms can explain the negative effect of terrorist attacks on subjective well-being? Table 3 presents results obtained by estimating the specification in (1) while using as a dependent variable several indicators aimed at capturing the potential role played by trust and satisfaction with institutions, as described in Sect. 2. This allows us to provide a direct test of hypothesis 2. The findings indicate that, as expected, general trust, trust

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[8] We have also explored possible interactions with individual characteristics. In line with the findings in the literature, the negative effect of terrorist attacks is significantly stronger for older individuals and for higher-income individuals (results available upon request).

Table 5 Terrorist attacks and well-being: immigrants

	Life satisfaction		Happiness	
	(1)	(2)	(3)	(4)
Post attack	− 0.274***	− 0.336***	− 0.144***	− 0.149***
	(0.045)	(0.044)	(0.038)	(0.037)
Immigrant*post	0.027		0.240**	
	(0.097)		(0.082)	
Immigrant	0.052		− 0.024	
	(0.058)		(0.047)	
Muslim immigrant*post		0.291		0.555***
		(0.183)		(0.155)
Muslim immigrant		0.138		0.020
		(0.132)		(0.100)
N.	35237	35339	35235	35337

Dependent variable as in column heading. OLS estimates. Covariates as described in equation (1) and Table 1. Robust standard error reported in brackets. *$p<0.05$, **$p<0.01$, ***$p<0.001$

in politicians, and trust in the national parliament are significantly lower following a terrorist attack. Similarly, satisfaction with democracy and satisfaction with government are also significantly reduced after terrorist attacks. Overall, these findings indicate that the negative effects of terrorism on trust and satisfaction with institutions provide one possible interpretation of the negative impact of terrorism on well-being.

4.2 Terrorist Attacks and Immigrants

The wave of xenophobic sentiments that followed the terrorist attacks in Europe has led to an increase in the perception of discrimination and threat among immigrants. Table 4 reports OLS estimates of the effects of terrorist attacks on attitudes towards migrants (columns 1 to 3) and perceived discrimination (columns 4 to 6).[9] The results indicate that, in the aftermath of a terrorist attack, there is a significant increase in negative attitudes towards immigrants. On a scale between 0 and 10, the ratings to the statement that immigrants are good for the economy, culture, or the country, fall by 0.636, 0.201 and 0.101, respectively. In addition, estimates for a linear probability model indicate a significant increase in perceived discrimination by race, religion, and nationality.

Against this background, we turn to testing hypothesis 3, by assessing whether the negative effect of terrorism on well-being is stronger for sub-groups directly associated with the terrorist attacks. Table 5 reports OLS estimates of the effects of terrorist attacks on the well-being of immigrants (columns 1 and 3) or, alternatively, of Muslim immigrants (columns 2 and 4). Focusing on life satisfaction, the findings indicate no differential effects for either immigrants or Muslim immigrants. On the other hand, when using happiness as a dependent variable, the negative effect of terrorist attacks is found – contrary

[9] Note that in order to assess the mediating mechanism of perceived discrimination on immigrants, columns 4-5-6 reports estimates obtained for immigrants only. Results are unchanged when estimates are obtained for the full sample.

Table 6 Terrorism and well-being of immigrants: mechanisms

	Trust			Satisfaction with		
	General	Politicians	**Parliament**	EU Parl.	Democracy	Government
Post attack	− 0.238***	− 0.593***	− 0.661***	− 0.262***	− 0.743***	− 0.901***
	(0.050)	(0.052)	(0.055)	(0.053)	(0.055)	(0.049)
Immigrant*post	0.071	0.230*	0.304*	0.224	0.525***	0.209
	(0.108)	(0.116)	(0.121)	(0.125)	(0.109)	(0.113)
immigrant	0.103	0.711***	0.740***	0.715***	0.890***	0.883***
	(0.056)	(0.063)	(0.066)	(0.066)	(0.062)	(0.061)
N.	35240	35093	34892	34168	34972	34771
Post attack	− 0.285***	− 0.626***	− 0.717***	− 0.288***	− 0.828***	− 0.994***
	(0.049)	(0.050)	(0.053)	(0.052)	(0.054)	(0.049)
Muslim immigrant*post	0.324	0.024	0.039	0.230	0.551**	0.421*
	(0.220)	(0.218)	(0.234)	(0.245)	(0.210)	(0.213)
Muslim immigrant	0.046	1.211***	1.242***	1.060***	1.415***	0.976***
	(0.122)	(0.143)	(0.145)	(0.147)	(0.128)	(0.141)
N.	35342	35193	34994	34266	35072	34871

Dependent variable as in column heading. OLS esimates. Covariates as described in equation (1) and Table 1. Robust standard error reported in brackets. *$p<0.05$, **$p<0.01$, ***$p<0.001$

to expectations – to be significantly *less* strong for both immigrants (0.240) and Muslim immigrants (0.565).[10]

How can these findings for immigrants and Muslim immigrants be interpreted? The literature shows that perceptions of threat among immigrants affect their political behavior (e.g., Ramakrishnan & Espenshade, 2001; Cho et al., 2006) by increasing their political engagement. We suggest that the increased perception of discrimination that immigrants have experienced in Europe has been followed by an unexpected political reaction (Bălţătescu, 2007): protection and absence of retaliation. To the extent that immigrants perceive that democratic institutions have protected them from this potential threat to their rights and freedoms, they may experience an increase in the satisfaction with the functioning of democracy, with a resulting differential effect in terms of well-being with respect to natives.

This interpretation can help to explain why we find the effect to be significant when using happiness as a dependent variable, while not significant when using life satisfaction. Despite the two variables being strongly correlated, happiness is more anchored to individual values (concern for others, security, conformity, etc.) while life satisfaction is more related to individual outcomes (type of work, income, etc.).[11] As a consequence, the former is likely to be more sensitive to threats to individual rights and freedoms.

Our interpretation, based on the *perception* by immigrants on the strength of democratic institutions in protecting individual rights and freedoms, explains also why we are able to detect this effect despite a relatively short period of time elapsed on average since the attack. Perception can in fact be affected rather quickly by political statements and stances

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[10] The limited sample size does not allow to exploit the information about 1st and 2nd generation immigrants.

[11] See Joshanloo et al., (2016).

and does not necessarily depend on effective outcomes in terms successful anti-terrorist actions.

In order to assess this possible interpretation, Table 6 reports estimates of the differential effect for Muslim immigrants of terrorism on the indicators of trust and satisfaction with institutions examined in Table 4. No significant difference for Muslim immigrants is found in the effect of terrorism on indicators of trust. On the other had, consistent with our predictions, the negative effect of terrorist attacks on satisfaction with democracy is significantly less strong for immigrants and Muslim immigrants.[12]

It should be noted that our interpretation is based on the assumption that both migrants and natives report their actual levels of satisfaction before and after the event. However, it might be the case that social desirability affects differently the responses of immigrants and natives after the event. More precisely, given the documented link between terrorist attacks and negative attitudes toward immigrants (e.g., Legewie, 2013), Muslim immigrants might be more reluctant than natives to reveal their preferences.

4.3 Robustness

Equation (1) was estimated by OLS for ease of interpretation. In order to take into account the ordinal nature of the dependent variables, we also report, as a robustness check, the results obtained by using ordered logit estimation. Furthermore, as an additional robustness check, we consider estimates obtained by using a multi-level model that takes into account the structure of the data set (individuals nested within countries and regions) or by using a discrete measure of time (in days) elapsed since the attacks. The results of these robustness checks are presented in Table 7. Overall, the results are virtually unchanged. The negative effect of terrorist attacks on well-being is qualitatively robust to the use of different estimation techniques and alternative indicators of terrorist attacks.

The identification strategy used in this paper is usually referred to as the Unexpected Event during Survey Design (Muñoz et al., 2020) (UESD henceforth). Several issues have to be considered regarding the causal interpretation of the results. First, a crucial feature of UESD is that it exploits the randomness of events occurring unexpectedly in order to provide credible estimates of the causal effects of those unexpected events on some outcomes.[13] This identification strategy relies, therefore, on the assumption that all respondents interviewed after the event were exposed to it (full compliance). This can be considered a plausible assumption given the salience of the events analyzed. Second, there may be imbalances in the sample of respondents before and after the attacks. Using data from the the 2014 round of the ESS, Muñoz et al., (2020) show that those who were older, less educated, and out of the labor market (unemployed, retired, or doing housework) were interviewed earlier during the fieldwork of this survey. This differential *reachability* becomes an issue when it is correlated with the potential outcomes. In our framework, this occurs when, for instance, individuals' willingness to respond to a survey is influenced by the attacks. As a result, while the sample as a whole may be representative of the underlying population, the two sub-samples of individuals interviewed before and after the attack

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[12] We acknowledge that ours is not the only possible interpretation. One alternative explanation could be that Muslim immigrants may have sympathized with the reasons underlying the terrorist attacks, blaming Western influence on their low level of subjective well being. The findings in Sirgy et al., (2019) may support this interpretation.

[13] This identification strategy has been extensively used to study the effects of terrorist attacks (Boydstun et al., 2018; Balcells & Torrats-Espinosa, 2018; Coupe, 2016; Dinesen & Jæger, 2013).

Table 7 Terrorism and wellbeing: robustness

	(1)	(2)	(3)	(4)	(5)	(6)
	Ordered Logit		Multilevel		OLS	
	Life Satisfaction					
Post attack	− 0.328***	− 0.324***	− 0.181**	− 0.175*		
	(0.039)	(0.040)	(0.067)	(0.068)		
Immigrant*post		− 0.039		− 0.062		
		(0.084)		(0.127)		
Time elapsed from attack					− 0.001***	− 0.001***
					(0.000)	(0.000)
Immigrant*time elapsed						0.000
						(0.000)
N.	35237	35237	12122	12122	35237	35237
Post attack	− 0.328***	− 0.389***	− 0.181**	− 0.189**		
	(0.039)	(0.039)	(0.067)	(0.068)		
Muslim immigrant*post		0.131		0.345		
		(0.168)		(0.245)		
Time elapsed from attack					− 0.001***	− 0.001***
					(0.000)	(0.000)
Muslim immigrant*time elapsed						0.001***
						(0.000)
N.	35237	35339	12122	12152	35237	35339
	Happiness					
Post attack	− 0.225***	− 0.245***	− 0.186***	− 0.214***		
	(0.040)	(0.041)	(0.049)	(0.050)		
Immigrant*post		0.178		0.297**		
		(0.093)		(0.107)		
Time elapsed from attack					− 0.000***	− 0.000***
					(0.000)	(0.000)
Immigrant*time elapsed						0.001***
						(0.000)
N.	35235	35235	12126	12126	35235	35235
Post attack	− 0.225***	− 0.266***	− 0.186***	− 0.200***		
	(0.040)	(0.039)	(0.049)	(0.049)		
Muslim immigrant*post		0.528**		0.821***		
		(0.182)		(0.207)		
Time elapsed from attack					− 0.000***	− 0.000***
					(0.000)	(0.000)
Muslim immigrant*time elapsed						0.002***
						(0.000)
N.	35235	35337	12126	12156	35235	35337

Dependent variable as in column heading. Covariates as described in equation (1) and Table 1. Columns 1–2 and 5 – 6 report robust standard errors *$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 8 Terrorism and wellbeing: Entropy balancing and placebo test

	(1) Life Satisfaction	(2) Happiness	(3) Life Satisfaction	(4) Happiness	(5) Life Satisfaction	(6) Happiness
Post attack	− 0.289***	− 0.252***				
	(0.065)	(0.053)				
Immigrant*post	− 0.037	0.137				
	(0.103)	(0.086)				
Post attack			− 0.305***	− 0.250***		
			(0.063)	(0.052)		
Muslim immigrant*post			0.293	0.481**		
			(0.196)	(0.167)		
Placebo					− 0.085	0.025
					(0.066)	(0.052)
N.	35237	35235	35237	35235	35237	35235

OLS with entropy balancing. *$p<0.05$, **$p<0.01$, ***$p<0.001$

may not, possibly leading to biased estimates. Entropy balancing (Hainmueller, 2012) provides a way to avoid this bias by pre-processing the data. More specifically, this method balances the mean, variance and skewness of the covariates between the treated and the control group. Third, there may be time trends, existing before the terrorist attacks took place and unrelated to the event itself, which could bias the findings. In order to address this issue we build a placebo treatment at a point in time to the left of the cutoff point, namely at the empirical median of the control group (Imbens & Lemieux, 2008) and test whether it affects the outcomes. Table 8 presents the results of both entropy balancing (columns 1 to 4) and placebo test (columns 5 to 6). Coefficient estimates obtained by using entropy balancing are virtually unchanged, in terms of both sign and significance, whereas no significant effect is found in the placebo test. Overall, these results provide support to the causal interpretation of our findings.

5 Conclusions

This paper investigates the well-being effects of terrorist attacks in France, Belgium and Germany between 2010 and 2017. By exploiting the exogeneity of the timing of the attacks, we find a significant negative association between terrorist attacks and individuals' subjective well-being. In order to assess possible channels through which this effect occurs, we show that terrorist attacks are associated to a significant reduction in trust and satisfaction with institutions. Moreover, terrorist attacks are found to be positively related to negative attitudes towards immigrants. However, the negative association between terrorism and well-being is found to be *less* strong for immigrants and, more specifically, for Muslim immigrants.

We show that the institutional channel could provide an explanation of this finding. In this perspective, immigrants may appreciate more the institutional reaction, while natives are likely to perceive that institutions have not done enough to protect their citizens. Although our data do not allow to corroborate further these findings, they may nevertheless provide important indications for future research. It should also be noted that, although we estimate a model with time elapsed since the attack, our data set does not allow us to assess

the long term consequences of the shocks and the extent to which they differ from short term effects. This is an additional relevant issue for future research.

Code Availability The code used to replicate the empirical analysis will be made available upon acceptance.

Declarations

Conflict of interest The author declares that they have no conflict of interest.

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