

Lange, Martin; Schmidt, Alexander

**Working Paper**

## High-profile crime and perceived public safety: Evidence from Cologne's new year's eve in 2015

ZEW Discussion Papers, No. 23-068

**Provided in Cooperation with:**

ZEW - Leibniz Centre for European Economic Research

*Suggested Citation:* Lange, Martin; Schmidt, Alexander (2023) : High-profile crime and perceived public safety: Evidence from Cologne's new year's eve in 2015, ZEW Discussion Papers, No. 23-068, ZEW - Leibniz-Zentrum für Europäische Wirtschaftsforschung, Mannheim

This Version is available at:

<https://hdl.handle.net/10419/283590>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

DISCUSSION

// NO.23-068 | 12/2023

# DISCUSSION PAPER

// MARTIN LANGE AND ALEXANDER SCHMIDT-CATRAN

## High-Profile Crime and Perceived Public Safety: Evidence From Cologne's New Year's Eve in 2015

# HIGH-PROFILE CRIME AND PERCEIVED PUBLIC SAFETY: EVIDENCE FROM COLOGNE'S NEW YEAR'S EVE IN 2015\*

Martin Lange<sup>1</sup> and Alexander Schmidt-Catran<sup>2</sup>

<sup>1</sup> ZEW Mannheim

<sup>2</sup> Goethe University Frankfurt

December 18, 2023

## Abstract

This study analyses the impact of a high-profile crime event on perceived public safety. At the 2015 New Year's Eve celebrations in Cologne (NYE), Germany, refugees allegedly committed over a thousand crimes, ranging from theft to sexual assault. The widespread media coverage of these incidents made a shift in the public's perceived safety plausible. We empirically analyze this proposition using a difference-in-differences strategy. Using the European Social Survey, we estimate the differential response of German respondents to those of other European countries in terms of perceived safety after NYE. We find that Germans feel less safe after the NYE incidents. Women and individuals leaning toward the political right are affected the most. An analysis of search queries suggests that the loss of perceived safety may also translate into changed behavior, indicated by a higher demand for defense goods.

JEL classification: J15, K42, Z13

Keywords: Crime, Perceived Safety, Immigration, Refugees

---

\* Martin Lange, ZEW Mannheim, L7 1, 68161 Mannheim, Email: martin.lange@zew.de; Alexander Schmidt-Catran, Department of Social Science, Institute for Sociology, Theodor-W-Adorno-Platz 6, 60323 Frankfurt am Main, Email: schmidt-catran@soz.uni-frankfurt.de. We thank Max F. Steinhardt, Christian Cymara, Sarah McNamara, and participants of the IMES Scientific Board Meeting, at the 1<sup>st</sup> Welfare and Policy Conference in Bordeaux, at the SOEP Brown Bag Seminar at DIW Berlin, at the Jena Economics Research Seminar, and at the Annual Meeting of Verein für Socialpolitik for valuable comments. Martin Lange gratefully acknowledges financial support from the German Federal Ministry of Labour and Social Affairs (Grant Number FIS.00.00140.20).

# 1. INTRODUCTION

Immigration often triggers fears among the host population, particularly with respect to a potential increase in crime (Hainmüller and Hopkins, 2014; Alesina and Tabellini, 2022; Dinas and van Spanje, 2011; Fitzgerald et al., 2012; Bianchi et al., 2012). Despite numerous studies showing that immigration has little impact on actual crime rates in host countries (in particular Ousey and Kubrin, 2018; Fasani et al., 2019), safety concerns persist among some segments of the population. This begs the question of why individuals harbor such elevated levels of fear about crime and safety when immigration is high, and what additional factors may contribute to a perceived deterioration of safety?

This study seeks to address these questions in the context of the refugee influx to Europe in 2015, during which approximately 1.3 million asylum seekers arrived in Europe from North Africa and the Middle East in 2015 alone. About one-third of these refugees applied for asylum in Germany (Connor, 2016). Our analysis centers on the role of a major crime event, namely, the New Year's Eve celebrations 2015/16 in Cologne, Germany (henceforth NYE). As in previous years, thousands gathered near the city's main train station to welcome the New Year. The 2015 festivities, however, were overshadowed by over a thousand crimes, ranging from theft to sexual assault, allegedly committed by refugees. The widespread media coverage of these incidents sparked a national debate on the consequences of immigration, prompting a shift in public opinion (Landtag NRW, 2017; Wigger et al., 2022). Given the broad reach of media coverage, it is likely that a substantial portion of the population became aware of the crimes committed during the NYE celebration. As such, these events represent a pivotal moment in the public discourse on immigration and security in Germany, with potentially lasting implications for attitudes and perceptions.

We explore whether the events surrounding NYE in Cologne in 2015 influenced the public's perception of safety in Germany. This study utilizes data from the European Social Survey (ESS) and a difference-in-differences (DiD) estimator to compare the perception of safety in Germany before and after the NYE events with those in other European countries. The latter is used as a control group to measure the influence of NYE on the perception of safety in Germany. The control group approach is based on the assumption that other European countries were also exposed to a significant influx of asylum seekers to Europe around 2015 but were not directly affected by the NYE events. In a second analysis we use data from the German Socio-economic Panel (SOEP), where the data collection took place around NYE; allowing us to compare safety perception before and after the event within Germany. The timing of the survey allows us to employ a regression discontinuity design (RDD) and fixed effects regressions. By focusing on two different identification strategies, we provide empirical evidence on whether and to what extent concerns about safety are driven by high-profile crimes committed by immigrants.

Our results from the ESS analysis showcase that German respondents are subject to a marked decrease in perceived safety after NYE compared with respondents in other European countries. In our most conservative specification, we find a decrease in the perceived safety of approximately five percent for German respondents. This decrease persists for up to two years and is associated with a more negative view on refugee immigration and marginally worse views about immigration in general. In terms of heterogeneity, women seem to be more affected by NYE than men. Similarly, strong political differences were also observed. While left-leaning individuals do not adjust their perception of safety significantly, those leaning to the political right become much more concerned about safety. Using the data from the SOEP, we can corroborate that worries about crime are indeed significantly higher after NYE than in the period before. Finally, using queries from a prominent internet search engine, we see that the loss in perceived safety likely increased the demand for self-defense goods.

We contribute to three research areas related to immigration and its impact on residents' attitudes, and perceptions of safety. First, we address the puzzle between the perceived crime impact of immigration and its actual effect on crime rates in destination countries. Although the fear of increased crime is the most common reason for opposing immigration, previous research has generally found either no or only weak associations between immigration and actual crime rates (Butcher and Piehl, 1998a,b; Bianchi et al., 2012; Bell et al., 2013; Nunziata, 2015; Özden et al., 2017). In fact, a meta-analysis by Ousey and Kubrin (2018) for the U.S. concluded that immigration even reduces crime to a modest extent. Furthermore, studies examining the relationship between asylum immigration and crime in Germany around 2015 have found no significant association (Gehrsitz and Ungerer, 2022; Huang and Kvasnicka, 2019) or, at most, only a small and economically irrelevant increase in crime (Lange and Sommerfeld, 2023). Previous research on the relationship between immigration and perceived safety is limited. The only studies we know suggest that the level of immigration itself works as a driver of feelings of insecurity. Fitzgerald et al. (2012), Ajzenman et al. (2021), and Bove et al. (2023) find that immigration per se increases concerns about crime. The contribution of this study is to extend the body of evidence on this puzzle by analyzing the impact of immigrant crime on perceptions of safety.

Second, we contribute to the analysis of immigration-related events that are highly publicized in the media, such as Islamist terrorist attacks and other violent assaults by migrants. Previous studies have shown that these events strongly influence individuals' attitudes. However, these studies are more concerned with the rejection of immigration in general, and not with perceived safety (for example, Finseraas et al., 2011; Legewie 2013; Ferrín et al., 2020; Nägel and Lutter, 2020; Frey, 2022). In this vein, the events of NYE 2015 in Cologne were explicitly considered in the context of attitudes toward immigration. For example, in a survey experiment, Czymara and Schmidt-Catran (2017) document a major shift in public support for refugee immigration in Germany following the events of NYE. While positive attitudes toward refugees in general remained, opposition to refugees from Arab and African countries increased significantly. In addition, Keita et al. (2023) document that the way newspapers report crimes affects attitudes toward immigrants following the events of NYE.

Third, the extent to which residents' perceptions of safety are affected by crimes committed by migrants has not yet been examined in the economic and social science literature. Previous studies on the causes of increased concerns regarding safety and crime have focused on other factors. For one, information deficits and misperceptions as well as media coverage have been examined. For example, Esberg and Mummolo (2018) find that misperceptions about rising crime are based in part on a lack of knowledge of official statistics and exposure to misleading reports in newspapers or statements by political figures. Similarly, Mastroiocco and Minale (2018) use a natural experiment in Italy to show that individuals who are less frequently exposed to crime reporting have lower concerns.

The remainder of this paper is organized as follows. First, we elaborate on the background of our study and introduce some thoughts on how immigrant crimes may affect perceptions of safety. We then summarize our data and describe the empirical approaches. Next, we present our main findings, discuss their implications, and present further results that corroborate our main results. We then provide the results of a thorough robustness check and draw a conclusion.

## 2. SETTING AND THEORETICAL BACKGROUND

### 2.1 SETTING

In 2015, the European Union registered over 1.3 million asylum seekers, more than double the number of the previous year. Over a third of these refugees applied for asylum in Germany, making it the most popular destination country in Europe (Connor, 2016).

The pivotal event under study is the NYE celebrations in Cologne in 2015. Every year, a large crowd of people come together at the central train station to welcome the New Year. In 2015, however, the celebrations have been accompanied by groups of young men committing an unparalleled number of crimes. At the end of the night, the police recorded more than 1,200 crimes. Offenses ranged from theft to physical and sexual assault, with the latter accounting for almost half of all reported crimes (Landtag NRW, 2017). In addition, this event was unique because of the large number of perpetrators. The police estimated that between 1,000 and 2,000 people were involved in the offenses (Landtag NRW, 2017). In the aftermath, many victims described the perpetrators as having a 'North African and Middle Eastern appearance' (Frey, 2020).

NYE led to a public outcry and heated the political debate on refugee immigration and public safety in general. In the public discourse, far-right speakers drew a picture of lost perceived safety associated with the influx of male immigrants from Arab and North African countries (Weiland, 2016; Czymara and Schmidt-Catran, 2017). Thus, immigrants were not only seen as symbolically threatening but also as posing a threat to collective and individual safety, especially for native women (de Rooij et al., 2015).

### 2.2 THEORETICAL BACKGROUND

The group-threat theory (Blalock 1967; Quillian 1995) is typically the theoretical starting point to explain the impact of immigration on attitudes towards immigrants. In his seminal paper, Blumer (1958) argued that ethnic prejudice results from threat perceptions. The traditional proposition in previous research is that public attitudes towards immigrants respond to actual immigration (Ceobanu and Escandell 2010). The empirical literature on the effects of immigration on individuals' attitudes towards immigrants, however, finds only inconclusive evidence (Schmidt-Catran and Czymara, 2023: p. 87). Some studies took Blumer's arguments more literally and started to investigate the influence of significant immigration-related events as the driver of threat perceptions and anti-immigrant attitudes. After all, Blumer specifically emphasizes the importance of "big events" (p. 6) for the formation of a threatening image of the out-group.

In this line of reasoning, many studies have analyzed the influence of events like terrorist attacks, which are viewed as a natural experiment, as they are hard to predict and therefore an exogenous treatment for the affected population. Such studies focus either on general attitudes towards immigration (Ferrín et al., 2020; Hopkins, 2010; Legewie, 2013) or on fear of terrorism (Finseraas and Listhaug, 2013). More recent studies in this line of research have argued that the effects of such events should primarily influence attitudes towards those immigrant groups that are associated with the event (Czymara and Schmidt-Catran, 2017; Frey, 2022; Jungkunz et al., 2018; Schmidt-Catran and Czymara, 2020). While we believe these arguments are important, we take yet another perspective here. We test whether the events on NYE 2015 influenced individuals' perceptions of safety threats. From the perspective of group threat theory, threat perceptions should precede the formation of prejudice against an out-group.

Our first hypothesis, thus, is that the events of NYE 2015 increased individuals' safety concerns (H1). Empirically, we also test for effect heterogeneity across different subgroups. Women consistently

show higher levels of fear than men (Ferraro, 1995), which may be due to fear of sexual assault in particular (Ferraro, 1996). People with prior victimization experiences may also be more susceptible to higher levels of fear (Weinrath and Gartrell, 1996). We, therefore, hypothesize that the events on NYE trigger stronger increases in fear in women and in those who have victimization experiences. We, furthermore, test whether the impact of the events on NYE depends on the ideological position of individuals. We assume that peoples' information processing is biased by their political beliefs (Taber and Lodge, 2006). People on the left and the right, therefore, may react differently to the political and medial discourses around the events on NYE (Schmidt-Catran and Czymara, 2023; Bail et al., 2018), where threat perceptions should increase stronger for people on the right.

After the basic proposition of the group threat paradigm has been tested, we analyze the influence on attitudes towards immigrants in general and refugees in particular. We assume that attitudes towards out-groups become more negative after the event (H2). Following the recent literature, we assume that the effect of NYE 2015 on attitudes towards refugees should be stronger than the effect on attitudes towards immigrants in general (H3).

### 3. DATA

The primary objective of this study is to investigate whether the perception of safety among the German population was affected by the events of NYE 2015. To this end, data from the European Social Survey (ESS, 2021) are utilized. The ESS is a cross-national survey that includes multiple European countries where respondents are asked uniform questions about their socioeconomic status, attitudes, and values. Hence, the ESS is particularly well suited to assess the impact of NYE on the German population's perception of safety, relative to populations in other European countries.

We use rounds 1 to 9 from the ESS, which collects data every other year. The entire dataset spans the period from 2002 to 2019, facilitating both short- and long-term comparisons of the perception of safety before and after NYE. The timing of the ESS data collection is convenient, as NYE lies exactly between two rounds of the ESS, i.e. between rounds 7 and 8, which were conducted in 2014/15 and 2016/17, respectively. We include all countries in the analysis in which the ESS conducted interviews at least in rounds 7 and 8. In Table A1, we report these countries together with the number of observations per country.

We restrict our analysis to natives by excluding first-generation immigrants, defined as people with a country of birth other than their country of residence, and those holding citizenship from a different country. Furthermore, we only consider adults and limit the age of the respondent to 85 years. The dataset is further trimmed by removing extreme or implausible observations, i.e., having spent more than 25 years in education or having more than ten household members. Finally, we construct a balanced sample of observations including only those respondents who gave answers to our main outcome variable and the main control variables (see below). In total, our analysis sample from the ESS comprises 189,927 observations of which 18,308 are from Germany (9.6 percent).

Our main outcome is a binary indicator that measures an individual's sense of safety in outdoor spaces during nighttime hours ("Feeling safe at night"). The variable takes a value of one if the individual reports feeling safe or very safe in such situations, and zero otherwise. The original variable with four ordinal answer categories ('very safe', 'safe', 'unsafe', and 'very unsafe') is used in a robustness check.

In further explorations, we also use binary indicators of positive attitudes toward refugees and immigrants.<sup>1</sup>

In the empirical analysis, we control for individual-level differences in gender, age, number of years of schooling, employment status, income, marital status, and victimization experience. We also include country-level variables from the World Bank Open Data portal (number of refugees per 100,000 residents, GDP per capita, and the unemployment rate) as well as crime statistics from Eurostat (drug offenses, murders, and robberies per 100,000 residents). Table A2 gives the summary statistics of the ESS data and country-level covariates used in the empirical analysis.

To corroborate our results, we also use the German Socio-Economic Panel (SOEP, 2022). The SOEP is a representative longitudinal survey for Germany and asks respondents about many dimensions of life. We use the survey years 2015 and 2016 when analyzing the SOEP data. For this exercise, we try to match the variables that are used in the analysis using the ESS as closely as possible. Unfortunately, the SOEP does not ask for perceived safety but instead asks about worries about crime. We use this variable as an outcome when working with the SOEP data and construct an indicator variable that is equal to one if a respondent is ‘very worried about crime’ and zero if the person is only ‘somewhat worried’ or ‘not worried at all’. The summary statistics of the variables used from the SOEP can be found in Table A3.

## 4. EMPIRICAL STRATEGY

### 4.1 CROSS-COUNTRY ANALYSIS

To quantify the influence of the crime events of NYE on the perception of safety in Germany, we implement a difference-in-differences (DiD) analysis. Building on the ESS as our main data set, we use other European countries as control units and assess the change in the perception of safety in Germany from prior to after NYE vis-à-vis this change for the other European countries (see Table A1 for the full list of control countries). Specifically, we estimate the following canonical DiD equation using a two-way fixed effects design:

$$y_{ics} = \alpha + \delta D_{sc} + X_{ics}\gamma + W_{cs}\theta + \phi_s + \phi_c + \phi_c \times S + \epsilon_{ics}, \quad (1)$$

where  $y_{ics}$  is the outcome of interest, for individual  $i$  in country  $c$  at time period  $s$ .  $D_{sc}$  is a binary indicator variable that varies over survey rounds and treatment status and is equal to one if the survey was conducted after NYE 2015 and if the respondent is from Germany and is equal to zero otherwise (*Post x Treat*).  $X_{ics}$  and  $W_{cs}$  are vectors including control variables that vary over time at the individual- or country-level, respectively. We control for standard demographics and socio-economic variables.

---

<sup>1</sup> A binary indicator of positive attitudes toward refugees comes from the question whether the Government should be generous in judging applications for refugee status. Participants could either indicate ‘Disagree strongly’, ‘Disagree’, ‘neither, nor’, ‘Agree’, or ‘Agree strongly’. We code those who answered ‘Agree’ or ‘Agree strongly’ equal 1, in favor of lenient recognition, and those who answered ‘Disagree’ or ‘Disagree strongly’ equal 0.

The binary indicator of positive attitudes toward immigration is based on responses to three questions about the respondents’ stance toward immigration in three domains of life. Specifically, the ESS asks about whether (i) “Immigration is bad or good for country's economy”, (ii) “Country's cultural life undermined or enriched by immigrants”, and (iii) “Immigrants make country worse or better place to live”. We estimate the principal component and create a binary indicator variable, where respondents with positive attitudes above the average are coded 1 and respondents below the mean are coded 0.



Additionally, we control for victimization experience in the last five years. We also control for time-varying country differences in GDP per capita, the national unemployment rate, the number of refugees per 100,000 residents, and crime rates for murder, robbery, and drug offenses (see Table A2 for more information on the control variables).  $\phi_s$  and  $\phi_c$  denote survey round and country fixed effects. To be as strict as possible in controlling for general country-level differences over time, we also control for country-specific time trends ( $\phi_c \times S$ ). Finally, standard errors are clustered at the country level to account for the non-independence of observations from the same country.

We are interested in identifying the parameter  $\delta$ , i.e. the coefficient of the interaction between post-NYE and the treatment indicator. The  $\delta$  coefficient represents the estimated treatment effect of the crime events of NYE on the perception of safety in Germany, relative to the other European countries. To be able to interpret  $\delta$  as a causal parameter, we rely on the parallel trend assumption, i.e. that German respondents would hold similar perceptions of safety as respondents from other countries in the absence of the events that occurred on NYE in 2015. While it is not possible to test this identifying assumption, we can test for pre-trends, i.e. whether the perception of safety differs markedly for Germany compared to the other ESS countries in the years prior to 2015. Figure 1 in Section 5.1 gives a first indication that pre-trends may not be an issue in our empirical setting. Figure 2 in the same section, which provides a more formal test of pre-trends, indeed shows no sign of pre-trends in the run-up to 2015. This result makes us confident that our identifying assumption is likely reasonable.

As we cannot fully exclude spillovers of NYE on the attitudes of respondents in other European countries, given the severity and immense coverage of crimes, it is worthwhile noting that a potential (weak) treatment of control respondents would downward bias the estimation of our parameter of interest. Prior research on the potential spillover effects of terrorist attacks on Europe has produced mixed results. While studies on terrorist attacks in France tend to find (small) spillover effects in other European countries (Castanho Silva, 2018; Ferrín et al., 2020), studies on terrorist attacks in other European countries find that spillover effects are rather limited (Finseraas et al. 2011; Larsen et al., 2019). Given the current evidence, we remain agnostic about any potential spillover effects of NYE. In the case that spillover effects do exist, it is important to note that our approach would not be invalidated. We would rather estimate a lower bound of the true effect.

Finally, as we exploit variation between Germany and other European countries over time to identify  $\delta$ , we have to assume that—conditional on covariates—there are no other factors that drive differences in perceived safety between respondents in Germany and other European countries. To make this assumption as plausible as possible, we included time-variant country control variables and country-specific time trends in equation (1). Nonetheless, there may remain unobserved factors for which we cannot control. Thus, we exploit an additional survey dataset, in which we can investigate the immediate reaction of Germans to NYE.

#### 4.2 WITHIN GERMANY ANALYSIS

To explore whether we see any differences in worries about crime before and after NYE, we use data from the SOEP and follow three approaches. First, we construct a sample that is based on respondents who were interviewed in the fourth quarter of 2015 and the first quarter of 2016. More precisely, the cutoff date between the two groups is January 4, 2016, that is, the date on which the crimes of NYE became publicly known via coverage in nationwide media.<sup>2</sup> We use simple conditional mean comparisons to show differences between these two groups of respondents. Specifically, we estimate the following linear regression model:

---

<sup>2</sup> Using December 31, 2015 as the cutoff date does not change our results qualitatively nor quantitatively.

$$y_i = \beta_0 + \beta_1 D_{s>2015} + X_{is}\gamma + \epsilon_i, \quad (2)$$

where  $y_i$  is a dummy variable which is equal to one if respondent  $i$  is concerned about crime and else equal to zero.  $D_s$  is a binary indicator variable that is equal to one if the survey  $s$  was conducted after January 4, 2016, and equal to zero otherwise.  $X_{is}$  is a vector including individual control variables, that is, gender, age, number of years of schooling, labor force status, log income, marital status, and whether the respondent lives in East or West Germany.

Second, we use the entire survey years 2015 and 2016 to be able to run individual fixed effects regressions in the following form:

$$y_{is} = \beta_0 + \beta_1 D_{s>2015} + X_{is}\gamma + \phi_i + \epsilon_{is}. \quad (3)$$

Note that equation (3) now includes an individual specific fixed effect  $\phi_i$ . By including  $\phi_i$ , we exploit variation within respondents between 2015 and 2016. This has the advantage that we control for any time-invariant individual specific variation that may influence worries about crime.

Third, we run a sharp RDD in time to demonstrate the immediate difference in worries about crime around the date on which the offenses at NYE became publicly known. Specifically, we estimate the following RDD specification:

$$y_i = f(x_i) + \beta_1(x_i \geq x_0) + \epsilon_i, \quad (4)$$

where  $f(x_i)$  is a non-linear function that we estimate nonparametrically via local linear regression of degree 1.  $x_0$  is the cutoff date, which we set to January 4, 2016. Bandwidth size is chosen optimally according to Calonico et al. (2020). In Section 5.3., we report bias-corrected RD estimates with a robust variance estimator following Calonico et al. (2014).

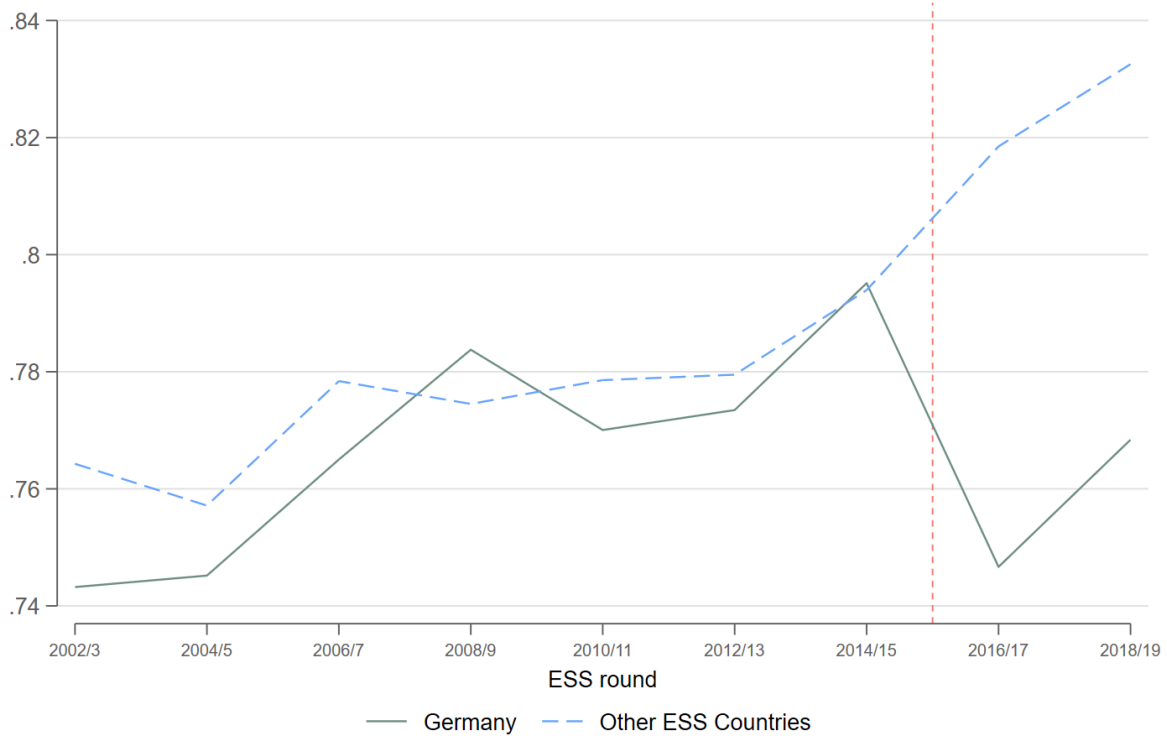
## 5. RESULTS

In this section, we first present our main results using the ESS and show which socio-demographic and socio-cultural groups react the most to NYE (Section 5.1). We then discuss the influence of NYE on general attitudes toward immigration (Section 5.2) and provide further evidence on the impact of NYE on perceived safety in Germany using the SOEP data (Section 5.3). Finally, we present indicative evidence that the loss of perceived safety by NYE may have triggered behavioral reactions among the German population (Section 5.4).

### 5.1 THE IMPACT OF NYE ON PERCEIVED SAFETY

Figure 1 shows how our main outcome variable developed over time between respondents in Germany and the other European countries. In general, we see a slight trend toward higher perceived safety over time. There does not seem to be much of a difference in perceived safety between respondents from Germany and those from other European countries in the period preceding NYE. After NYE, however, perceived safety decreases substantially for respondents from Germany, while respondents in other European countries continue to feel safer. This descriptive evidence may already give a preview of the econometric results presented later on.

FIGURE 1: SHARE OF RESPONDENTS FEELING SAFE OUTSIDE AT NIGHT



Note: The figure shows the share of respondents that feel safe outside at night for Germany and all other ESS countries for each survey round. The dashed orange line indicates the timing of NYE in 2015.

Our main results are presented in Table 1. The table presents the results of DiD regressions with perceived safety as a binary outcome measure. Model 1 in Table 1 shows the estimation results for the DiD coefficients of a model without control variables. The second column presents the results for a model including individual-level control variables and the third column features the results of a model with the full set of control variables.

**TABLE 1: DIFFERENCE-IN-DIFFERENCES RESULTS OF FEELING SAFE AT NIGHT**

	Model 1	Model 2	Model 3
Post x Treat	-0.0567*** (0.00994)	-0.0581*** (0.00906)	-0.0380*** (0.00828)
Country Fixed Effects	Yes	Yes	Yes
ESS Round Fixed Effects	Yes	Yes	Yes
Ind. Control Variables	No	Yes	Yes
Macro Control Variables	No	No	Yes
Adj. R-squared	0.0410	0.115	0.117
No. of Observations	189,927	189,927	189,927
Mean of Dependent Variable	0.800	0.800	0.800

Note: The table presents difference-in-differences regression results about the post-NYE 2015 feeling of safety. Treatment is defined by being a respondent in the ESS in Germany. Standard errors are clustered at the country level and displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In general, the DiD term *Post x Treat*, i.e.  $\delta$  from estimation equation (1), is negative, statistically significant at the 1%-level, and remarkably stable across specifications. This means that the negative impact of NYE on the perception of safety was stronger for respondents from Germany than for respondents from the control countries, supporting hypothesis H1. In our most conservative estimation in Model 3, respondents in Germany feel about 3.8 percentage points less safe at dark after

NYE compared to respondents in the control countries. This is a difference of about 4.8 percent (-0.038/0.800).

FIGURE 2: THE DYNAMIC INFLUENCE OF NYE ON PERCEIVED SAFETY



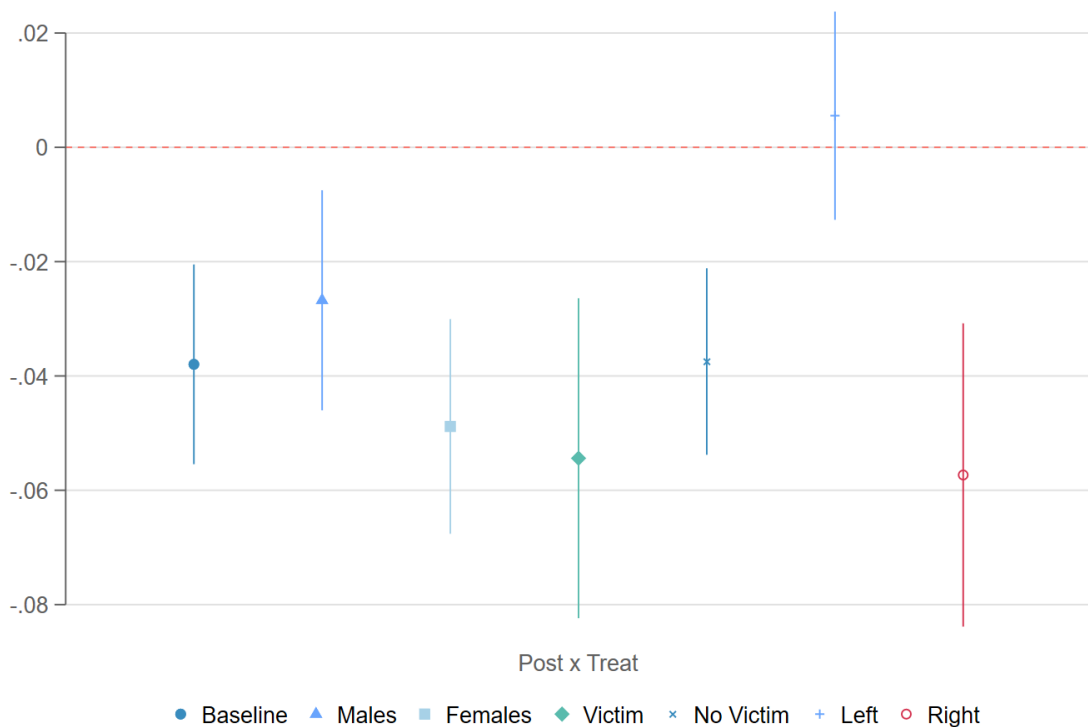
Note: The figure shows the DiD terms for each survey round. The vertical red line marks NYE 2015. Control variables are identical to Model 3 from Table 1. The reference period is the 2014/15 ESS survey round.

The repeated implementation of the ESS allows us to also analyze the dynamics of the influence of NYE on perceived safety. Figure 2 shows the estimated difference between German respondents and those from other European countries for each survey round. This result is based on a dynamic DiD estimation based on the full estimation equation (1). Here, we include a series of treatment identifiers for each survey round. The reference period is the 2014/15 survey round. As clearly visible, there is no statistically significant difference in perceived safety between respondents in Germany and those in the other control countries prior to NYE 2015. In the survey wave following NYE 2015, i.e. in 2016/17, there is a marked deterioration of perceived safety among respondents from Germany. However, this difference vanishes after two years and the coefficient for the treatment identifier at the survey round in 2018/19 becomes statistically indistinguishable from zero again.

Table 1 and Figure 1 show a clear drop in perceived safety among German respondents after NYE. But is this deterioration in perceived safety the same among all individuals? Figure 3 estimates the parameter of interest for different subgroups in the sample. The first blue dot depicts the baseline estimate and its standard error from Model 3 (Table 1). As women were the main targets of the sexual assaults, we suspect this group to have a stronger reaction to the event. The reaction to NYE of women indeed seems to be almost twice as strong as compared to men and the two coefficients differ statistically significantly from each other ( $p < 0.01$ ).

Similarly, when we differentiate between previous victimization experiences, we see a much larger point estimate for those who have been a victim of burglary or assault in the last five years. However, due to large standard errors, we cannot reject that the estimates for previously victimized and non-victimized individuals are indeed statistically different from each other.

FIGURE 3: HETEROGENEITY BY SUBGROUP



Note: The figure shows the *Post x Treat* coefficient from the difference-in-differences regression described by equation (1) in Section 4. The estimation samples vary in size based on the distribution of the group variables.

Finally, we analyze differences in the treatment effect based on the political orientation of respondents. Using information on the left-right self-placement, we re-estimate our main estimation for both groups separately.<sup>3</sup> While the perception of safety does not change in response to NYE for respondents on the left, we see a pronounced deterioration of perceived safety for respondents on the right. In this case, we can again conclude that these two coefficients differ statistically significantly from each other ( $p < 0.001$ ).

## 5.2 NYE AND ATTITUDES TOWARD IMMIGRATION

The previous results show that perceived safety in Germany indeed deteriorates after NYE. Theoretically, we expect that these perceived threats can translate into negative attitudes towards out-groups. As refugees allegedly committed the crimes at NYE, it is plausible that attitudes toward refugees and perhaps more generally toward immigration became more negative. We investigate changes in these attitudes in Table 2.

Table 2 presents the results of the baseline DiD analysis with different outcome variables. In Model 1, we use as outcome variable an indicator that is equal to one if a respondent favors a more lenient approach to refugee recognition and zero otherwise. This question is asked only in survey rounds 7 and 8 and therefore reduces the number of observations substantially. Models 2 to 4 report results on a binary outcome variable that is equal to one if respondents are in favor of immigration and zero otherwise. The outcome in Model 2 should capture respondents' overall attitudes toward immigration

<sup>3</sup> We construct a binary variable from the 11 point left-right scale. The variable is equal to zero, if respondents place themselves on the left, and equal to one, if respondents place themselves on the right. We omit the neutral category.

and comes from a principle component analysis on three survey questions related to immigration (see Section 3). The outcomes in Models 3 and 4 relate to whether respondents think that immigration enriches life in their home countries and is good for the domestic economy, respectively.

**TABLE 2: DIFFERENCE-IN-DIFFERENCES RESULTS OF ATTITUDES TOWARD IMMIGRATION**

	Attitudes toward Immigration			
	Pro-Refugees	Overall	Life in General	Labor Market
	Model 1	Model 2	Model 3	Model 4
Post x Treat	-0.0525** (0.0233)	-0.0368** (0.0129)	-0.0554*** (0.0138)	-0.0215 (0.0193)
Country Fixed Effects	Yes	Yes	Yes	Yes
ESS Round Fixed Effects	Yes	Yes	Yes	Yes
Ind. Control Variables	Yes	Yes	Yes	Yes
Macro Control Variables	Yes	Yes	Yes	Yes
Adj. R-squared	0.207	0.135	0.162	0.152
No. of Observations	34,577	179,370	127,580	140,405
Mean of Dependent Variable	0.547	0.534	0.512	0.534

Note: The table presents difference-in-differences regression results about post-NYE 2015 attitudes toward refugees and immigration. Treatment is defined by being a respondent in the ESS in Germany. Standard errors are clustered at the country level and displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Turning to refugee attitudes, we estimate an additional decrease in post-NYE pro-refugee attitudes of about almost six percentage points for German respondents. This translates into a decrease of about ten percent (-0.0525/0.547). Model 2 shows the DiD estimate for overall attitudes toward immigration. We find a statistically significant negative coefficient of about four percentage points or seven percent (-0.0368/0.534). However, this deterioration in attitudes toward immigration is driven by very different concerns. While German respondents feel that life in Germany is generally worse due to immigration, with a decrease of more than five percentage points (Model 3), German respondents' attitudes toward immigration with respect to economic concerns do not seem to be affected by NYE (Model 4).

Given the estimates presented in Table 2, we conclude that attitudes toward refugees and immigration are also affected by NYE, supporting Hypothesis H2. As expected, attitudes toward refugees are more strongly affected than general attitudes towards immigration, supporting Hypothesis H3.

### 5.3 WITHIN GERMANY EVIDENCE

Thus far, we have assumed that the post NYE loss in perceived safety among German respondents is indeed due to the crime events at NYE in 2015 in Cologne. While this premise seems natural given the immense coverage of the crimes in Germany and the heated political debate that followed the incident, we cannot strictly rule out that German respondents differentially reacted to other security-related events than other countries. Unfortunately, we cannot use variation in the timing of the ESS survey in Germany, as fieldwork of round 7 in Germany was completed by February 2015. Hence, we resort to analyzing the SOEP.

We do so by three different approaches. First, we estimate differences in (conditional) means for those who potentially know about NYE vis-à-vis those who cannot know due to the timing of their interview date. We construct similar samples around NYE in 2014 and 2016, which serve as placebo test samples.

Table 3 shows the results of regressions of the differences in worries about crime between respondents interviewed in the fourth quarter of 2015 and before January 4, 2016 and in the first quarter of 2016 and after January 4, 2016 in Models 1 and 2, and between respondents interviewed in

the same time period but one year earlier or later, respectively for Models 3 and 4. Model 1 shows the raw difference without adding any control variables. Survey participants who have been interviewed after the NYE events became public are almost 12 percentage points more likely to be worried about crime than respondents who have been interviewed before the nationwide coverage of NYE 2015. When we include control variables, we estimate a conditional increase in worries of about nine percentage points or of about 18.6 percent (0.0937/0.503).

**TABLE 3: DIFFERENCE IN PRE- AND POST-NYE WORRIES ABOUT CRIME**

	Model 1	Model 2	Model 3	Model 4
Post NYE 2015	0.119*** (0.0202)	0.0937*** (0.0213)		
Post NYE 2014			0.0239 (0.0171)	
Post NYE 2016				0.0341* (0.0192)
Control Variables	No	Yes	Yes	Yes
Adj. R-squared	0.00267	0.0857	0.0776	0.101
No. of Observations	11,913	11,336	10,654	11,366
Mean of Dependent Variable	0.497	0.503	0.381	0.463

Note: The table presents regression results about the difference in pre- and post-NYE worries about rising crime in Germany. Pre-NYE respondents are interviewed in the fourth quarter of a year and before January 5 of the following year. Post-NYE respondents are interviewed in the first quarter but after January 4 of the following year. Columns (1) and (2) show the estimate of interest for NYE 2015, while columns (3) and (4) show placebo estimates for NYE 2014 and NYE 2016, respectively. Control variables include an indicator variable for gender, age, number of years of schooling, the labor force participation status, log labor income, an indicator variable whether an individual is married, and an indicator variable for whether an individual lives in East or West Germany. Robust standard errors are displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

We present placebo checks in Models 3 and 4 in Table 3. We would not expect any statistically meaningful difference in worries about crime after NYE in 2014 and 2016. The conditional estimates presented in these columns are much smaller in size and statistically indistinguishable from zero in the case of NYE 2014 (see Model 3). For NYE 2016, we find a marginally significant estimate. This could be the case due to a terrorist attack that happened in Berlin, Germany, on December 19, 2016. Nonetheless, the estimate is only about a third of the difference that we find for NYE 2015 and plausibly less relevant for large shifts in worries about crime for the public.

The results presented in Table 3 are already quite indicative that NYE had an immediate impact on worries about crime in Germany. We further corroborate these findings by alternative estimation strategies. As laid out in Section 4.2, we also estimate individual fixed effect regressions and an RDD on the entire survey years 2015 and 2016. Table 4 presents the results of this exercise.

Models 1 and 2 in Table 4 show the regression results when we include an individual fixed effect. We thereby only exploit within-respondent variation over time. In both models, we find very similar estimates as for Models 1 and 2 in Table 3. Similarly, when we turn to our RDD presented in Model 3, we estimate differences in worries about crime extremely close to our previous estimates. The corresponding RD plot is presented by Figure A2 in the appendix.

We conclude from this subsection that attitudes about crime in Germany react immediately to the news of the crime events of NYE. These results are consistent with the findings from the ESS analysis and lend further credibility to the interpretation that the robust differences in perceived safety are indeed attributable to NYE 2015 in Cologne.

**TABLE 4: FE AND RDD RESULTS OF POST-NYE WORRIES ABOUT CRIME**

	Individual Fixed Effects		RDD
	Model 1	Model 2	Model 3
Post NYE 2015	0.114*** (0.00381)	0.117*** (0.00393)	0.087** (0.0375)
Control Variables	No	Yes	No
Adj. R-squared	0.0487	0.0504	
No. of Observations	38,947	36,787	38,947
Mean of Dependent Variable	0.412	0.419	0.412

Note: The table presents regression discontinuity and individual fixed effects results about the difference in pre- and post-NYE worries about rising crime in Germany. Pre-NYE respondents are interviewed in 2015 or before January 5, 2016. Post-NYE respondents are interviewed in 2016 and after January 4, 2016. Models 1 and 2 show the average difference in concerns about crime of these groups using linear regressions including an individual fixed effect. Control variables include number of years of schooling, the labor force participation status, log labor income, an indicator variable whether an individual is married, and an indicator variable whether an individual lives in East or West Germany. Model 3 shows this difference based on an RD approach with a polynomial of one with optimal bandwidth according to Calonico et al. (2020). Robust standard errors are displayed in parentheses.

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

#### 5.4 CONSEQUENCES OF LOST PERCEIVED SAFETY

After documenting the impact of these high-profile crime events for public safety concerns and attitudes towards immigrants, it remains somewhat unclear how a loss in perceived safety affects behavior. It may be plausible that lowered perceived safety translates into individual actions, as for instance buying self-defensive equipment or increasing safety measures for one's property.

While we do not have any data on the consumption of security products, we can analyze the online search behavior among Europeans. Using Google Trends, we can reconstruct the relative importance of search queries in a given time period. We investigate the relative frequency of the search entry "pepper spray" and "self-defense", two low-key ways to potentially increase safety. We extract the results of the Google Trends database for these two search items in the national languages of the respective countries and for the period October 1, 2015 to March 31, 2016, i.e. three months before and after the NYE crime events.<sup>4</sup>

We perform two complementary analysis with the Google search data. For one, we follow our main approach and estimate a difference-in-differences model in which search data from Germany belongs to the treatment group whereas all other countries serve as a control group. The post period starts at January 5, 2016, i.e. one day after the crime events were covered in news outlets nationwide. This approach gives us an estimate of how much more intensively Germans searched online for certain self-defensive goods than other Europeans. Our second approach only uses search queries for Germany and follows a regression discontinuity (RD) in time design. The discontinuity in search behavior is assumed to be on January 4, 2016.<sup>5</sup> The RDD estimate provides the local effect of the revelation of the NYE crimes on the online search behavior of Germans.

<sup>4</sup> Google search data is given as daily relative frequencies of search queries with respect to the time period under study. The day with the most searches is normalized to 100 and serves as benchmark for all other days. Days without a significant amount of search queries are set to zero. We document these search histories separately for each country in Figure A3 in the appendix. Furthermore, Table A8 provides an overview on the search entries in the official languages of each country that are used to retrieve the Google search data.

<sup>5</sup> We perform this analysis using `rdrobust` from Calonico et al. (2014). We implement a sharp RD design with a polynomial of one. Optimal bandwidth size is chosen based on Calonico et al. (2020). The corresponding RD plots are presented by Figure A4 in the appendix.



Table 5 shows the DiD and RDD results, where columns (1) and (2) present the results for “pepper spray”, while columns (3) and (4) present the results for “self-defense”. The DiD estimate in column (1) highlights that Germans are more than twice as likely to search for pepper spray than other Europeans after the NYE crimes became public (10.65/9.357). Similarly, Germans are about three times more interested in self-defense than other Europeans after NYE (20.13/10.79). The RDD estimate gives the immediate or so-called local difference after the NYE crimes become public. The search intensity almost quadruples for pepper spray (54.97/13.77) and more than doubles for self-defense (73.05/26.28).

**TABLE 5: DiD AND RD RESULTS OF GOOGLE SEARCH QUERIES**

	Pepper Spray		Self-Defense	
	DiD (1)	RDD (2)	DiD (3)	RDD (4)
Post x Treat	10.65*** (0.861)		20.13*** (0.653)	
RD Estimate		54.97*** (10.61)		73.05*** (10.51)
Country Fixed Effects	Yes		Yes	
Day Fixed Effects	Yes		Yes	
Adj. R-squared	0.0557		0.0984	
No. of Observations	3,843	183	3,660	183
Mean of Dependent Variable	9.357	13.765	10.79	26.284

The table presents difference-in-differences (DiD) and regression discontinuity design (RDD) results of post-NYE 2015 Google search queries. DiD results are based on all countries from the ESS sample and presented in odd columns while RD results are based on Germany only and shown in even columns. Treatment in the DiD analysis is defined by search queries from Germany. The post period is after January 4, 2016, one day after the nationwide coverage of NYE crimes. RD results are based on a polynomial of two. Bandwidth size in the RD analysis is chosen optimally according to Calonico et al. (2020). Robust standard errors are displayed in parentheses and clustered at the country level for the DiD analysis. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

These large responses in search behavior indicate that a lower perceived safety indeed ends up in looking for information to overcome the loss of confidence about one’s own personal safety. Whether and to which extent these search inquiries led consumers to shift to self-defense products is, however, unobservable to us. Nevertheless, there exists anecdotal evidence from newspaper reports that pepper spray was short in supply for months after NYE (i.e. Welt, 2016).

## 6. Robustness

Our results indicate that NYE in Cologne in 2015 had a substantial impact on perceived safety among Germans. In this section, we inspect the sensitivity of our baseline results with respect to transforming the dependent variable, alterations in the control group, the use of yearly data as opposed to survey rounds, and apply a matching procedure to pre-select similar control respondents in European countries.

First, we use the original version of our main dependent variable, with four answer categories. Table A4 in the appendix shows the regression results of this exercise. By and large, results are not sensitive to our transformation of the dependent variable.

Second, we analyze whether the choice of the control countries matters for our main results. To do so, we re-estimated our baseline model but excluded each of the control countries one at a time. Figure A1 shows that the results do not depend on the inclusion of a single control country. Furthermore, we

excluded all countries from East Europe. One concern about using Eastern European countries as the control group could be that these countries have been very restrictive in hosting refugees. If the perceived threat to safety is connected to the intake of refugees, and these countries are not hosting a significant number of refugees, these countries would not represent a meaningful control group. Excluding all East European countries, however, does not affect the estimation of our main estimate (last coefficient in Figure A1).

Third, we re-estimate our DiD model using yearly survey data as opposed to using the survey waves. An advantage of this approach is a finer comparison of attitudes based on the same year. However, a serious disadvantage is uneven numbers of observations within years, leading to substantially smaller samples in some years. Table A5 in the appendix shows that the time dimension, whether annual or by survey round, does not matter for our findings.

Finally, we employ a matching procedure to pre-select control respondents in European countries. We perform a one-to-one nearest neighbor propensity score matching without replacement. Since the ESS consists of repeated cross-sections, we need to perform the matching procedure for each survey round. We match on all individual control variables used in our main empirical specification. Table A6 presents the outcome of the matching procedure. We are able to achieve balance in all variables such that the standardized bias lies always below five percent. Table A7 presents our results based on the pre-processed data by matching. Note that we conducted a one-to-one matching, which reduces the number of observations substantially. Nonetheless, we estimate very similar results as in our baseline specification, with the same degree of precision.

## 7. CONCLUSION

This study investigated whether and for whom high-profile crime events of immigrants affect perceived safety. Combining data from the ESS with a DiD estimation strategy, we show that perceived safety decreased in Germany vis-à-vis other European countries after the crime incidents at NYE in Cologne in 2015. We conclude that this major crime event changed perceived safety in Germany. We confirmed this baseline result using individual panel data with survey dates close to NYE.

Our results from the ESS imply a medium-run impact of a maximum of two years after which perceived safety returns almost to pre-NYE levels. Analyzing the impact of NYE on perceived safety shows that women seem to be more affected than men. In addition, those leaning to the political left do not react to NYE, while those leaning to the political right drive our main finding. Additional analyses demonstrated that the events on NYE also impacted public attitudes towards refugees and immigrants in general. Furthermore, we document a heightened interest in defense goods in Germany following NYE, which is not visible for other European countries.

These results not only advance our understanding of the role of crime events on perceived safety but also suggest important potential implications for policy. Changes in perceptions of safety are of great importance as they can result in changes in behavior, such as increased demand for defense equipment. Such actions can be interpreted as a loss of trust in the state's ability to ensure citizens' safety and may have broader implications for societal security. Therefore, policymakers should be aware of the potential risks of a trend towards individual self-armament and take measures to counteract this trend, such as promoting policies that strengthen citizens' trust in the state's ability to provide security. This study highlights the significance of understanding the underlying causes of perceived insecurity and its potential consequences for policy.

## REFERENCES

- Ajzenman, N., P. Dominguez, and R. Undurraga (2021). „Immigration, Crime, and Crime (Mis)Perceptions“. *American Economic Journal: Applied Economics*, forthcoming.
- Alesina, A. and M. Tabellini (2022). „The Political Effects of Immigration: Culture or Economics?“. *Journal of Economic Literature*, forthcoming.
- Bail, C. A., L.P. Argyle, T.W. Brown, J.P. Bumpus, H. Chen, M.F. Hunzaker, J. Lee, M. Mann, F. Merhout, and A. Volfovsky (2018). “Exposure to opposing views on social media can increase political polarization”. *Proceedings of the National Academy of Sciences*, 115(37): 9216-9221.
- Bianchi, M., P. Buonanno, and P. Pinotti (2012). „Do immigrants cause crime?“. *Journal of the European Economic Association*, 10(6): 1318–1347.
- Bell, B., F. Fasani, and S. Machin (2013). „Crime and immigration: Evidence from large immigrant waves“. *Review of Economics and Statistics*, 95(4): 1278–1290.
- Blalock, H. M. (1967). “Toward a Theory of Minority-Group Relations”. New York: John Wiley & Sons In.
- Blumer, H. (1958). “Race Prejudice as a Sense of Group Position”. *The Pacific Sociological Review*, 1(1): 3–7.
- Bove, V., L. Elia, and M. Ferraresi (2023). “Immigration, Fear of Crime, and Public Spending on Security”. *The Journal of Law, Economics, & Organization*, forthcoming.
- Butcher, K. F. and A. M. Piehl (1998a). „Cross-city evidence on the relationship between immigration and crime“. *Journal of Policy Analysis and Management*, 17(3): 457–493.
- (1998b). „Recent Immigrants: Unexpected Implications for Crime and Incarceration“. *Industrial and Labor Relations Review*, 51(4): 654–679.
- Calonico, S., M. D. Cattaneo, and R. Titiunik (2014). “Robust Data-Driven Inference in the Regression-Discontinuity Design”. *Stata Journal*, 14(4): 909–946.
- Calonico, S., M. D. Cattaneo, and M. H. Farrell (2020). “Optimal Bandwidth Choice for Robust Bias Corrected Inference in Regression Discontinuity Designs”. *Econometrics Journal*, 23(2): 192–210.
- Castanho Silva, B. (2018). “The (Non)Impact of the 2015 Paris Terrorist Attacks on Political Attitudes.” *Personality and Social Psychology Bulletin*, 44(6): 838–50.
- Ceobanu, A. M. and Escandell, X. (2010). “Comparative analyses of public attitudes toward immigrants and immigration using multinational survey data: a review of theories and research”. *Annual Review of Sociology*, 36: 309–328.
- Connor, P. (2016). “Number of Refugees to Europe Surges to Record 1.3 Million in 2015”. <http://www.Pewglobal.Org/2016/08/02/Number-of-Refugees-to-Europe-Surges-to-Record-1-3-Million-in-2015/>, last retrieved: 27.02.2023. Pew Research Center. 2016.
- Czymara, C. S. and A. W. Schmidt-Catran (2017). „Refugees Unwelcome? Changes in the Public Acceptance of Immigrants and Refugees in Germany in the Course of Europe’s ‘Immigration Crisis’“. *European Sociological Review*, 33(6): 735–751.

- de Rooij, E. A., M. J. Goodwin, and M. Pickup (2015). „Threat, prejudice and the impact of the riots in England.” *Social Science Research*, 51: 369–383.
- Dinas, E. and J. van Spanje (2011). „Crime Story: The role of crime and immigration in the anti-immigration vote”. *Electoral Studies*, 30(4): 658–671.
- Esberg, J. and J. Mummolo (2018). „Explaining Misperceptions of Crime”. Mimeo.
- ESS (2021). European Social Survey European Research Infrastructure. ESS1 – ESS9. Sikt - Norwegian Agency for Shared Services in Education and Research.
- Fasani, F., G. Mastrobuoni, E. G. Owens, and P. Pinotti (2019). *Does Immigration Increase Crime? Migration Policy and the Creation of the Criminal Immigrant*. Cambridge University Press.
- Ferraro, K. F. (1995). “Fear of crime: Interpreting victimization risk”. SUNY press.
- Ferraro, K. F. (1996). “Women's fear of victimization: Shadow of sexual assault?”. *Social Forces*, 75(2): 667-690.
- Ferrín, M., M. Mancosu, and T. M. Cappiali (2020). „Terrorist attacks and Europeans’ attitudes towards immigrants: An experimental approach”. *European Journal of Political Research*, 59(3): 491–516.
- Finseraas, H., N. Jakobsson, and A. Kotsadam (2011). „Did the Murder of Theo van Gogh Change Europeans’ Immigration Policy Preferences?”. *KYKLOS*, 64(3): 396–409.
- Finseraas, H. and O. Listhaug (2013). „It can happen here: The impact of the Mumbai terror attacks on public opinion in Western Europe”. *Public Choice*, 156: 213-228.
- Fitzgerald, J., K. A. Curtis, and C. L. Corliss (2012). „Anxious publics: Worries about crime and immigration”. *Comparative Political Studies*, 45(4): 477–506.
- Frey, A. (2020). „‘Cologne Changed Everything’—The Effect of Threatening Events on the Frequency and Distribution of Intergroup Conflict in Germany”. *European Sociological Review*, 36(5): 684–699.
- Frey, A. (2022). „Getting under the Skin: The Impact of Terrorist Attacks on Native and Immigrant Sentiment”. *Social Forces*, 101(2): 943–973.
- Gehrsitz, M. and M. Ungerer (2022). „Jobs, Crime, and Votes – A Short-run Evaluation of the Refugee Crisis in Germany”. *Economica*, 89(335): 592–626.
- Hainmueller, J. and D. Hopkins (2014). „Public Attitudes Toward Immigration”. *Annual Review of Political Science*, 17: 225–249.
- Hopkins, D. J. (2010). “Politicized Places: Explaining Where and When Immigrants Provoke Local Opposition”. *American Political Science Review*, 104(1): 40–60.
- Huang, Y. and M. Kvasnicka (2019). „Immigration and Crimes Against Natives: The 2015 Refugee Crisis in Germany”. IZA Discussion Paper No. 12469.
- Jungkunz, S., M. Helbling, and C. Schwemmer (2018). “Xenophobia before and after the Paris 2015 Attacks: Evidence from a Natural Experiment”. *Ethnicities*, 19(2): 271-291.
- Keita, S., T. Renault, and J. Valette (2023). “The Usual Suspects: Offender Origin, Media Reporting and Natives’ Attitudes Towards Immigration”. *The Economic Journal*, forthcoming.

- Landtag NRW (2017). Schlussbericht des Parlamentarischen Untersuchungsausschusses IV. Drucksache 16/14450, 1–1352.
- Lange, M. and K. Sommerfeld (2023). „Do Refugees Impact Crime? Causal Evidence from Large-Scale Refugee Immigration to Germany“. *Labour Economics*, forthcoming.
- Larsen, E. G., D. Cutts, and M. J. Goodwin (2019). “Do Terrorist Attacks Feed Populist Eurosceptics? Evidence from Two Comparative Quasi-Experiments.” *European Journal of Political Research*, 59(1): 182–205.
- Legewie, J. (2013). „Terrorist Events and Attitudes toward Immigrants: A Natural Experiment“. *American Journal of Sociology*, 118(5): 1199–1245.
- Mastorocco, N. and L. Minale (2018). „News media and crime perceptions: Evidence from a natural experiment“. *Journal of Public Economics*, 165: 230–255.
- Nägel, C. and M. Lutter (2020). „The Christmas Market Attack in Berlin and Attitudes Toward Refugees: A Natural Experiment with Data from the European Social Survey.“ *European Journal for Security Research*, 5: 199–221.
- Nunziata, L. (2015). „Immigration and crime: Evidence from victimization data“. *Journal of Population Economics*, 28(3): 697–736.
- Ousey, G. C. and C. E. Kubrin (2018). „Immigration and Crime: Assessing a Contentious Issue“. *Annual Review of Criminology*, 1(1): 63–84.
- Özden, C., M. Testaverde, and M. Wagner (2017). „How and Why Does Immigration Affect Crime? Evidence from Malaysia“. *The World Bank Economic Review*, 32(1): 183–202.
- Quillian, L. (1995). “Prejudice as a response to perceived group threat: Population composition and anti-immigrant and racial prejudice in Europe“. *American Sociological Review*, 69(4): 586–611.
- Schmidt-Catran, A. W. and C. S. Czymara (2020). "Did You Read About Berlin?" Terrorist Attacks, Online Media Reporting and Support for Refugees in Germany. *Soziale Welt*, 71(2–3): 305–337.
- Schmidt-Catran, A. W. and C. S. Czymara (2023). "Political elite discourses polarize attitudes toward immigration along ideological lines. A comparative longitudinal analysis of Europe in the twenty-first century". *Journal of Ethnic and Migration Studies*, 49(1): 85–109.
- SOEP (2022). German Socio-Economic Panel, data for years 1984-2020, SOEP-Core v37, EU Edition. DIW, Berlin. DOI: 10.5684/soep.core.v37eu.
- Taber, C. S. and M. Lodge (2006). “Motivated skepticism in the evaluation of political beliefs“. *American Journal of Political Science*, 50(3): 755-769.
- Weiland, S. (2016). „Wie die AfD die Übergriffe von Köln instrumentalisiert“. <http://www.spiegel.de/politik/deutschland/koeln-afd-instrumentalisiert-uebergriefe-politisch-a-1070895.html>, last retrieved: 23.02.2023.
- Weinrath, M., and J Gartrell (1996). “Victimization and fear of crime“. *Violence and Victims*, 11(3): 187-197.

Welt (2016). „Deutsche decken sich massenhaft mit Pfefferspray ein“. <https://www.welt.de/wirtschaft/article150758016/Deutsche-decken-sich-massenhaft-mit-Pfefferspray-ein.html>, last retrieved: 23.02.2023.

Wigger, I., A. Yendell, and D. Herbert (2022). “The end of ‘Welcome Culture’? How the Cologne assaults reframed Germany’s immigration discourse”. *European Journal of Communication*, 37(1): 21–47.

## A. APPENDIX

### A1. ADDITIONAL TABLES

**TABLE A1: NUMBER OF OBSERVATIONS BY COUNTRY**

	N	Percent
Belgium (BE)	11,639	6.13
Switzerland (CH)	8,985	4.73
Czech Republic (CZ)	11,087	5.84
Germany (DE)	18,308	9.64
Estonia (EE)	4,358	2.29
Spain (ES)	9,920	5.22
Finland (FI)	13,713	7.22
France (FR)	10,477	5.52
United Kingdom (GB)	13,553	7.14
Hungary (HU)	7,650	4.03
Ireland (IE)	11,206	5.90
Lithuania (LT)	7,209	3.80
Netherlands (NL)	10,288	5.42
Norway (NO)	12,065	6.35
Poland (PL)	11,152	5.87
Portugal (PT)	7,561	3.98
Sweden (SE)	12,439	6.55
Slovenia (SI)	8,317	4.38
Total	189,927	100.00

Note: Table shows number of observations by country from the ESS.

**TABLE A2: SUMMARY STATISTICS ESS**

	Mean	SD	Median	Min	Max	N
<b>Outcomes</b>						
Feeling safe at night (binary)	0.80	0.40	1.00	0.00	1.00	189,927
Feeling safe at night (scale 1-4)	3.04	0.76	3.00	1.00	4.00	189,927
Lenient refugee recognition (binary)	0.55	0.50	1.00	0.00	1.00	34,577
Attitudes toward immigration (binary)	0.53	0.50	1.00	0.00	1.00	179,370
<b>Individual-level variables</b>						
Male	0.48	0.50	0.00	0.00	1.00	189,927
Age in years	49.51	17.18	49.00	18.00	85.00	189,927
Years of schooling	12.72	3.89	12.00	0.00	25.00	189,927
Out of labor force	0.13	0.33	0.00	0.00	1.00	189,927
(Self-)Employed	0.55	0.50	1.00	0.00	1.00	189,927
Unemployed	0.06	0.23	0.00	0.00	1.00	189,927
Retired	0.26	0.44	0.00	0.00	1.00	189,927
Income<1000	0.07	0.25	0.00	0.00	1.00	189,927
1000<Income<2000	0.08	0.28	0.00	0.00	1.00	189,927
2000<Income<3000	0.10	0.30	0.00	0.00	1.00	189,927
3000<Income<4000	0.12	0.32	0.00	0.00	1.00	189,927
4000<Income<5000	0.12	0.32	0.00	0.00	1.00	189,927
5000<Income<6000	0.11	0.31	0.00	0.00	1.00	189,927
6000<Income<7000	0.10	0.31	0.00	0.00	1.00	189,927
7000<Income<8000	0.10	0.30	0.00	0.00	1.00	189,927
8000<Income<9000	0.11	0.31	0.00	0.00	1.00	189,927
9000<Income	0.09	0.29	0.00	0.00	1.00	189,927
Married	0.53	0.50	1.00	0.00	1.00	189,927
Victim of burglary/assault within last 5 years	0.19	0.39	0.00	0.00	1.00	189,927
Politically right leaning	0.58	0.49	1.00	0.00	1.00	133,804
<b>Country-level variables</b>						
Refugees per 1000 residents	3.91	4.43	2.16	0.03	24.69	189,927
GDP per capita (in thousands)	37.76	19.13	39.98	7.61	88.41	189,927
Unemployment rate	7.72	3.94	7.07	2.01	26.09	189,927
Drug offenses per 100.000 residents	236.73	276.73	96.53	6.20	1,202.68	189,927
Murders per 100.000 residents	1.34	0.96	1.10	0.47	6.24	189,927
Robberies per 100.000 residents	80.68	63.19	57.84	3.65	293.13	189,927

Note: Table shows summary statistics of the main dependent and control variables from the ESS.



**TABLE A3: SUMMARY STATISTICS SOEP**

	Mean	SD	Median	Min	Max	N
<b>NYE 2015</b>						
Worried about criminal activity	0.50	0.50	0.00	0.00	1.00	11,913
Male	0.47	0.50	0.00	0.00	1.00	11,972
Age in years	52.39	17.74	53.00	18.00	85.00	11,972
Years of schooling	12.66	2.76	11.50	7.00	18.00	11,431
Out of labor force	0.12	0.33	0.00	0.00	1.00	11,972
Employed	0.59	0.49	1.00	0.00	1.00	11,972
Unemployed	0.04	0.19	0.00	0.00	1.00	11,972
Retired	0.25	0.43	0.00	0.00	1.00	11,972
Log labor income	6.28	4.85	9.11	0.00	13.97	11,972
Married	0.58	0.49	1.00	0.00	1.00	11,926
Lives in West Germany	0.73	0.44	1.00	0.00	1.00	11,972
<b>NYE 2014</b>						
Worried about criminal activity	0.38	0.48	0.00	0.00	1.00	11,170
Male	0.46	0.50	0.00	0.00	1.00	11,215
Age in years	52.04	17.54	52.00	18.00	85.00	11,215
Years of schooling	12.56	2.72	11.50	7.00	18.00	10,723
Out of labor force	0.13	0.33	0.00	0.00	1.00	11,215
Employed	0.59	0.49	1.00	0.00	1.00	11,215
Unemployed	0.04	0.20	0.00	0.00	1.00	11,215
Retired	0.24	0.43	0.00	0.00	1.00	11,215
Log labor income	6.23	4.84	9.04	0.00	13.32	11,215
Married	0.58	0.49	1.00	0.00	1.00	11,182
Lives in West Germany	0.72	0.45	1.00	0.00	1.00	11,215
<b>NYE 2016</b>						
Worried about criminal activity	0.46	0.50	0.00	0.00	1.00	11,969
Male	0.46	0.50	0.00	0.00	1.00	12,016
Age in years	52.43	17.75	53.00	18.00	85.00	12,016
Years of schooling	12.68	2.77	11.50	7.00	18.00	11,439
Out of labor force	0.11	0.31	0.00	0.00	1.00	12,016
Employed	0.61	0.49	1.00	0.00	1.00	12,016
Unemployed	0.03	0.18	0.00	0.00	1.00	12,016
Retired	0.25	0.43	0.00	0.00	1.00	12,016
Log labor income	6.34	4.86	9.21	0.00	13.64	12,014
Married	0.58	0.49	1.00	0.00	1.00	11,978
Lives in West Germany	0.75	0.44	1.00	0.00	1.00	12,016

Note: Table shows summary statistics of the main dependent and control variables from the SOEP.

**TABLE A4: DIFFERENCE-IN-DIFFERENCES RESULTS OF FEELING OF SAFE (SCALE 1-4)**

	Model 1	Model 2	Model 3
Post x Treat	-0.117*** (0.0161)	-0.123*** (0.0148)	-0.124*** (0.0188)
Country Fixed Effects	Yes	Yes	Yes
ESS Round Fixed Effects	Yes	Yes	Yes
Ind. Control Variables	No	Yes	Yes
Macro Control Variables	No	No	Yes
Adj. R-squared	0.0774	0.175	0.177
No. of Observations	189,927	189,927	189,927
Mean of Dep. Variable	3.041	3.041	3.041

Note: The table presents difference-in-differences regression results about the post-NYE 2015 feeling of safety. Treatment is defined by being a respondent in the ESS in Germany. Standard errors are clustered at the country level and displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**TABLE A5: DIFFERENCE-IN-DIFFERENCES RESULTS: ANNUAL FIXED EFFECTS**

	Model 1	Model 2	Model 3
Post x Treat	-0.0544*** (0.0100)	-0.0562*** (0.00918)	-0.0354*** (0.00731)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Ind. Control Variables	No	Yes	Yes
Macro Control Variables	No	No	Yes
Adj. R-squared	0.0411	0.115	0.118
No. of Observations	189,927	189,927	189,927
Mean of Dep. Variable	0.800	0.800	0.800

Note: The table presents difference-in-differences regression results about the post-NYE 2015 feeling of safety. Treatment is defined by being a respondent in the ESS in Germany. Standard errors are clustered at the country level and displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**TABLE A6: COVARIATE BALANCE AFTER MATCHING**

	Mean			t-test	
	Treated	Control	% Bias	t	p> t
Male	0.489	0.483	1.2	0.96	0.337
Age in years	50.130	49.958	1.0	0.85	0.393
Years of schooling	13.669	13.62	1.4	1.18	0.240
(Self-)Employed	0.542	0.554	-2.5	-2.11	0.035
Unemployed	0.070	0.060	3.8	3.14	0.002
Retired	0.276	0.277	-0.1	-0.12	0.906
1000<Income<2000	0.061	0.061	0.1	0.09	0.931
2000<Income<3000	0.074	0.072	0.9	0.77	0.439
3000<Income<4000	0.106	0.106	0.2	0.18	0.858
4000<Income<5000	0.135	0.129	1.8	1.51	0.132
5000<Income<6000	0.134	0.133	0.2	0.15	0.885
6000<Income<7000	0.131	0.137	-1.9	-1.59	0.111
7000<Income<8000	0.111	0.113	-0.7	-0.54	0.588
8000<Income<9000	0.115	0.121	-2.0	-1.66	0.096
9000<Income	0.082	0.800	0.8	0.66	0.509
Married	0.580	0.583	-0.7	-0.60	0.551
Victim of burglary/assault within last 5 years	0.107	0.937	4.4	3.66	0.000

Note: Table shows post-matching means in covariates by treatment and control group. Matching is based on a nearest neighbor propensity score without replacement.

**TABLE A7: PRE-PROCESSED DIFFERENCE-IN-DIFFERENCES RESULTS**

	Model 1	Model 2	Model 3
Post x Treat	-0.0559*** (0.0118)	-0.0539*** (0.0114)	-0.0479*** (0.00967)
Country Fixed Effects	Yes	Yes	Yes
ESS Round Fixed Effects	Yes	Yes	Yes
Ind. Control Variables	No	Yes	Yes
Macro Control Variables	No	No	Yes
Adj. R-squared	0.0224	0.109	0.110
No. of Observations	36,523	36,523	36,256
Mean of Dep. Variable	0.802	0.802	0.802

Note: The table presents difference-in-differences regression results on the post-NYE 2015 feeling of safety. Treatment is defined by being a respondent in the ESS in Germany. Pre-processing by Mahalanobis matching in each ESS round on individual control variables. Standard errors are clustered at the country level and displayed in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

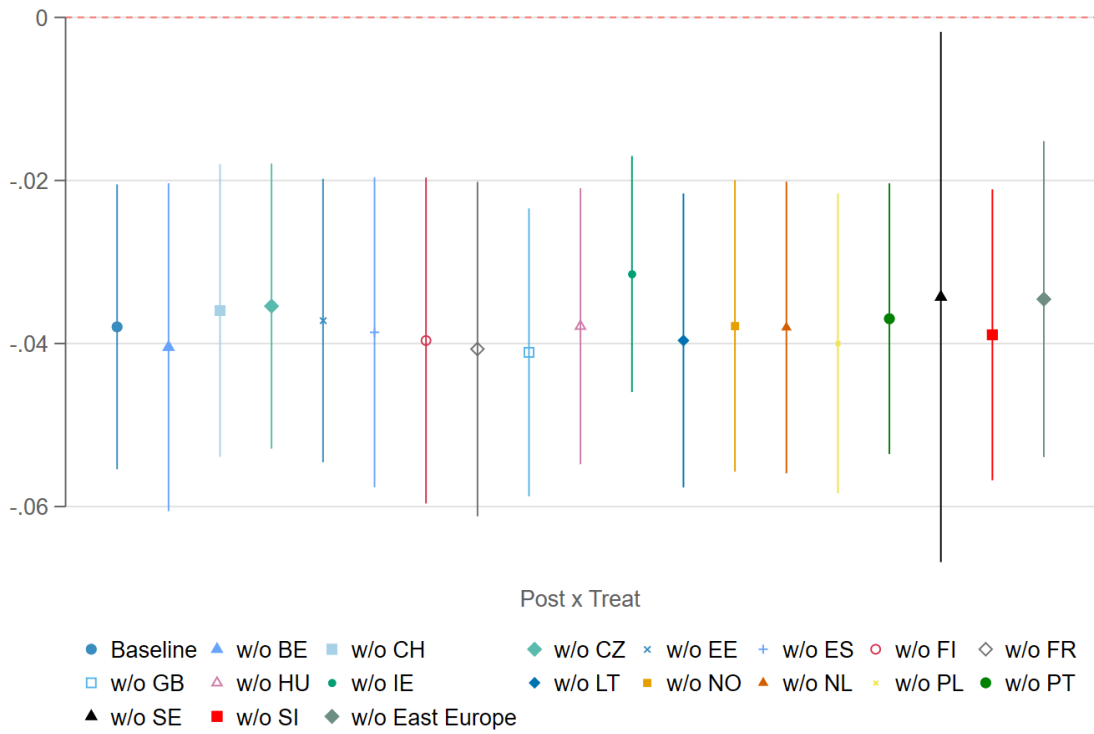
**TABLE A8: ORIGINAL SEARCH ENTRIES BY COUNTRY**

Country	Search Item: Pepper Spray	Search Item: Self-Defense
Belgium	Pepperspray / spray au poivre	zelfverdediging / auto défense
Czech Republic	pepřový sprej	Sebeobrana
Estonia	Pipragaas	enesekaitse
Finland	pippurisumute	Itsepuolustus
France	spray au poivre	auto défense
Germany	Pfefferspray	Selbstverteidigung
Hungary	paprikaspray	önvédelem
Ireland	pepper spray	self defense
Lithuania	pipirinės dujos	savigyna
Netherlands	pepperspray	zelfverdediging
Norway	pepperspray	selvforsvar
Poland	gaz pieprzowy	Samoobrona
Portugal	pimenta do reino	Defesa pessoal
Slovenia	pepper spray	samoobramba
Spain	spray de pimienta	autodefensa
Sweden	pepparspray	självförsvar
Switzerland	Pfefferspray / spray al peperoncino / spray au poivre	Selbstverteidigung / autodifesa / auto défense
United Kingdom	pepper spray	self defense

Note: Table shows the original search entries used to collect the Google search data.

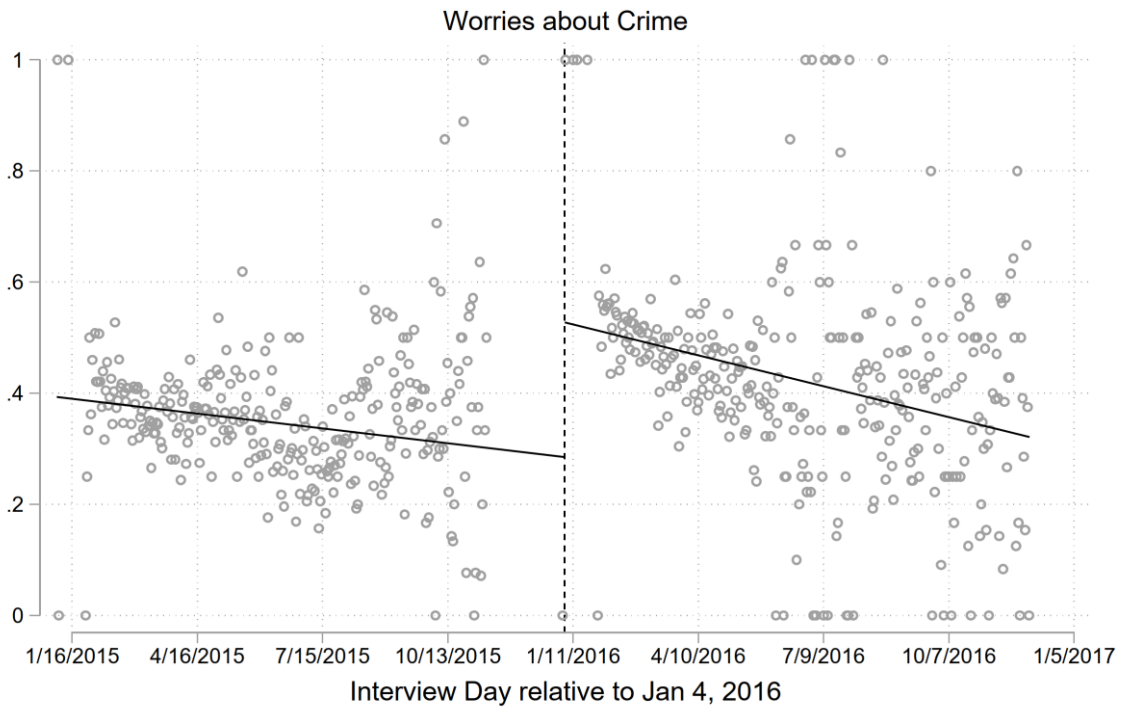
A2. ADDITIONAL FIGURES

FIGURE A1: PIECEWISE EXCLUSION OF CONTROL COUNTRIES



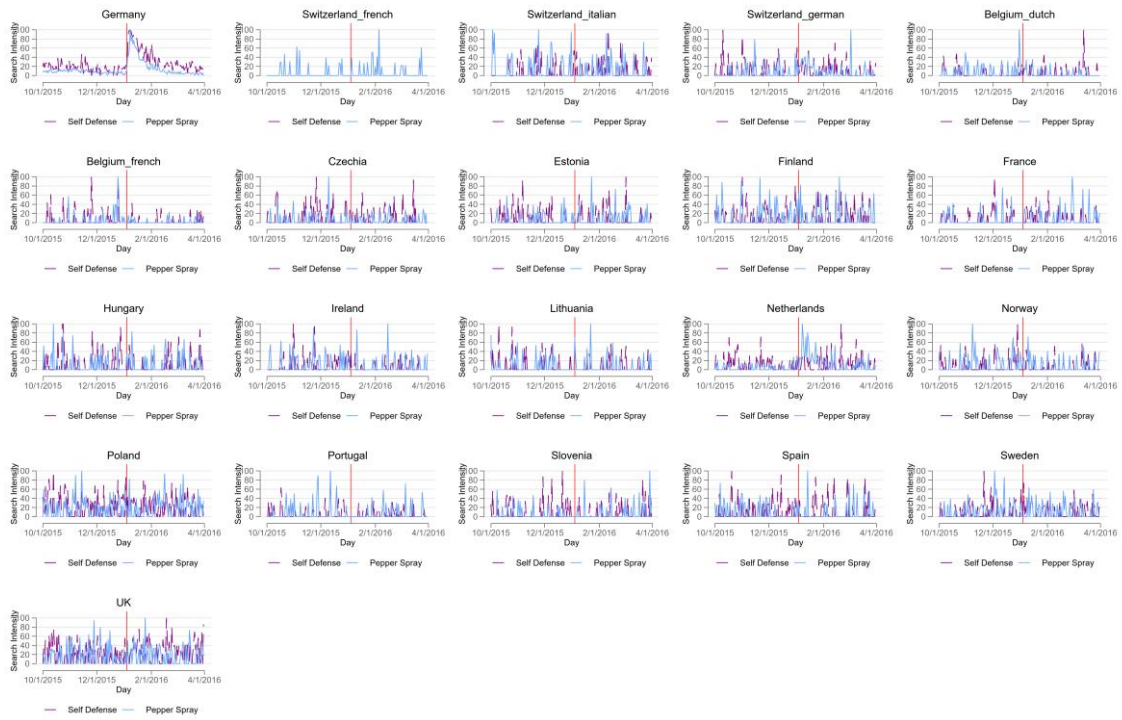
Note: The figure shows the *Post x Treat* coefficient from the difference-in-differences regression described by equation (1) in Section 4. The sample of control countries varies by the exclusion of the respective country.

FIGURE A2: RD PLOT OF WORRIES ABOUT CRIME



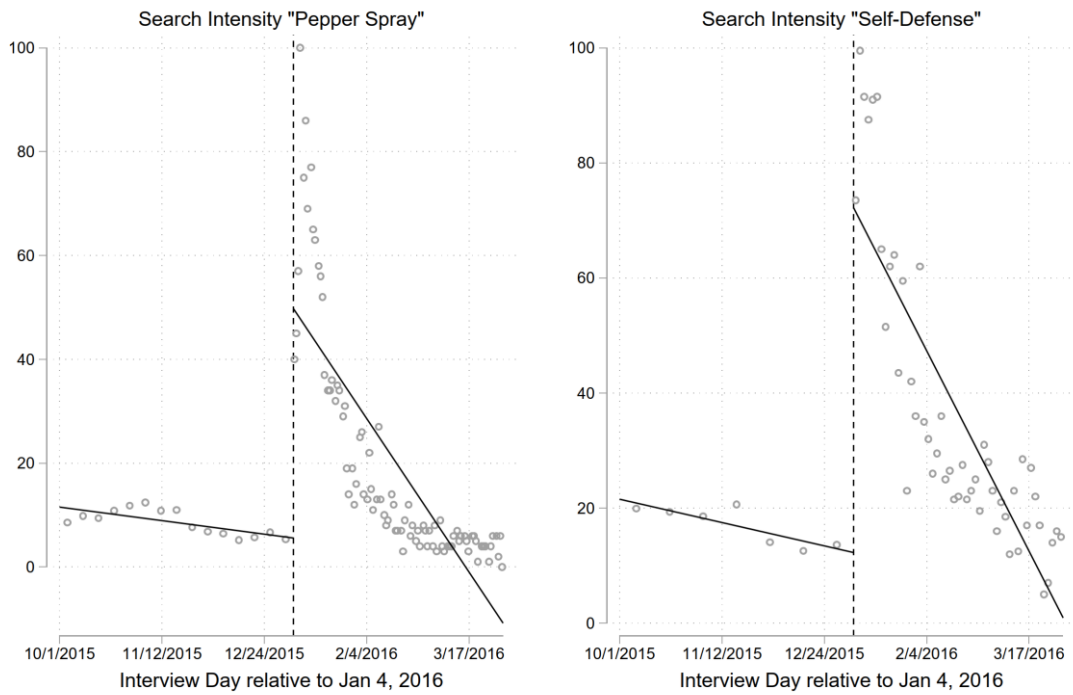
Note: The figure shows the Regression Discontinuity (RD) plot for Model 3 in Table 4. The cutoff date is January 4, 2016, that is, the date the NYE events became public. The RD is based on a polynomial of order one. Bandwidth size is selected optimally according to Calonico et al. (2020).

FIGURE A3: GOOGLE SEARCH INQUIRIES ABOUT PEPPER SPRAY AND SELF-DEFENSE



Note: The figure shows the relative frequency of search inquiries of the respective key word over time for the countries in our ESS sample. The red line marks the start of the nationwide coverage of the crime events at NYE in Cologne on January 4, 2016.

FIGURE A4: RD PLOT OF GOOGLE SEARCHES FOR PEPPER SPRAY AND SELF-DEFENSE



Note: The figure shows the Regression Discontinuity (RD) plot for the Google search item “pepper spray” on the left and “self defense” on the right for October 1, 2015 to March 31, 2016 in Germany. The cutoff date is January 4, 2016, that is, the date the NYE events became public. The RD is based on a polynomial of order one. Bandwidth size is selected optimally according to Calonico et al. (2020).



Download ZEW Discussion Papers:

<https://www.zew.de/en/publications/zew-discussion-papers>

or see:

<https://www.ssrn.com/link/ZEW-Ctr-Euro-Econ-Research.html>

<https://ideas.repec.org/s/zbw/zewdip.html>



## IMPRINT

### **ZEW – Leibniz-Zentrum für Europäische Wirtschaftsforschung GmbH Mannheim**

ZEW – Leibniz Centre for European  
Economic Research

L 7,1 · 68161 Mannheim · Germany

Phone +49 621 1235-01

[info@zew.de](mailto:info@zew.de) · [zew.de](http://zew.de)

Discussion Papers are intended to make results of ZEW research promptly available to other economists in order to encourage discussion and suggestions for revisions. The authors are solely responsible for the contents which do not necessarily represent the opinion of the ZEW.