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Getting used to terrorist threats? Evidence from French terrorist attacks between 2015 and 2016

Sylvie Blasco* Eva Moreno - Galbis† Jeremy Tanguy‡§

Abstract

This paper evaluates the effect on mental health of consecutive terrorist attacks in France in 2015 and 2016. We compile information about the three main terrorist attacks that struck France over this period and assess whether the potential effect on mental health (*i.e.* depression) of a terrorist attack is smoothed once people consider terrorist attacks as “the new normality”. We exploit data from the French Constances epidemiological survey and combine an event study strategy with a difference-in-difference approach to compare before-after changes in mental health the year of the attack with the same changes the year before. We show that the negative effect of a terrorist attack on mental health decreases over time from one attack to another, and disappears completely for the last attack. Socio-demographic composition of the sample, geographical or socio-demographic proximity to the victims or media exposure do not arise as factors responsible for this changing effect of terrorist attacks on mental health.

Keywords— Mental Health, Terrorism, Event Study, Difference-in-Difference.

JEL codes— I10, I12, I31, F52

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1 Introduction

In recent years, several terrorist attacks struck Western Europe countries over a relative short period of time. Between 2014 and 2018, these countries set the alert for the risk of terrorist attack at the highest level due to the activities of the Islamic State. In France, according to the Global Terrorism Database (Start), 215 successful and averted attacks were recorded between 2012 and 2018, causing the death of 286 persons and injuries to 1,003 others. In comparison, over the almost twice as long 2000-2011 period, 242 attacks left 8 persons dead and 90 injured. In addition to greater intensity and frequency, recent attacks differentiate from previous ones because they occur in a greater diversity of locations, are more targeted to random citizens but to places and events strongly associated with French fundamental values.¹ Furthermore, they benefit from greater media coverage due to the spread of social media and 24/7 news channels. These new features of attacks may have participated in creating an increasing feeling of uncertainty, fear and anxiety, which could negatively affect mental health. At the same time, repeated attacks could also have favored adaptation to terror, which could mitigate the detrimental health effect of successive attacks.

We compile information about the main terrorist attacks that took place in France over the 2013-2016 period and assess their effect on the mental health of French residents. On January 7, 2015, 17 people were murdered and 22 wounded in an attack with submachine guns against the French satirical journal CharlieHebdo. On November 13, 2015, a series of coordinated attacks with submachine guns and explosives caused 130 deaths and around 500 wounded in bars, restaurants, concert halls and the football stadium where the French National team was playing. Eight months later, during the fireworks display on July 14 (National French Day), a terrorist ran over a crowd with a truck, causing 84 deaths and around 200 wounded.

We estimate the average effects of these attacks on mental health and investigate reasons for differential effects across attacks. We exploit a large French population-based epidemiological survey called Constances, and combine an event-study design with a difference-in-difference (DiD): we analyse how the health outcomes of respondents evolves right after the attacks. To control for time-variant and invariant confounding factors, including seasonal effects, we compare this change with the ones measured over the exact same dates, but in the previous years. Our indicator of mental health is the Center for Epidemiological Studies-Depression (CES-D) scale, which aims at identifying depression in general population.

Estimation results reveal that the first attack increased the CES-D score by 1.7 point the week after the attack (which accounts for 19.1% of a standard deviation), the second attack by around 0.9 point (10.4% of a standard deviation) the week after and 1.3 points three weeks after (14.4% of a standard deviation), while the third attack had no effect on mental health. This declining effect of terror along the attacks is consistent with the “habituation” effect found in the psychological literature. Our results are not modified when we leave unchanged the socio-demographic distribution of the sample, meaning that the estimated “de-cumulative” effect is not driven by differences in the socio-demographic characteristics of respondents. Causality events such as natural disasters or terrorist attacks are found to have detrimental health and social consequences. Most of the studies that analyze the effect of terror on well-being and mental health focus on post-traumatic stress disorder (PTSD) symptoms and more generalized forms of distress (Bonanno et al., 2006; Galea et al., 2003; Schlenger et al., 2002; Schuster et al., 2001; Silver et al., 2002).² Some focus

¹France repeatedly faces a number of attacks from Corse separatists, but these attacks are mostly concentrated in Corsica and cause no or few casualties.

²See also Pynoos et al. (1993), Piyasil et al. (2007), Kronenberg et al. (2010) for an analysis on PTSD consequences following a natural disaster.

on depressive symptoms (see Knudsen et al., 2005, Tsai and Venkataramani, 2015, Ford et al., 2003 or Metcalfe et al., 2011). Others focus on somatic illness induced by the stress connected to bereavement following a terror attack (see Catalano and Hartig, 2001).

To our knowledge the economic literature focuses on the consequences of a single event, Akay et al. (2020) being a notable exception (see Kim and Albert Kim, 2018 for the CharlieHebdo attack in Paris, Ford et al., 2003; Galea et al., 2003; Knudsen et al., 2005; Metcalfe et al., 2011; Schlenger et al., 2002; Schuster et al., 2001; Silver et al., 2002; Tsai and Venkataramani, 2015, for September 11, Clark et al., 2020 for the Boston Marathon bombing, or Giordano and Lindström, 2016 for the 2005 London underground attacks). In contrast, the psychological and psychiatric literatures consider response to individual trauma (disaster or terror) in case of prior exposure to other traumas and document two possible patterns in such a context: sensitization and habituation (see Seery et al., 2010).³ The former implies that exposure to prior trauma increases the risk of developing PTSD (see Kessler et al., 1995; Breslau et al., 1999; McLaughlin et al., 2010; Catani et al., 2010; Garfin et al., 2015). The latter means that the detrimental health effect declines along traumas. People keep living in some locations despite frequent natural disasters (hurricanes, floods) or attacks, suggesting that prior experience with disasters and terror may inoculate against the possible psychological harm in subsequent disasters, improving their chances for a resilient outcome. Repeated exposure to similar stressors reduces the intensity of the stress-hormone response (see Andersen et al., 2013 for shootings at US universities; Norris and Murrell, 1988 for repeated flooding in Kentucky or Bleich et al., 2003 for terror in Israel).

As already noted by Bonanno et al. (2010), one of the main limitations of papers analyzing the consequences of cumulative exposure to collective trauma is that they are based on retrospective accounts of past events which induces a recall bias. Moreover, in most cases the considered successive traumatic events are of different nature (see Catani et al., 2010; Garfin et al., 2015; Kronenberg et al., 2010). Our paper provides three contributions to this literature. First, we consider exposure to multiple events of the same nature, terrorist attacks, over a relative short period of time (18 months). Second, recall bias does not apply here since health indicators are collected around the time of the attacks and we do not ask individuals about past traumas. Third, we consider France, where extreme violence is less present and constant for less time than in Israel on which Bleich et al. (2003) focus.

We also contribute to the literature on “communal bereavement” (Catalano and Hartig, 2001) and “peripheral victims” (Dixon et al., 1993). First, existing evidence reveals strong and significant negative mental health effects three to five days after the attack (Schuster et al., 2001), during the four weeks following the attack (see Ford et al., 2003; Galea et al., 2003; Knudsen et al., 2005; Tsai and Venkataramani, 2015) and two months after (Schlenger et al., 2002; Silver et al., 2002). In line with these results, we find short-lived effects. The use of consecutive attacks allows us to add that the duration of communal bereavement is reduced with the rank of the attack, as it would be expected in case of habituation.⁴

Second, the literature shows that a wide variety of dimensions influence both the extent to which people personalize the attack and the prevalence of mental health consequences. The first but most controversial dimension is geographical proximity. Galea et al. (2003), Schlenger et al. (2002), Schlenger et al. (2002), Ford et al. (2003) and Kim and Albert Kim (2018) find a delimited geographical impact, while

³As remarked in Seery et al. (2010) there is also evidence suggesting the existence of a quadratic relationship between exposure to negative life events and psychological outcomes. This response pattern implies that people who report some exposure to negative life events fare better than people who reported no prior exposure or many prior exposures to such events.

⁴In case of sensitization an increasing duration of communal bereavement would have been expected.

Metcalfe et al. (2011), Finseraas and Listhaug (2013), Akay et al. (2020), Schuster et al. (2001) or Silver et al. (2002) conclude that terror has a larger, even global impact. For the terror events in Paris in November 13, 2015, Gruebner et al. (2016) exploit data from social media data (*i.e.* Twitter) between November 13 and November 16, 2015 and detect clusters of sadness and fear around the attack sites.⁵ Different socio-demographic groups are also found to be differently affected by terror. Following the Charlie Hebdo attack, Kim and Albert Kim (2018) conclude that well-being and mental health were significantly more deteriorated for immigrants and low income individuals, while the effect was less dramatic for extreme-right supporters. Last, media coverage is another determinant of prevalence of symptoms of depression and post-traumatic stress after a terror attack (Ahern et al., 2002; Holman et al., 2014; Neria and Sullivan, 2011; Silver et al., 2013). We find heterogenous response to terror with respect to geographical proximity, family status and media exposure, but these heterogeneous effects do not explain the differentiated impacts we find across attacks.

The rest of the paper is organized as follows. Section 2 describes the data and presents the empirical strategy. Results are reported in section 3 and the economic mechanisms behind these results are analyzed in section 4. Section 5 concludes.

2 Data and method

2.1 Data

Constances cohort. We use the Constances data which is a large population-based and general-purpose epidemiological cohort (see Zins et al., 2015). Started at the end of 2012, it includes about 200,000 individuals. Participation was voluntary upon invitation sent to randomly selected individuals. Participants were invited to go to one of the 21 partner Health Screening Centers (HSC) to undergo a health examination. They also had to complete at home questionnaires about their health, lifestyle and job history. Participants were then followed annually, using self-administered follow-up questionnaires.

The Constances data was designed to be representative of the general French population aged between 18 and 69, excluding agricultural and self-employed workers.⁶ The fact that individuals were randomly drawn from 21 departments is not a threat for representativeness. However, non-random acceptance of the invitation and attrition are. To deal with non-random participation, individuals were drawn randomly by stratified sampling with unequal probabilities, over-representing individuals with a higher probability of non-volunteering according to age.

The socio-demographic composition of the Constances sample is summarized in Table A.1 in Appendix A. We compared the age distribution of Constances sample with the age distribution of the sample provided by the French Labor Force Survey (see Figure 1 in the Online Appendix⁷). Both the youngest and the oldest age categories are slightly under-represented in Constances. Our findings should therefore not be considered as representative of the whole population, but we can reasonably accept that they correctly capture the mental health response of people between 30 and 60 years old following continuous exposure to terror⁸.

⁵See also the paper by Gouraud et al. (2021) for an analysis on benzodiazepine use in the French general population after November 2015 terrorist attacks.

⁶Representativeness was in terms of age and gender.

⁷Available on the authors' web-page.

⁸Imputing to the Constances sample the average weights computed by gender, nativity and 5 age categories from the French LFS, only leads to an over-representation of the older age category and does not improve the

Health-related outcomes of interest. In this paper we focus on measures of mental health. Our preferred mental health indicator is the CES-D scale, that measures the mood and mental state of individuals in the past week. This outcome is particularly suited to our design that exploits week-by-week assessments of patients. It includes 20 items that cover the main symptoms of depression. Questions allowing to construct the CES-D scale are asked at inclusion. Participants answer each item on a four-point scale on which they indicate the frequency with which they experienced the corresponding symptom during the past week: 0 = rarely or none of the time (less than 1 day); 1 = some or little of the time (1-2 days); 2 = occasionally or a moderate amount of the time (3-4 days); and 3 = most or all of the time (5-7 days).⁹ The total score ranges from 0 to 60, with higher scores indicating more symptoms and therefore worse mental health.

Sample. We only consider the inclusion questionnaire, meaning that we implement our analysis in cross-section without exploiting within-individual heterogeneity over time. Any analysis trying to exploit longitudinal data would require the same individuals to be interviewed every week during a non negligible period of time (before the attack and after the attack). To our knowledge, there is no available database having these characteristics, which justifies why the economic literature on the topic adopts a similar cross-sectional approach (Metcalf et al., 2011; Tsai and Venkataramani, 2015).

2.2 Method

An event study combined with DiD. To evaluate the impact of terrorist attacks on mental health, we implement an event study strategy combined with a DiD approach, similar to Clark et al. (2020), Tsai and Venkataramani (2015) or Metcalfe et al. (2011).

For the event study analysis, we rely on the exact date when the individual fills in the questionnaire, and compare outcomes of those who completed their questionnaire during the reference period to those who did it around the attack: a five one-week period before and a six one-week period after the attack. The identifying assumption is that attacks are unanticipated, so that in the absence of the attacks the considered outcome would have changed identically in the reference and around attack groups.

The DiD framework relies on the parallel trends assumption, which requires that trends in mental health outcomes prior to the attacks were similar for participants who were interviewed in year $t - 1$ (*i.e.* one year previous to the attack) compared to those who were interviewed in year t , and that these trends would have continued if the attacks had not occurred. Figures B.1 and B.2 in Appendix B confirm the validity of this assumption.¹⁰

This identifying strategy is threatened if the sample composition is modified after the attack. Estimates would be biased downward if those in poorer health no longer answered due to the attack. Figure B.3 in Appendix B shows the number of questionnaires filled in by participants 8 weeks before and after the date of the attack (set to zero) in years t and $t - 1$. It confirms that no strong difference between the two years is found. The socio-demographic composition of the sample has remained fairly constant between before and after each attack, though some changes seem to operate¹¹. We then propose an original counterfactual representation of the youngest age category of the Constances sample with respect to the LFS sample (see Figure 2 of the Online Appendix). We thus keep the original sample of the Constances survey without implementing any counterfactual reweighting procedure.

⁹See Morin et al. (2011) for further details.

¹⁰See also Google Trends in Figures 6-9 of the Online Appendix available on the authors' webpage.

¹¹See Tables 1-3 in the Online Appendix. The stability of the socio-demographic composition of the sample follow-

weight strategy, imposing a constant socio-demographic composition of the sample over time, to control for any potential effects on mental health driven by socio-demographic characteristics.¹²

A second potential threat to identification is the existence of confounding seasonal effects. To remedy this threat we compare pre/post-attack differences with respect to the reference period measured the year of the attack to pre/post-attack differences with respect to the reference period as measured the previous years, in a DiD fashion, and control for year, month and day-of-the-week fixed effects. Here, participants who were interviewed on the same days of the month in years $t - 1$ or $t - 2$ serve as an additional comparison group. This combined event-study-DiD strategy allows us to get rid of confounding seasonal effects and to purge our estimates of bias that could result from secular trends in the outcomes unrelated to the considered terrorist attacks, permitting the identification of a causal effect of the terrorist attack on mental health.

Finally, our estimation strategy could also be threatened if, following the first terror attack (*i.e.* CharlieHebdo) mental health had followed an upward trend, *i.e.* deterioration. This would mainly concern the Nice attack in 2016 (*i.e.* 2015 attacks use both the same reference period, so there is no trend problem), since the baseline value of mental health during the 2016 reference period could be already high, which would lead to a smaller marginal variation in mental health following the Nice attack. To discard this possibility, Figures B.4 and B.5 represent, respectively, the average CES-D score by year-month between January 2014 and December 2016 and the share of people with CES-D score of 16 or more (*i.e.* clinical depression) by year-month during the same period. Both the monthly points and the quadratic fit (in red) indicate that there is no continuous degradation in mental health over the study period. Except from the sharp increase in November and December 2015, following the Paris attacks, mental health has rather improved over the period. This is also confirmed by Figures B.6 and B.7, which consider, respectively, the fact of feeling fearful and hopeful between January 2014 and December 2016.

We replicate Tsai and Venkataramani (2015) and Metcalfe et al. (2011), and estimate the following equation on cross-sectional inclusion observations separately for the three major terrorist attacks that occurred in France in 2015 and 2016 (CharlieHebdo, Paris and Nice attacks):

$$y_i = \beta_0 + \delta T_i \times Year_i + \beta_1 T_i + Year_i + \beta X_i + day_i + month_i + u_{it} \quad (1)$$

where T_i represents the timing at which participant i filled in the questionnaire. We flexibly parameterize it as a vector of 12 dummy variables representing the five one-week periods prior to a terrorist attack, the six one-week period after the terrorist attack and the several months period used as reference (in any given year) that precede the five one-week period before the attack. We aggregated the time periods outside the assessment window of interest for the sake of parsimony. $Year_i$ is a dummy equal to one for the year of the considered attack and zero otherwise. X_i is the vector of controls for the usual sociodemographic and socioeconomic characteristics that may be correlated with mental health: age, gender, skill (defined in terms of education), labor market status, family situation and nativity.

ing the attacks is also confirmed by Tables 4-6 in the Online Appendix, where we regress every socio-demographic control over the 5 one-week periods preceding every attack and the 6 one-week periods following every attack.

¹²Given that we use cross-sectional data, we cannot control for changes in the composition of unobservables. To limit the relevance of this possible bias, which is standard in the literature using this empirical strategy, we control for various observed attributes, *i.e.* gender, age, labour market situation, family status and nativity. As explained by Akay et al. (2020), one can expect that individuals the most affected by the attacks would the most likely not to answer just after the attack. This means that our estimates would be a lower bound of the average effects in case of selection on unobservables. The assumption we need to make to compare the responses to the three attacks is that the selection on unobservables, if any, does not change from an attack to another.

Parameters δ measure week-by-week changes in mental health outcomes for a five one-week period before the attack and for a six one-week period after the attack with respect to a reference period. Statistically significant positive coefficients on the time period-by-year dummy variables indicate worsened mental health with respect to the reference period in year t (year when the attack took place) compared to year $t - 1$ or $t - 2$ (years preceding the terrorist attack). In the absence of treatment, the δ s would not be statistically different from zero, *i.e.* the pre- and post-mental health would be the same the year of the attack and in the previous years.

Heterogenous effects. Our econometric analysis includes three different stages. In stage 1, we estimate equation (1) independently for each of the main attacks we consider: *(i)* The CharlieHebdo attack (January 7, 2015); *(ii)* The Paris attacks (November 13, 2015); *(iii)* The Nice attack (July 14, 2016). The reference period and the individual observations used differ between the three regressions.

In stage 2 we consider the three attacks jointly in a single regression. The considered period covers now years 2014-2016 and we consider the 52 weeks of the year. The excluded year category is 2014 and within every year the reference period goes from March 1 to May 31. This reference period is kept constant for the three considered years, so that estimated coefficients are comparable across terrorist attacks. Stage 2 allows us to test whether terrorist attacks have a cumulative or a de-cumulative effect on mental health (*i.e.* sensitization vs. habituation as defined by the psychological literature). In the former case, we expect the size of the δ coefficients estimated in the weeks following an attack to become increasingly important from the CharlieHebdo attack to the Nice attack. The opposite is expected in case of a de-cumulative effect. The last stage studies the mechanisms that may be driving differences in size and duration of each terrorist attack on mental health. We explore the following mechanisms: *(i)* Geographical distance with respect to the attack; *(ii)* Socio-demographic proximity between the individual and the composition of the victims (age, gender, having children, religion); *(iii)* Media exposure.

3 Results

Stage 1: Individual effects. This section reports estimation results from equation (1) when considering separately each attack. Results are reported in Table 1 for the CharlieHebdo attack, in Table 2 for the Paris attacks and in Table 3 for the Nice attack. In each table, the first three columns consider the whole population. They successively add day-of-the-week and month fixed effects in column (2) and additionally socio-demographic control variables in column (3). Columns (4) and (5) implement separate regressions for females and males, respectively.

The coefficients on the six weeks following the CharlieHebdo attack are positive, but only the coefficient on the first week after the attack is statistically significant (column (3) in Table 1). This result holds when distinguishing between females and males. The response pattern corresponds to the resilience trajectory: after the attack there is an immediate deterioration in mental health followed by a relatively stable trajectory of healthy adjustment (see Bonanno et al., 2010).¹³

¹³The positive coefficient on 15-22 December is likely to be explained by the terrorist attack that took place in Jou  -l  s-Tours on 20th December 2014. An Islamic terrorist entered a police station armed with a knife and injured 3 policemen, 2 of them very seriously. The terrorist was shot. Consequently, the significant coefficient on the week 15-22 December would not capture the violation of the parallel trend assumption but simply a shock. Indeed, we compare the before/after change with respect to the reference period in health outcomes the year of the attack with

Table 1: Effect on the CES-D score of the CharlieHebdo attack

| | (1) | (2) | (3) | (4) | (5) |
|--|--------------------|---------------------|--------------------|-------------------|--------------------|
| 1 September - 30 November, 2014 | ref. | ref. | ref. | ref. | ref. |
| 1 December - 6 December (-5 weeks) | 0.223 (0.596) | 0.277 (0.601) | 0.099 (0.542) | 0.166 (0.868) | 0.094 (0.782) |
| 7 December - 14 December (-4 weeks) | -0.461 (0.547) | -0.436 (0.542) | -0.263 (0.475) | 0.409 (0.564) | -0.962 (0.755) |
| 15 December - 22 December (-3 weeks) | 1.470** (0.552) | 1.503*** (0.552) | 1.294** (0.497) | 1.432 (0.874) | 0.909 (0.738) |
| 23 December - 30 December (-2 weeks) | 0.908 (1.043) | 0.823 (1.055) | 0.880 (0.881) | 0.923 (1.338) | 0.779 (0.852) |
| 31 December 2014 - 7 January (-1 week) | 0.130 (0.651) | 0.123 (0.635) | 0.131 (0.638) | 0.037 (0.991) | 0.218 (0.872) |
| 8 January - 15 January (+1 week) | 1.568** (0.697) | 1.545** (0.697) | 1.567** (0.615) | 1.595* (0.836) | 1.575** (0.702) |
| 16 January - 23 January (+2 weeks) | 0.005 (0.658) | 0.051 (0.672) | 0.079 (0.628) | 0.482 (0.862) | -0.336 (0.806) |
| 24 January - 31 January (+3 weeks) | 0.099 (0.671) | 0.105 (0.675) | 0.173 (0.585) | -0.076 (0.833) | 0.356 (0.805) |
| 1 February - 8 February (+4 weeks) | 0.218 (0.656) | 0.199 (0.662) | 0.226 (0.554) | -0.256 (0.760) | 0.827 (0.701) |
| 9 February - 16 February (+5 weeks) | 1.060 (0.728) | 1.062 (0.729) | 0.874 (0.679) | 0.835 (1.093) | 0.752 (0.701) |
| 17 February - 24 February (+6 weeks) | 0.022 (0.619) | -0.018 (0.632) | 0.177 (0.606) | 0.057 (0.825) | 0.298 (0.834) |
| Day of week FE | No | Yes | Yes | Yes | Yes |
| Month FE | No | Yes | Yes | Yes | Yes |
| Controls | No | No | Yes | Yes | Yes |
| Observations | 20419 | 20419 | 20419 | 10852 | 9567 |
| R-squared | 0.001 | 0.002 | 0.086 | 0.054 | 0.086 |
| Population | All | All | All | Female | Male |

Source: Constances (2013-2015). Notes: OLS estimation of equation (1). Robust standard errors clustered at the department-year level in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In the week following the Paris attacks, (Table 2), there is a significant degradation in mental health (for males the effect is not significantly different from zero). Three weeks after the attack the coefficient is still positive and significant for the whole population and males. This response pattern corresponds to the “Recovery” prototypical trajectory, along which there are initial elevations in depressive symptoms soon after the target event that only gradually decrease over the ensuing months (see Bonanno et al., 2010). Last, the Nice attack does not seem to have any negative impact on mental health (Table 3).

the change over the same period but one year before. The Joué-lès-Tours attack is not in the reference period so it does not affect our estimates.

Table 2: Effect on the CES-D score of the Paris attacks

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------------|--------------------|--------------------|--------------------|-------------------|--------------------|
| 1 April - 30 September, 2015 | ref. | ref. | ref. | ref. | ref. |
| 1 October - 12 October (-5 weeks) | 0.210 (0.347) | 0.218 (0.353) | 0.089 (0.358) | -0.527 (0.558) | 0.715 (0.464) |
| 13 October - 20 October (-4 weeks) | 0.395 (0.540) | 0.364 (0.533) | 0.237 (0.534) | -0.147 (0.811) | 0.686 (0.746) |
| 21 October - 28 October (-3 weeks) | 0.160 (0.459) | 0.160 (0.458) | 0.480 (0.441) | 0.055 (0.627) | 0.955 (0.614) |
| 29 October - 5 November (-2 weeks) | 0.196 (0.562) | 0.238 (0.556) | 0.511 (0.577) | 0.955 (0.741) | 0.032 (0.744) |
| 6 November - 13 November (-1 week) | 0.509 (0.568) | 0.507 (0.571) | 0.271 (0.517) | 0.184 (0.693) | 0.397 (0.774) |
| 14 November - 21 November (+1 week) | 1.131** (0.521) | 1.131** (0.523) | 0.984* (0.540) | 1.327* (0.754) | 0.676 (0.720) |
| 22 November - 29 November (+2 weeks) | 0.372 (0.575) | 0.401 (0.569) | 0.604 (0.518) | 0.266 (0.753) | 1.091 (0.689) |
| 30 November - 7 December (+3 weeks) | 1.418** (0.626) | 1.408** (0.617) | 1.361** (0.577) | 1.589 (1.030) | 1.089** (0.523) |
| 8 December - 15 December (+4 weeks) | 0.629 (0.479) | 0.585 (0.471) | 0.540 (0.470) | 1.222* (0.645) | -0.103 (0.768) |
| 16 December - 23 December (+5 weeks) | -0.421 (0.515) | -0.391 (0.523) | -0.146 (0.533) | -0.781 (0.745) | 0.578 (0.951) |
| 24 December - 31 December (+6 weeks) | 1.248 (1.082) | 1.255 (1.084) | 1.242 (1.004) | 1.638 (1.279) | 0.933 (1.168) |
| Day of week FE | No | Yes | Yes | Yes | Yes |
| Month FE | No | Yes | Yes | Yes | Yes |
| Controls | No | No | Yes | Yes | Yes |
| Observations | 32953 | 32953 | 32953 | 17498 | 15455 |
| R-squared | 0.001 | 0.002 | 0.085 | 0.054 | 0.086 |
| Population | All | All | All | Female | Male |

Source: Constances (2014-2015). Notes: OLS estimation of equation (1). Robust standard errors clustered at the department-year level in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Effect on the CES-D score of the Nice attack

| | (1) | (2) | (3) | (4) | (5) |
|----------------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| 1 March - 31 May, 2016 | ref. | ref. | ref. | ref. | ref. |
| 1 June - 12 June (-5 weeks) | 0.111 (0.474) | 0.102 (0.474) | 0.097 (0.450) | 0.281 (0.817) | -0.080 (0.469) |
| 13 June - 20 June (-4 weeks) | 0.003 (0.491) | -0.004 (0.489) | 0.208 (0.516) | 0.538 (0.669) | -0.219 (0.741) |
| 21 June - 28 June (-3 weeks) | -0.346 (0.437) | -0.341 (0.439) | -0.299 (0.397) | -0.368 (0.685) | -0.247 (0.564) |
| 29 June - 6 July (-2 weeks) | -0.515 (0.507) | -0.544 (0.499) | -0.727 (0.440) | -0.856 (0.727) | -0.494 (0.643) |
| 7 July - 14 July (-1 week) | 0.103 (0.481) | 0.108 (0.487) | -0.116 (0.478) | -0.538 (0.658) | 0.381 (0.786) |
| 15 July - 22 July (+1 week) | -0.179 (0.576) | -0.181 (0.576) | -0.093 (0.577) | -0.419 (0.686) | 0.276 (0.861) |
| 23 July - 30 July (+2 weeks) | -0.323 (0.633) | -0.301 (0.636) | -0.088 (0.612) | -0.689 (0.911) | 0.490 (0.672) |
| 31 July - 7 August (+3 weeks) | -0.335 (0.760) | -0.354 (0.765) | -0.346 (0.732) | -0.282 (1.303) | -0.396 (0.591) |
| 8 August - 15 August (+4 weeks) | 0.116 (0.733) | 0.094 (0.744) | -0.056 (0.579) | -0.178 (1.124) | 0.091 (0.844) |
| 16 August - 23 August (+5 weeks) | -0.462 (0.679) | -0.444 (0.679) | -0.674 (0.641) | -0.304 (0.938) | -1.077* (0.625) |
| 24 August - 31 August (+6 weeks) | 0.550 (0.574) | 0.525 (0.567) | 0.602 (0.563) | 0.272 (0.676) | 0.966 (0.847) |
| Day of week FE | No | Yes | Yes | Yes | Yes |
| Month FE | No | Yes | Yes | Yes | Yes |
| Controls | No | No | Yes | Yes | Yes |
| Observations | 25301 | 25301 | 25301 | 13366 | 11935 |
| R-squared | 0.002 | 0.002 | 0.081 | 0.050 | 0.083 |
| Population | All | All | All | Female | Male |

Source: Constances (2014, 2016). Notes: OLS estimation of equation (1). Robust standard errors clustered at the department-year level in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Stage 2: Cumulative or de-cumulative effect? We now need to consider the three attacks jointly to compare the size of their effect on mental health. Figure 1 displays the estimated coefficients for years 2015 and 2016 when considering the three terrorist attacks together.

From the first panel of Figure 1, we deduce that the week following the CharlieHebdo attack there was a significant degradation in mental health. Similarly, one week after the Paris attacks, the estimated coefficient becomes positive and significant (at 10%) and two weeks after it is again significantly positive. Moreover, using a F-test on the coefficients following the CharlieHebdo and Paris attacks, we can reject the hypothesis that these coefficients are equal. Actually, following the CharlieHebdo attack the CES-D score increases by 1.7 units from a scale going from 0 to 60. It accounts for an increase of 19.1% of the standard deviation of the CES-D score.¹⁴ The increase in the CES-D score the week after the Paris attacks is almost half of this: the CES-D score increases by 0.8 units, which accounts for an increase of 10.4% of a standard deviation. Following the CharlieHebdo attack, mental health deteriorated relatively more than following the Paris attacks. However, the negative impact on health is more long lasting following the Paris attacks, since three weeks after the attacks we still find significant negative effects on mental health. These findings contrast with those for the Nice attack, reported in the second panel of Figure 1. In this case, we find no significant impact on mental health.

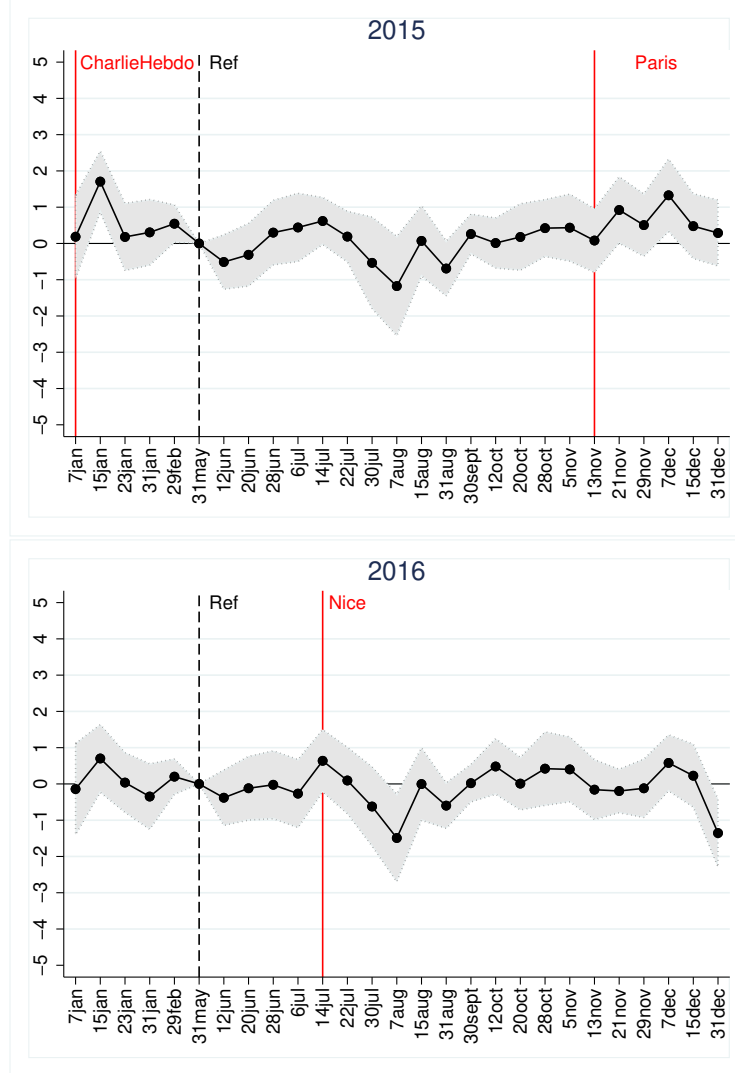
Robustness and falsification tests Results are overall robust to the way we aggregate data and define mental health.

The “de-cumulative” effect is reinforced when we consider a two-week period interval instead of a one-week period interval, as revealed by Figure C.1 in Appendix C. The CharlieHebdo attack induced a two-weeks deterioration in mental health (smaller than the one found when considering one-week intervals), while following the Paris attacks there was a four-weeks deterioration but much smaller than for CharlieHebdo. We additionally estimate the probability of developing a clinical depression (*i.e.* having a CES-D score of 16 or above) following the attacks. Estimation results are presented in Figure C.2 in Appendix C (see also Tables 7-9 in the Online Appendix). They are less precise than the ones obtained using the continuous CES-D score. The de-cumulative effect is less clear here, suggesting different reactions at the extensive and at the intensive margins: while the third attack has still no significant effect on mental health, the second attack has now the strongest impact. This does not challenge the robustness of our results given that the continuous score and the binary indicator of depression do not capture the same information and given that the habituation effect seems more appropriately captured by a continuous score than by a dichotomous measure. Still, we run quantile regressions on the continuous CES-D score (Figures C.3-C.5 in Appendix C) to have a better understanding of the discrepancies between the two sets of results.¹⁵ The quantile regression estimates are fairly consistent with our main OLS estimates. We show that the CharlieHebdo attack mostly deteriorates mental health among people with an initially high CES-D score (at the 90th and 95th percentiles, above the score of 16), when the Paris attacks affect mostly people who are close to falling into depression (at the 75th percentile, just below the score of 16). This explains why the CharlieHebdo attack has no effect on the probability of having a CES-D score of 16 or above, but a significant impact on the CES-D score, when the opposite is found for the Paris attacks. For the Nice attack no significant effect is found at any percentiles, which is consistent with the main estimates in the paper.

¹⁴We use here the moments of the distribution of the CES-D in the period before the CharlieHebdo attack.

¹⁵Quantile regressions are run with the fixed effects but not the additional controls because of convergence issues linked to the small sample size relative to the number of parameters to be estimated.

Figure 1: Effect on the CES-D score of the three attacks



Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Following Tsai and Venkataramani (2015), we propose a falsification test consisting in estimating the effect of attacks on the BMI to ensure that our estimates capture the causal effect of attacks. As the BMI is not expected to be affected by the attacks in the short run, finding an association between the event and the BMI would suggest a bias in our study design. As revealed by Figure C.6 in Appendix C, coefficients associated to the post-period attacks are not significantly different from zero, meaning that the attacks had no effect on the BMI.¹⁶ Our falsification test therefore passes and we are confident that our design controls for confounding factors.

¹⁶Results from independent regressions available in the Online Appendix also reveal no significant effect on the BMI following any of the terrorist attacks.

4 The mechanisms behind the impact on mental health

Our estimates may reflect the action of a psychological mechanism by which individuals “get adapted” to terror (*i.e.* habituation), but it may also capture the effects of other drivers linked to socio-demographic characteristics of the individuals interviewed in the sample, as well as the effect of differences in the characteristics of the terrorist attack. In this section, we test the relevance of the main mechanisms we can test with the data at hand.

Differences in the characteristics and contexts of the attacks. The attacks we consider have different characteristics and this may generate different reactions in the population. Three attacks do not provide enough variation to identify the role of the differences in the attacks’ attributes on their differential effect on mental health. A comparison of the attacks however does not support the idea that the latest attacks were less serious than the previous ones and were therefore less likely to impact the population. A ranking in terms of seriousness of the events is uneasy to produce given that the attacks differ with respect to multiple dimensions (Table 4). Still, there were more casualties in the second and third attacks than in the first one. Moreover, contrary to the first attack, which was targeted to journalists and caricaturists who received death threats for years, the second and third attacks hurt and killed random citizens.

It could also be that the first attack changed the context and hence limited the possible aftermaths of following attacks. After the first attack the French government indeed increased the security level. This could have increased the feeling of safety in the population or make the population realize that an attack was likely to struck in the future, limiting the impact of another attack. External data however do not support this explanation for the de-cumulative effect we observe. The timeline of the national security alert system indeed reveals that the number of men deployed to protect the population against terror was raised at its maximum level only after the attacks we consider struck. There was no increase days or weeks before the second or third attacks and it was even announced on June 2016, *i.e.* a few weeks before the Nice attack, that the number of military men deployed was about to be reduced.

All in all, it is not clear that the second and third attacks were more expected to happen than the first one, even if the overall alert security level was raised after the CharlieHebdo attack. This is confirmed by a Google trends analysis that shows that the Google search indexes associated with the words “Attack”, “Terror” and “Terrorist threat” were stable at an extremely low level prior to the attacks and only jump the exact days of the attacks (see Figures 6-9 in the Online Appendix).

It could also be that the CharlieHebdo attack permanently raised the level of anxiety, reducing the margins for additional increase. But the average CES-D score has not increased continuously over the study period. Except the sharp increase in November and December 2015, following the Paris attacks, the average CES-D score has rather decreased. Therefore, there is not a rising baseline in the CES-D score, which could have partly or fully explained the smaller marginal effect of the latest attacks (Figures B.4 and B.5 in Appendix B). The same, no trend is observed when we consider the average probabilities of being fearful or of feeling hopeful about the future (Figures B.7 and B.6 in Appendix B), indicating that the overall feeling of safety and hope remained the same from one attack to another.

Table 4: Comparison of the attributes of the attacks

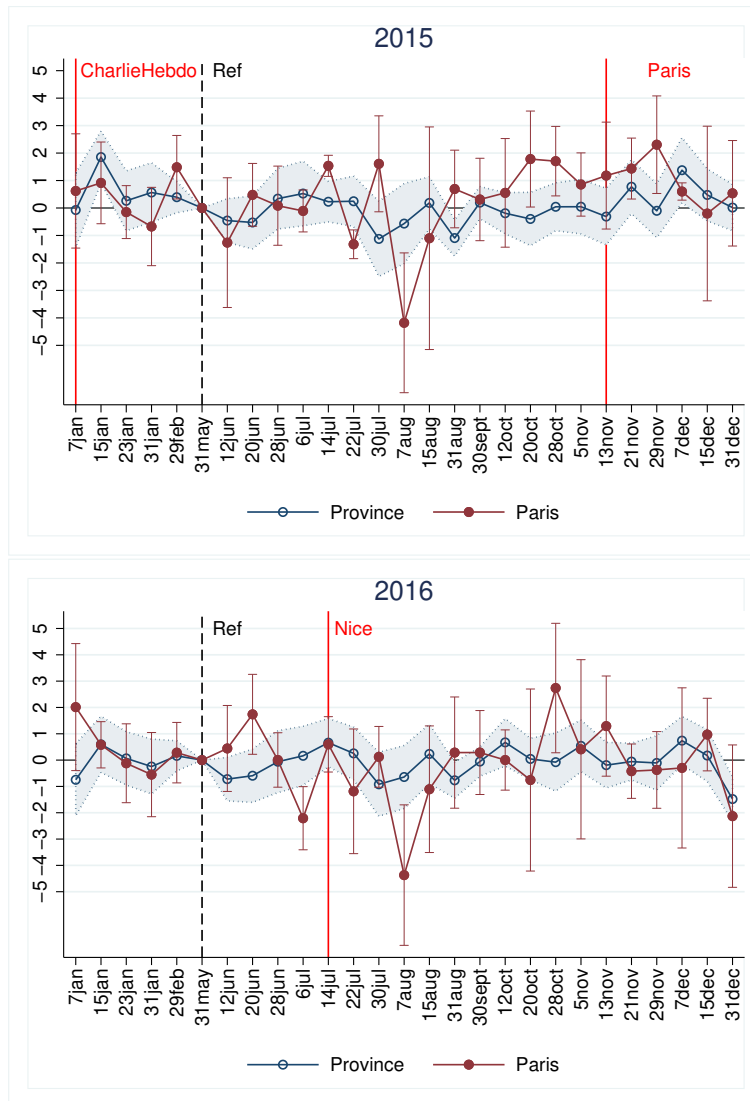
| | CharlieHebdo | Paris | Nice |
|------------------------------------|-------------------|--|--------------|
| Date | Jan 7-9, 2015 | Nov 13-14, 2015 | Jul, 14 2016 |
| Duration for the victims (in min.) | 3210 | 186 | 18 |
| Location | Newspaper offices | Stadium Bars, Restaurants and Concert hall | Outside |
| Type/weapons | Armed assault | Bombing, Armed assault | Truck |
| | Hostage taking | Hostage taking | |
| Nb deaths | 17 | 130 | 86 |
| Nb wounded | 22 | 413 | 202 |
| Characteristics of victims (in %) | | | |
| Share women | 12 | 39 | 57 |
| Share below 18 years old | 0 | 0 | 19 |
| Share 18-30 years old | 18 | 37 | 21 |
| Share 30-40 years old | 0 | 43 | 6 |
| Share 40-55 years old | 35 | 17 | 24 |
| Share 55 years old and above | 47 | 3 | 30 |

Geographical proximity. First we consider the geographical proximity to the site of the attack, with the idea that people react more when they are closer to the victims and the place of the attack, even if recent studies challenge this a priori. Two of the attacks we consider took place in Paris, while the third one occurred in Nice, that the French call *Province* like any other metropolitan territory outside Paris. We replicate the econometric estimation in stage 2, but separately on people living in Paris and on people living in *Province*.¹⁷ We expect the CharlieHebdo and Paris attacks to have stronger impact in the Paris sample than in the *Province* sample. We expect the opposite for the Nice attack.¹⁸

¹⁷With such stratified estimations, the value of coefficients will not be directly comparable across samples, but we can compare whether our DiD coefficients are significant or not on each subsample.

¹⁸None of the 21 HSC is located in Nice, so it is not possible to precisely test the geographical proximity hypothesis for the Nice attack.

Figure 2: Effect of terrorist attacks on mental health: Paris vs. *Province*



Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Results do not conclusively support this hypothesis, so that geographical proximity cannot be considered as a driver of the mental health impact of a terrorist attack. The CharlieHebdo attack had a negative and significant impact on the mental health of people living in *Province*, but no significant impact on the mental health of Parisians (first panel in Figure 2). In contrast, the Paris attacks had a negative and significant impact on Parisians' mental health (lasting up to 3 weeks after the attacks) but no significant impact on the mental health of people living in *Province*. As for the Nice attack, it did not have any significant effect on mental health, neither in Paris nor in *Province*.

Proximity to the victims. Second we consider proximity in terms of socio-demographic attributes, with the idea that proximity to the victims may favor negative mental health outcomes if people identify with the victims based on similarities shared with them. The attacks we consider differ greatly in the profile of their victims. For instance in terms of age, the victims were mostly above 55 years old during the CharlieHebdo and Nice attacks (47% and 36% of the victims, respectively) and between 30 and 40 years old during the Paris attacks (43%). In the Nice attack 19% of the victims were below 18 years old. Last, given that the attacks we consider were claimed by ISIS, they could have induced a negative impact on mental health for both Jews and Muslims. The formers were actually targeted as a follow-up to the CharlieHebdo attack with the attack on a kosher supermarket, while the latter felt the rejection of the French society and the association of their religion to terror. Such differences could generate heterogeneous impacts across attacks if identification to the victims is at play.

We replicate the estimation of stage 2 on stratified samples.¹⁹ Figures C.7 and C.8 in Appendix C analyze the effect of the three terrorist attacks on people between 30 and 40 years old and people above 55 years, respectively. Figures C.9 and C.10 consider people with and without children and Figure C.13 focuses on circumcised men, circumcision being used as a proxy for religious belonging.²⁰

Figure C.7 reveals that age proximity to the victims does not seem to be a significant determinant of the deterioration of the individual's mental health. People between 30 and 40 years old represented the majority of the victims in the Paris attacks but their mental health is not significantly deteriorated after this attack. This finding is confirmed when considering people above 55 years (Figure C.8) who did not suffer any significant deterioration in mental health after the CharlieHebdo or Nice attacks, even if this age range represented the most numerous group among the victims.

The Nice attack is the only one involving children. Parents may be more affected by the Nice attack than the other attacks and than non parents if they identify their children to the victims. Figure C.9 reveals that people with children experienced no significant impact in the week following the Nice attack. If people without children seem less sensitive to terror than people with children (see Figure C.10), we cannot conclude that parents are more affected by terror due to proximity to the victims since the Nice attack does not significantly deteriorate parents' mental health. It could be that deeply loving someone increases the attachment of people to life and makes them more vulnerable to the effects of terror. To test the relevance of this interpretation, we replicate the estimations using the sample of people living in couple (Figure C.11 in Appendix C) and the sample of people that do not live in couple (see Figure C.12 in Appendix C). Findings obtained are in line with those obtained for people with children²¹.

Finally, Figure C.13 in Appendix displays coefficient estimates for males that are circumcised. Estimates are less precise due to a reduced sample size (we now work on 5,111 individuals). No significant degradation though arises following any of the attacks.

All in all, socio-demographic proximity to the victims does not seem to be a major driver behind the

¹⁹While it would have been optimal to work with the whole sample and interact our weekly dummies with dummy variables indicating socio-demographic proximity to the victims by individual, multicollinearity problems prevent us from implementing this approach.

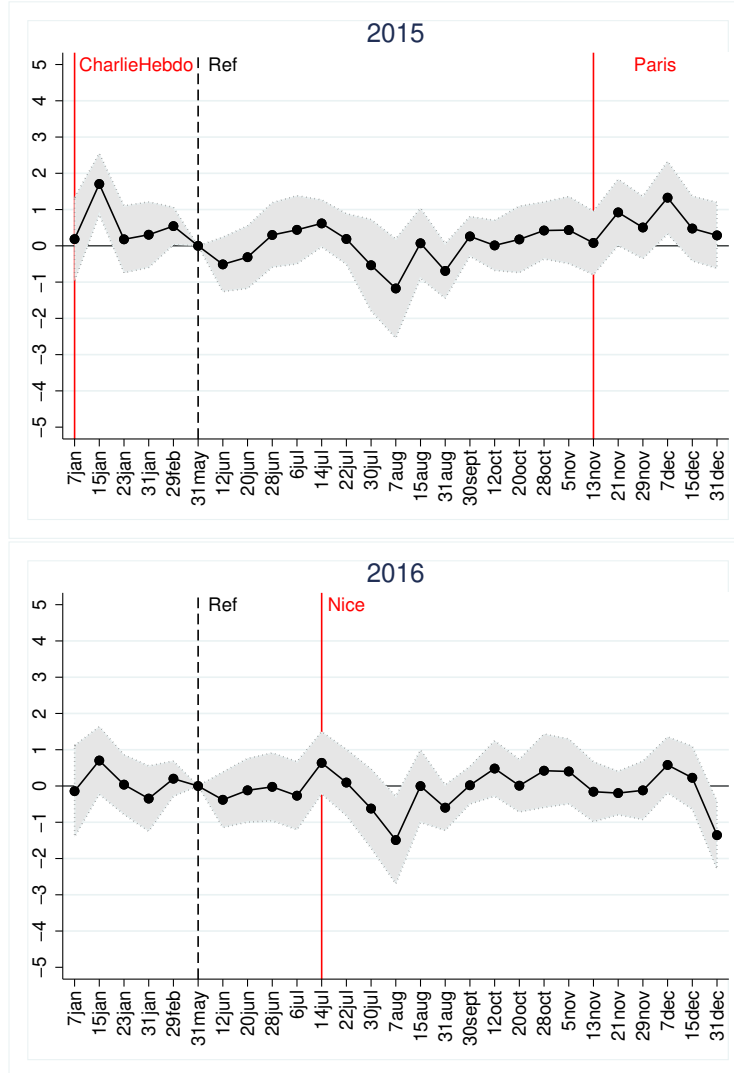
²⁰In France, circumcision is very unfrequent among men unless it is guided by religious motives. Essentially, only Muslims and Jews are circumcised. We therefore consider that in the specific case of France, circumcision is a good proxy for minority religions.

²¹Note that these two samples do not perfectly overlap. More than 44% of people living in couple do not have children. So when we consider the sample of people living in couple, we are not considering the same sample than the one of people with children.

degradation in mental health following a terrorist attack. In contrast, personal circumstances promoting values of life, such as parenthood or couple life, appear as significant drivers behind the degradation in mental health following the attacks.

The implication of these heterogenous effects is that our estimations may capture composition effects if the socio-demographic composition of the subsamples on which we identify the effects of the attacks are different (*i.e.* there may be more people with children in the sample used for the CharlieHebdo attack than in the sample used for Nice, for example). We propose then a counterfactual weight approach imposing identical socio-demographic composition of the sample along the three attacks. We consider two sample periods $t_0 = 2013 - 2014$ and $t_1 = 2015 - 2016$. For period t_0 we define cells by gender, age, education, civil status and children. We compute the relative weight of each of these cells in period t_0 and impose this weight in period t_1 to individuals belonging to the same cell. This counterfactual approach ensures that along the period 2015-2016 the corresponding socio-demographic composition of the sample is constant and equal to that of the period 2013-2014. Therefore, when estimating the mental health impact of every terrorist attack we can be confident that differences across attacks are not driven by composition effects. Conclusions drawn from Figure 3 remain unchanged with respect to Figure 1, which confirms that the “de-cumulative” effect is not driven by changes in the socio-demographic composition of the samples.

Figure 3: Effect of terrorist attacks on mental health. Counterfactual weights.

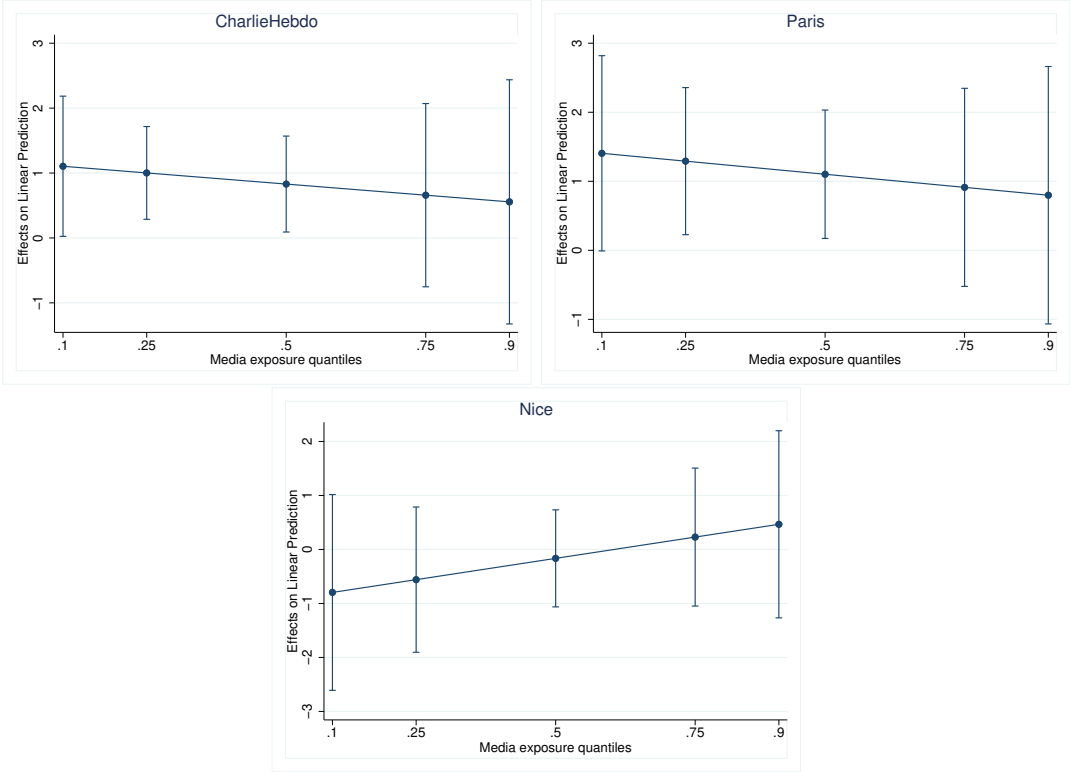


Source: Constances (2014-2016). Notes: Weighted OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Weights guarantee that gender, age, education, civil status and children composition is equal and constant between $t_0 = 2013, 2014$ and $t_1 = 2015 - 2016$. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Exposure to media. We now consider the role of exposure to media as a stressor potentially amplifying the impact of terror on mental health.

We exploit the European Social Survey (ESS) to infer television exposure of individuals in our sample, since individual media consumption is not provided in the Constances data.²² Specifically, we use the answers given by French people in the 2014 ESS to an explicit question on the time spent on average weekday watching news/politics/current affairs on TV. The answer allows for 8 different categories, from “No time at all” to “More than 3 hours”, with 30-minutes brackets. We define age-gender cells²³ and compute the average daily time spent watching TV news by people within each cell. We normalize this variable between 0 and 1 across cells, so that the higher the value the more time is spent by people in the cell watching TV news. We then attribute these amounts to individuals of the corresponding age-gender. Finally, we estimate the marginal effect of media exposure on mental health during the week following the attack to see if individuals that were relatively more exposed to media experienced a larger drop in their mental health.

Figure 4: Effect of terrorist attacks on mental health, the week following the attack, by media exposure.



Source: Constances (2014-2016) and European Social Survey (France) 2014. Notes: OLS estimation of the marginal effects on the CES-D score of media exposure (normalized between 0 and 1) during the week following the attack. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

²²Additionally, this approach leaves us less exposed to biases given that media consumption may be endogenous to the individual’s mental health.

²³We define 11 age ranges (19-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69 and 70-75) and distinguish between females and males.

Figure 4 shows that media exposure does not explain the degradation in mental health estimated following the CharlieHebdo and Paris attacks. Specifically, degradation in mental health the week following each of these two attacks is confined to individuals with low or intermediate media exposure. For the Nice attack, no significant effect is found on mental health, whatever individual media exposure.²⁴

Surprisingly, the effects on mental health of CharlieHebdo and Paris attacks seem to follow a decreasing trend along media exposure. It is above the scope of this paper to identify the psychological mechanism behind this finding. A first guess could be though that it is the same mechanism that drives the “de-cumulative” effect of terror attacks on mental health. People continuously exposed to terror images eventually get used to them. One additional minute of exposure no longer has any significant effect on mental health.

5 Conclusion

Our findings reveal that continuous exposure to terror leads to a de-cumulative path in mental health deterioration after the first attack. Our policy recommendation would then be to provide support to the general population immediately after the very first attack, as it is the one that has the strongest impact. This requires reactivity and the ability to deploy support structure quickly. Identifying the target population may result complicated, so an interesting public policy to reach the largest possible population would be to use media (television, radio, paper journals, social media, etc) to implement mental health public programs. More precisely, mental health professionals (psychologists or psychiatrists) should be involved in these programs and make lectures about mental health consequences following the attack and how to handle them. Implementing this type of policy is currently under debate in Spain to deal with post-pandemic mental health consequences.

²⁴The large confidence intervals may result from the measurement error introduced by imputing ESS measures on media exposure by age-gender cells to single individuals in Constances.

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A Appendix: Descriptive statistics

Table A.1: Sample composition 2014-2016. Socio-demographics

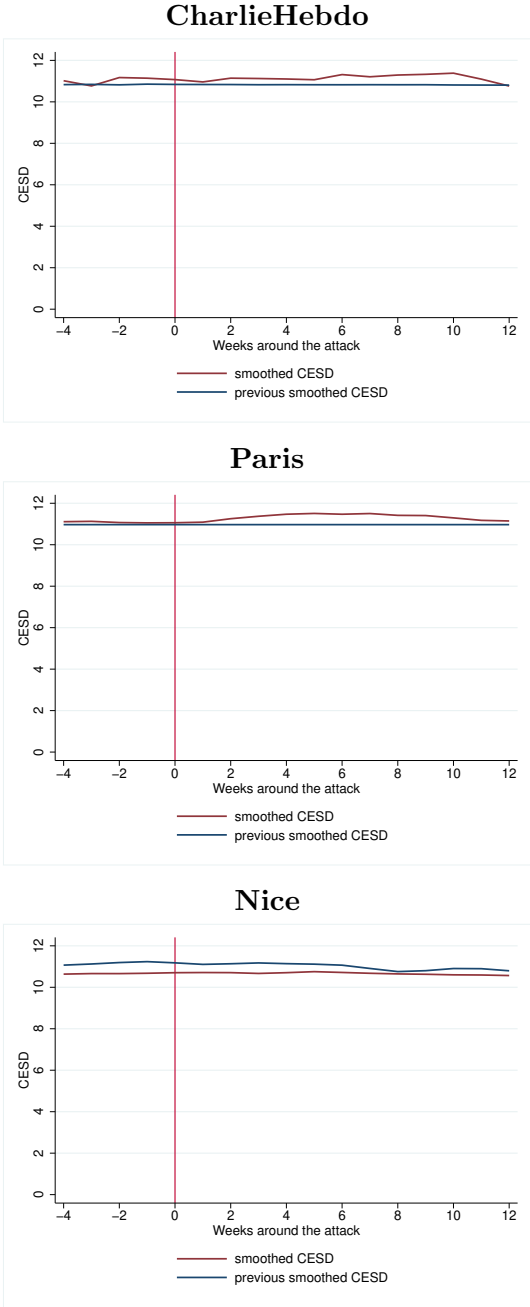
| Variable Names | Mean | Obs |
|-----------------------------|-------|-------|
| Female | 0.528 | 47864 |
| Age (in years) | | |
| 15-29 | 0.125 | 11375 |
| 30-39 | 0.192 | 17425 |
| 40-49 | 0.231 | 20946 |
| 50-59 | 0.227 | 20574 |
| 60 and above | 0.224 | 20343 |
| Education | | |
| No education | 0.024 | 2217 |
| CFG/CEP/Brevet/BEPC | 0.055 | 5006 |
| CAP/BEP | 0.159 | 14376 |
| Bac | 0.175 | 15856 |
| More than BAC | 0.587 | 53208 |
| In a relationship | 0.732 | 66408 |
| With children | 0.463 | 41987 |
| French | 0.927 | 83590 |
| Immigrant | 0.105 | 9517 |
| Second generation immigrant | 0.037 | 3330 |
| Work status | | |
| Employed | 0.661 | 59907 |
| Unemployed | 0.060 | 5438 |
| Retired | 0.189 | 17150 |
| No working activity | 0.040 | 3613 |
| Student, trainee | 0.009 | 846 |
| Disability | 0.021 | 1901 |
| Other | 0.020 | 1808 |
| High income | 0.575 | 52103 |

Source: Constances (2014-2016).

B Appendix: Threats to the identification strategy

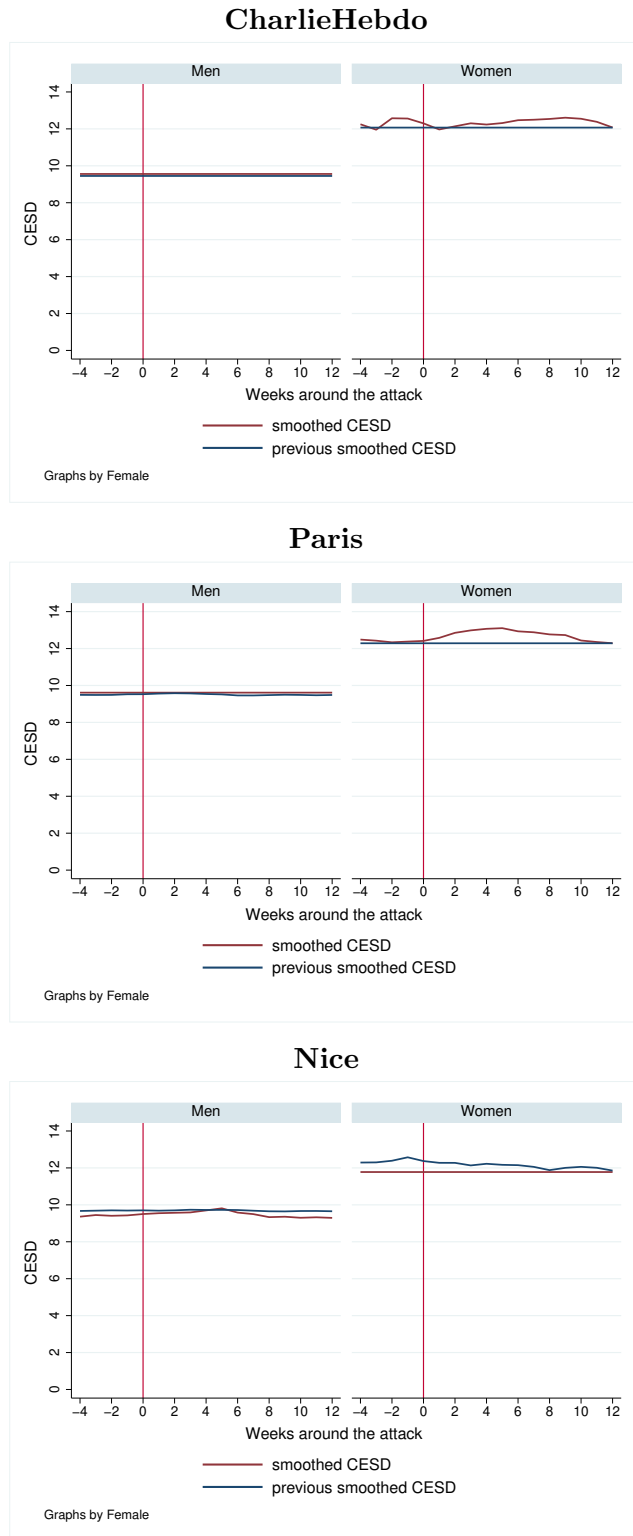
B.1 Pre-trends

Figure B.1: Pre-trends in mental health over previous weeks



Source: Constances (2014-2016). Note : Quadratic smooth. Previous smoothed CES-D computed over two years.

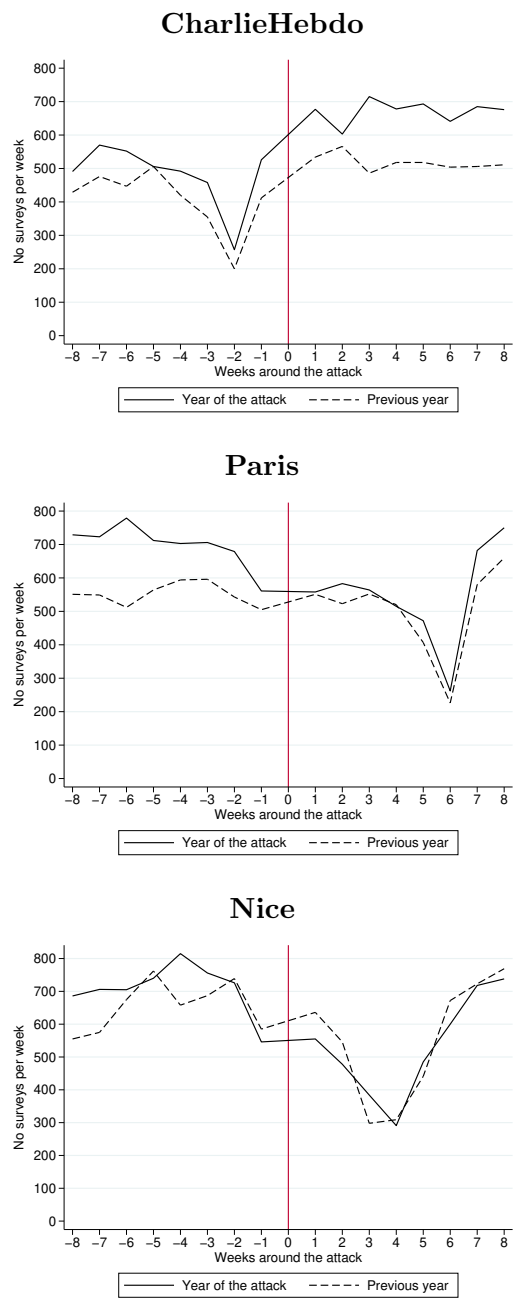
Figure B.2: Pre-trends in mental health over previous weeks by gender



Source: Constances (2014-2016). Note : Quadratic smooth. Previous smoothed CES-D computed over two years.

B.2 Number of Interviews

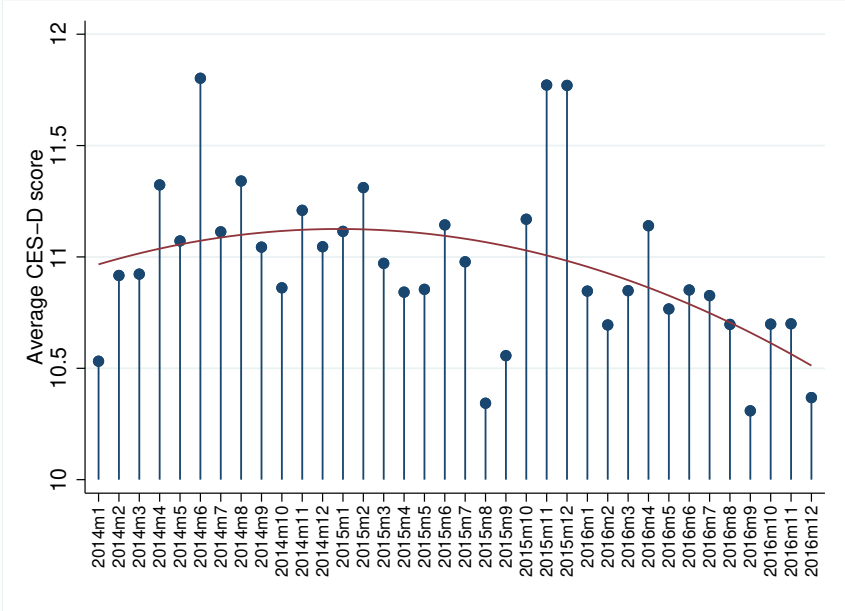
Figure B.3: Weekly volume of surveys around the attacks



Source: Constances (2014-2016).

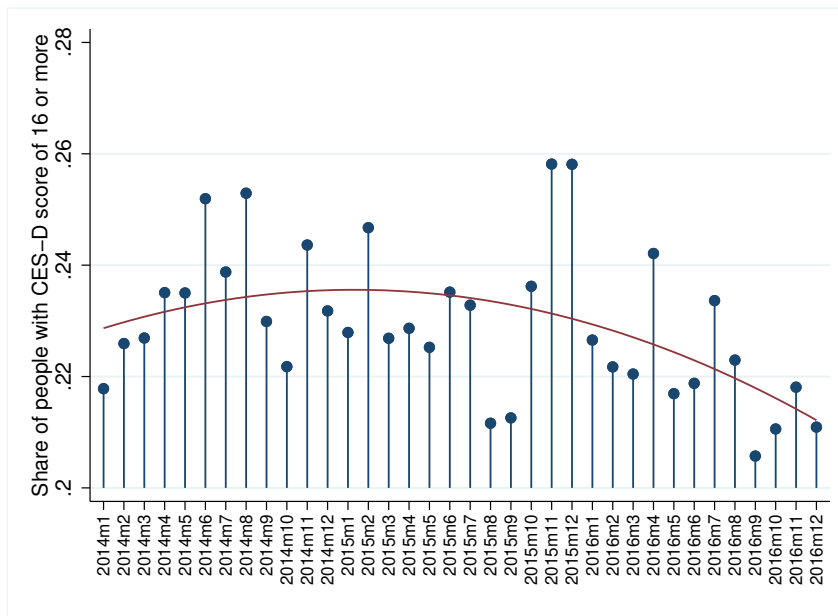
B.3 Change in the Baseline

Figure B.4: Average CES-D score by year-month



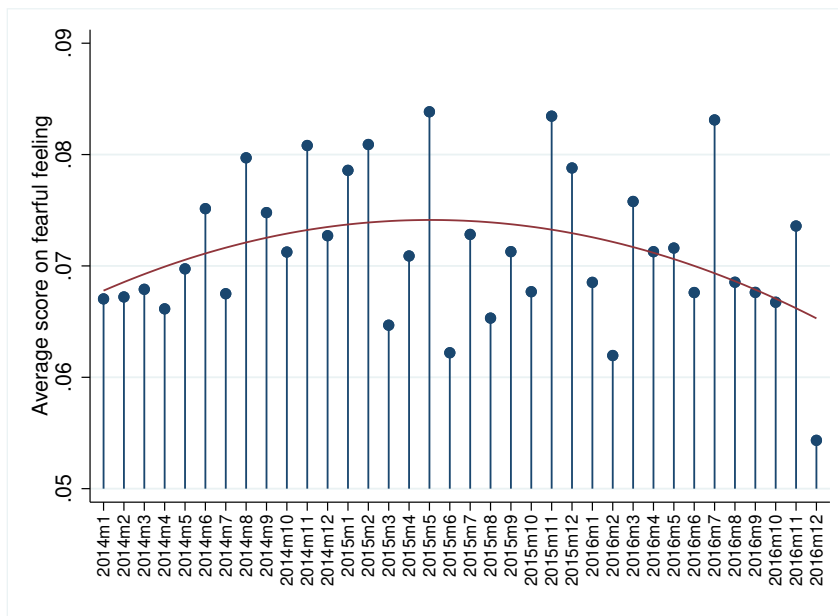
Source: Constances (2014-2016).

Figure B.5: Share of people with CES-D score of 16 or more by year-month



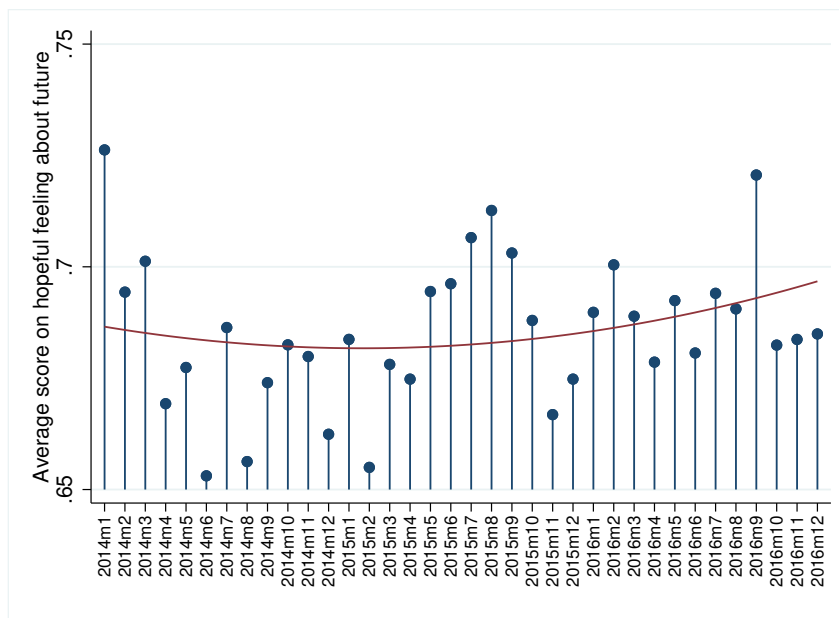
Source: Constances (2014-2016).

Figure B.6: Average score on fearful feeling by year-month



Source: Constances (2014-2016).

Figure B.7: Average score on hopeful feeling about the future by year-month

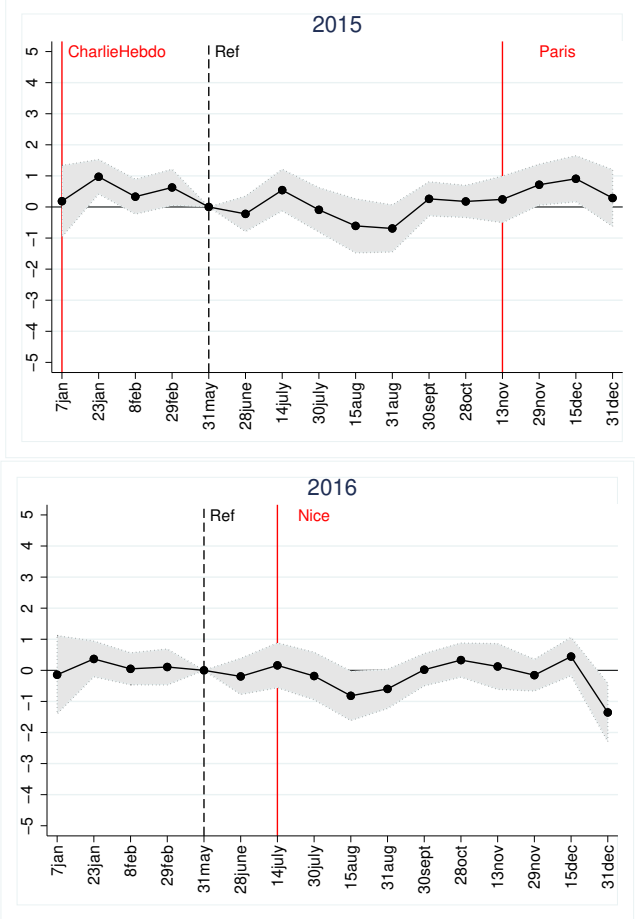


Source: Constances (2014-2016).

C Appendix: Additional regressions

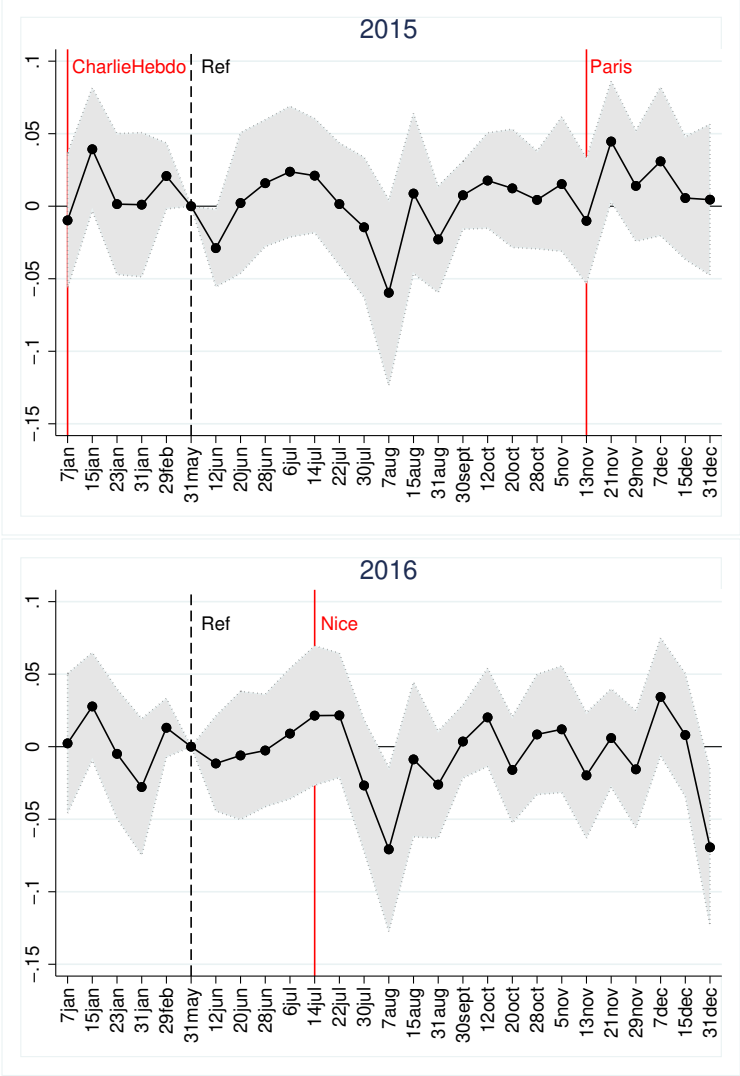
C.1 Robustness and Falsification Tests

Figure C.1: Effect of terrorist attacks on mental health. Two-week intervals.



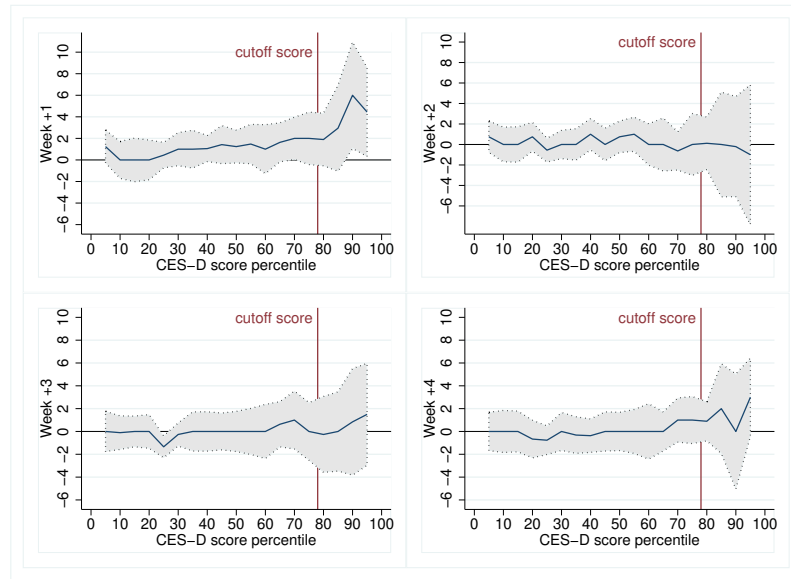
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.2: Effect of the three attacks on the probability of having a CES-D score greater than or equal to 16



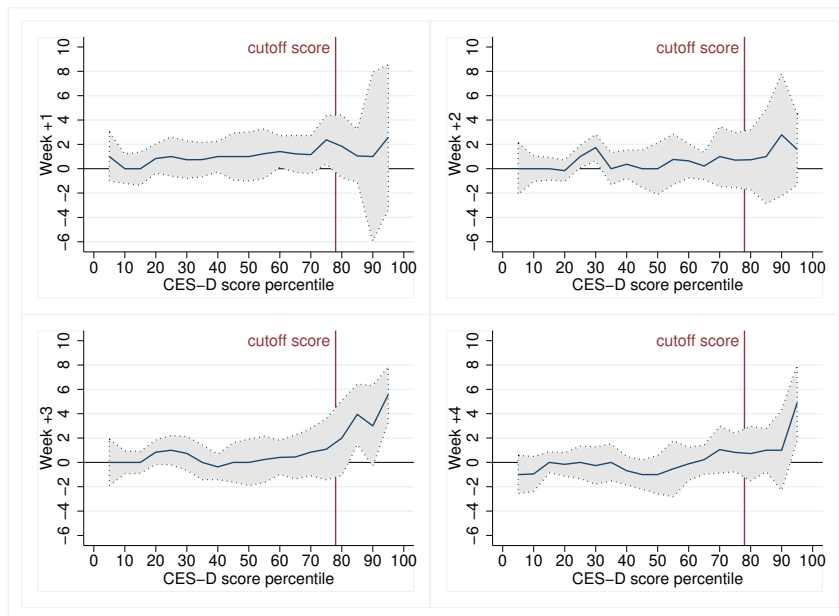
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The confidence intervals correspond to a statistical significance of 10%.

Figure C.3: Effect of the Charlie Hebdo attack on CES-D score percentiles: the 4 weeks after



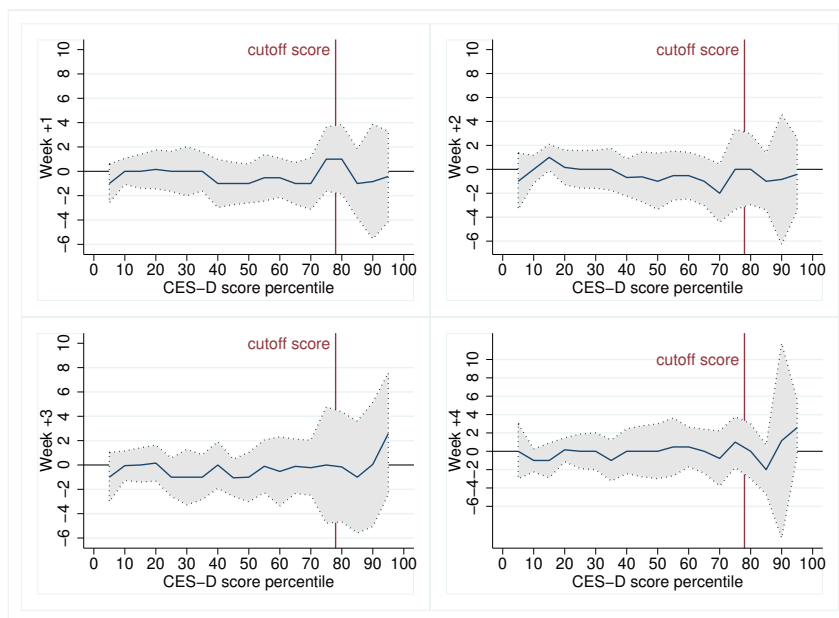
Source: Constances (2014-2016). Notes: Coefficient estimates from quantile regressions of equation (1). Robust standard errors clustered at the department-year level. The grey shade area corresponds to 95% confidence intervals.

Figure C.4: Effect of the Paris attacks on CES-D score percentiles: the 4 weeks after



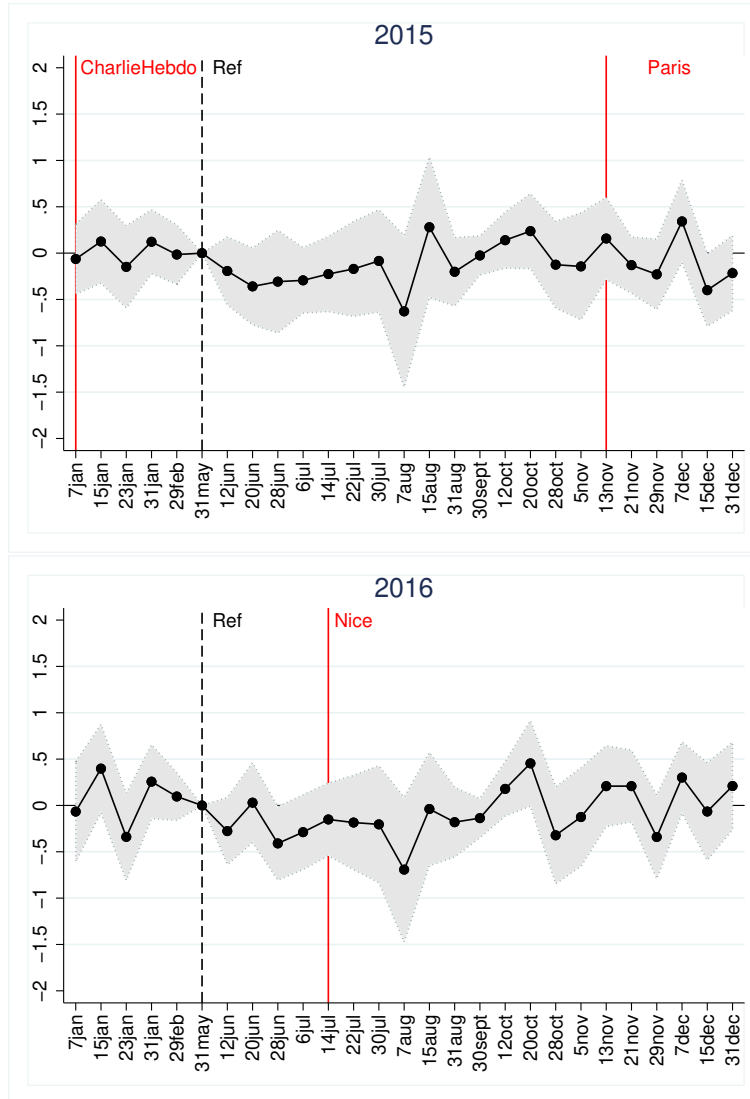
Source: Constances (2014-2016). Notes: Coefficient estimates from quantile regressions of equation (1). Robust standard errors clustered at the department-year level. The grey shade area corresponds to 95% confidence intervals.

Figure C.5: Effect of the Nice attack on CES-D score percentiles: the 4 weeks after



Source: Constances (2014-2016). Notes: Coefficient estimates from quantile regressions of equation (1). Robust standard errors clustered at the department-year level. The grey shade area corresponds to 95% confidence intervals.

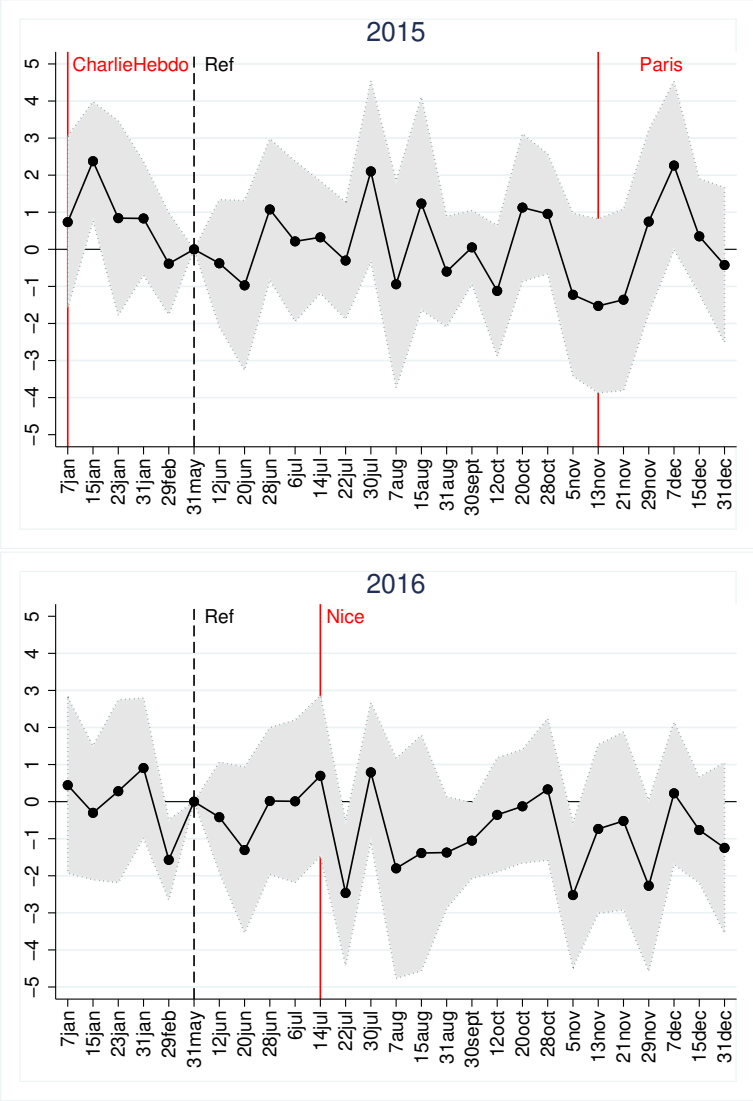
Figure C.6: Falsification test: Effect on the BMI of the three attacks.



Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

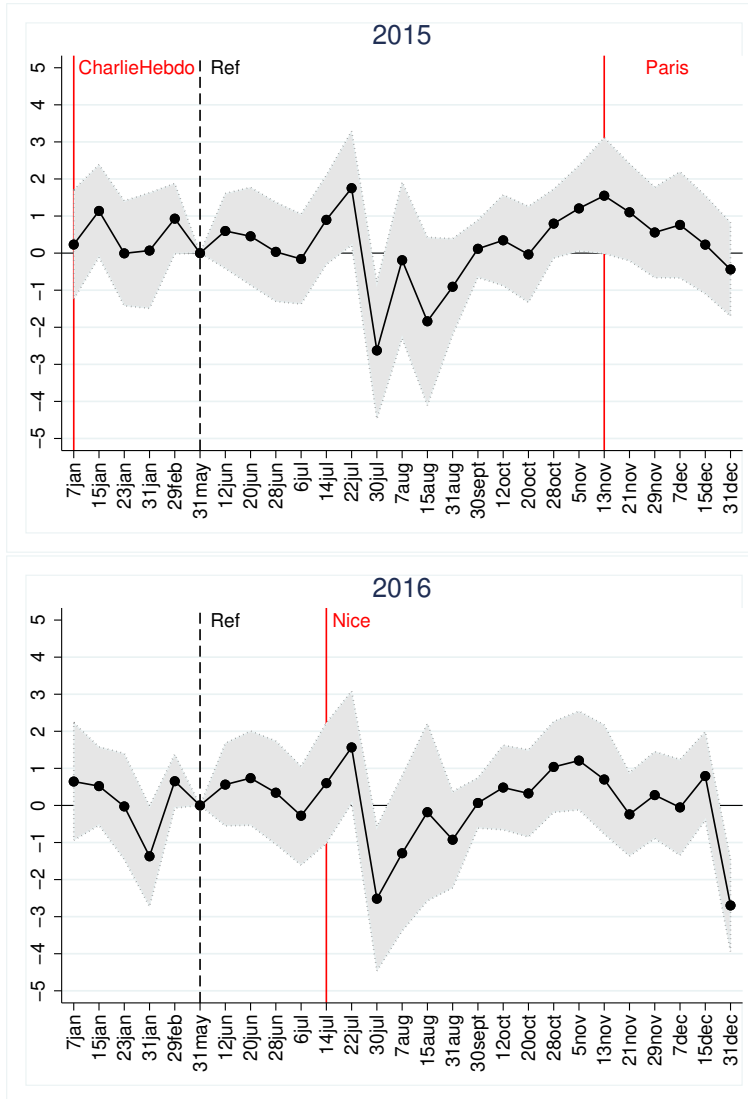
C.2 Heterogeneous Effects

Figure C.7: Effect of terrorist attacks on people between 30 and 40 years old



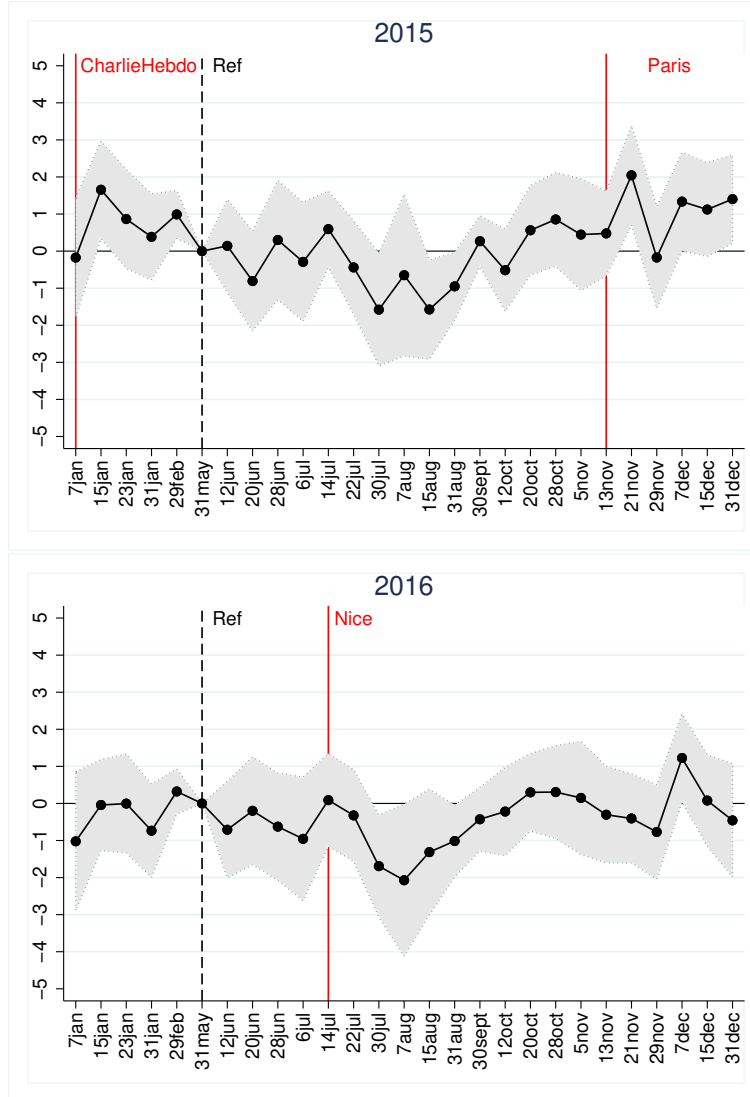
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.8: Effect of terrorist attacks on people above 55 years old.



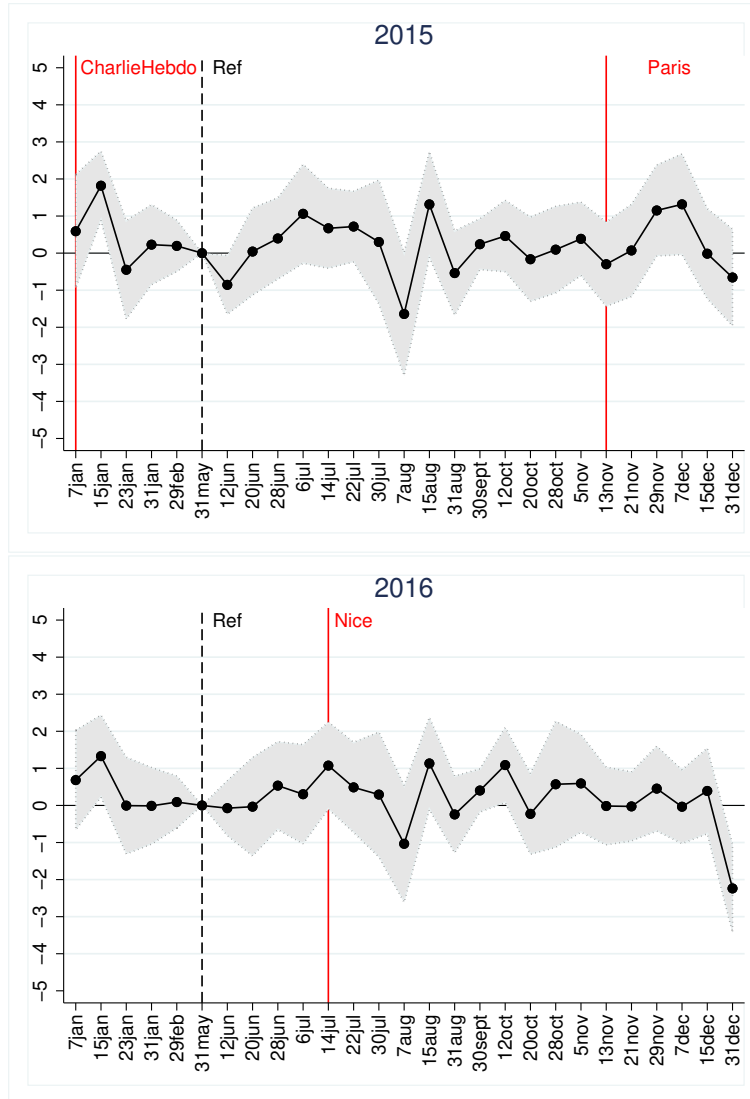
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.9: Effect of terrorist attacks on people with children



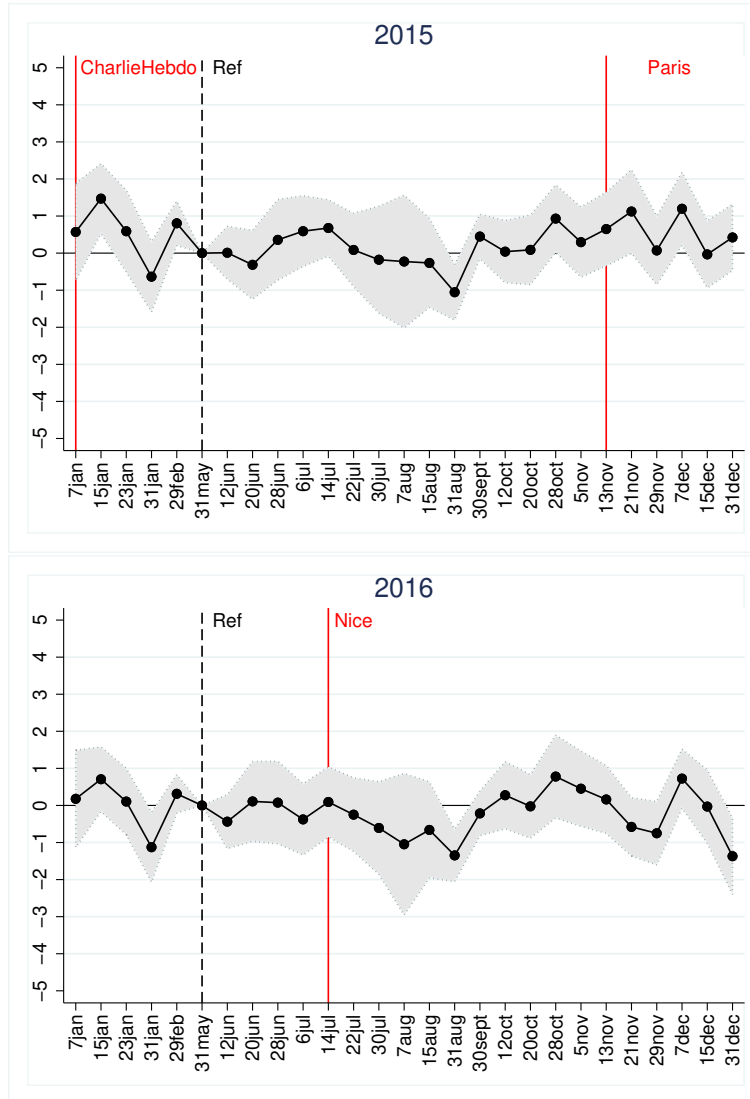
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.10: Effect of terrorist attacks on mental health: people without children



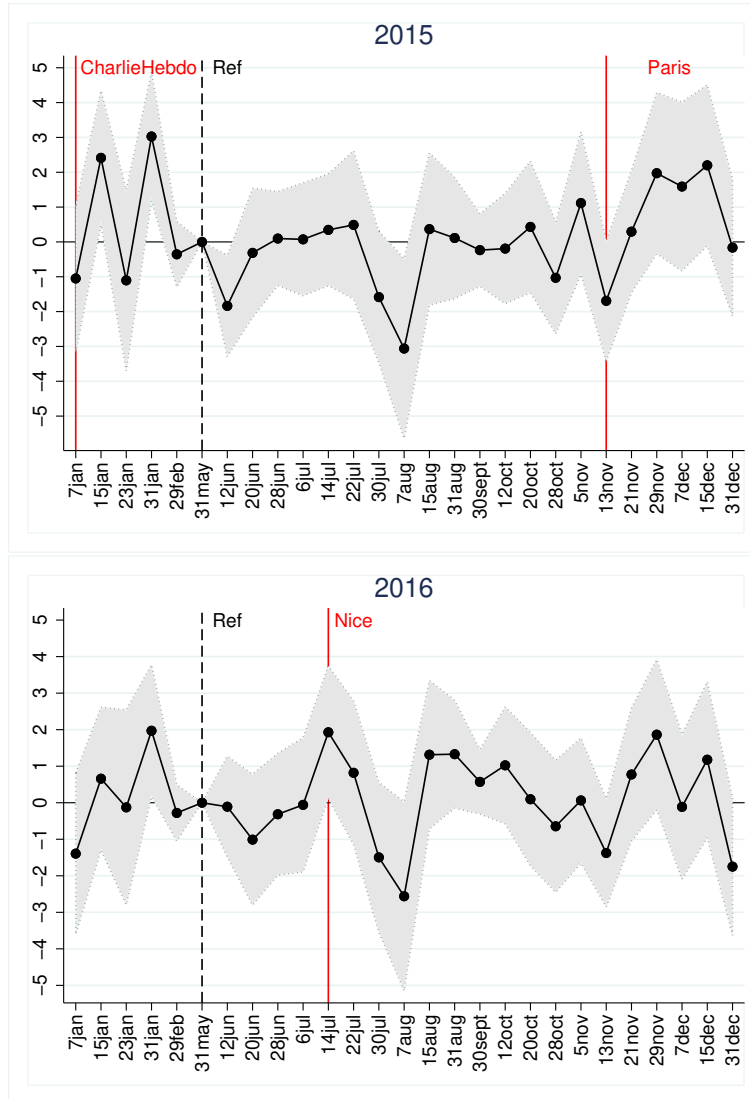
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.11: Effect of terrorist attacks on mental health: people living in couple



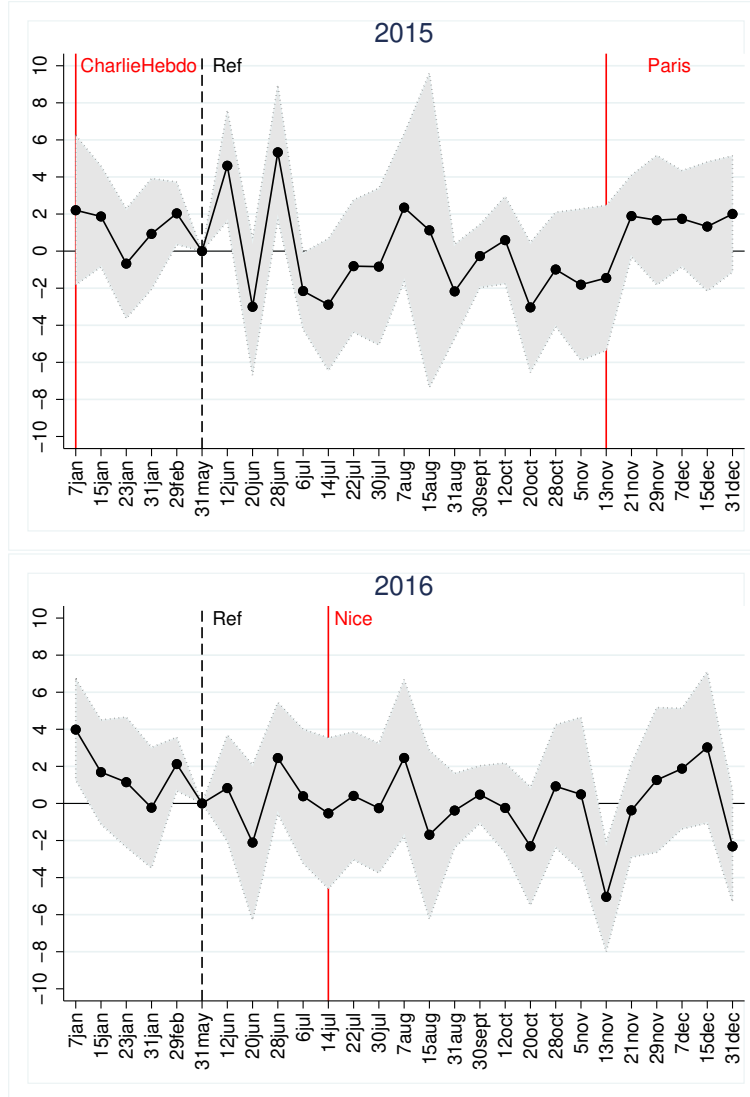
Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.12: Effect of terrorist attacks on mental health: people not living in couple



Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.

Figure C.13: Effect of terrorist attacks on circumcised people



Source: Constances (2014-2016). Notes: OLS estimation of equation (1) over the pooled sample where 2014 corresponds to the excluded year category and within every year the reference period is March 1 to May 31. Robust standard errors clustered at the department-year level in parentheses. The grey shade area corresponds to 90% confidence intervals.