



**HAL**  
open science

# Under the Veil of Tolerance: A Justification-Suppression Approach to Anti-Islamic Implicit Bias in Reaction to Terrorist Attacks

Manon Arnoult, Leila Selimbegović, Gilad Hirschberger, Tom Pyszczynski,  
Armand Chatard

## ► To cite this version:

Manon Arnoult, Leila Selimbegović, Gilad Hirschberger, Tom Pyszczynski, Armand Chatard. Under the Veil of Tolerance: A Justification-Suppression Approach to Anti-Islamic Implicit Bias in Reaction to Terrorist Attacks. *Journal of Personality and Social Psychology*, 2023, 10.1037/pspa0000337. hal-03921796

**HAL Id: hal-03921796**

**<https://hal.science/hal-03921796>**

Submitted on 4 Jan 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Under the Veil of Tolerance: A Justification-Suppression Approach to Anti-Islamic  
Implicit Bias in Reaction to Terrorist Attacks

Manon Arnoult and Leila Selimbegović

Université de Poitiers, CNRS, Poitiers, France

Gilad Hirschberger

Baruch Ivcher School of Psychology, Reichman University, Herzliya, Israel

Tom Pyszczynski

University of Colorado, Colorado Springs, USA

Armand Chatard

Université de Poitiers, CNRS, Centre Hospitalier Laborit, Poitiers, France

**Journal of Personality and Social Psychology (in press)**

**© 2022, American Psychological Association. This paper is not the copy of record and may not exactly replicate the final, authoritative version of the article. Please do not copy or cite without authors' permission. The final article will be available, upon publication, via its DOI: 10.1037/pspa0000337**

Open Practices

The data for all studies reported here are available in Open Science Framework at

<https://osf.io/x7z4f/>. Study 4 was fully preregistered at: <https://osf.io/a2m6g>.

Corresponding Author

Armand Chatard  <https://orcid.org/0000-0003-4823-2903>

Université de Poitiers, CERCA, CNRS 7295, 5, rue Théodore Lefebvre, TSA 21113,

Poitiers Cedex 9, France, Phone number: + 33 5 49 45 46 83

E-mail: [armand.chatard@univ-poitiers.fr](mailto:armand.chatard@univ-poitiers.fr)

### Abstract

Twenty years after 9/11, the impact of terrorism on social and political attitudes remains unclear. Several large-scale surveys suggest that terrorism has no discernible effects on direct, self-report measures of prejudice towards Arab-Muslims. However, direct measures may lack the sensitivity to detect subtle underlying attitudes that are considered socially unacceptable to openly express. To tap these subtle reactions, we assessed more sensitive and implicit measures of the cognitive–affective aspects of prejudice. Building on the justification-suppression model of prejudice, we hypothesized that terrorist attacks increase implicit bias towards Arab-Muslims, especially among individuals who are unable to regulate automatic hostile reactions due to personality or situational variables. Study 1, using data from Project Implicit ( $N = 276,311$ ), showed that terrorist attacks increased implicit bias but not expressed prejudice towards Arab-Muslims. Study 2, using data from Google Trends, showed that terrorist attacks increased anti-Islamic searches on the Internet. Four studies that collected original data (Total  $N = 851$ ) showed that the effects of reminders of terrorism on anti-Islamic implicit bias are moderated by individual differences in prejudice and automaticity (Studies 3–4); by the strength of implicit Muslim–terrorist associations (Study 5); and by momentary self-control depletion (Study 6). Overall, the present research indicates that despite little evidence for elevated overt expression of prejudice against Arab-Muslims following terrorist attacks, terrorist attacks increase anti-Islamic implicit bias whenever individuals are unlikely to control automatic hostile reactions.

*Keywords:* Islamist terrorist attacks, implicit bias, expressed prejudice, project implicit, Google Trends, automaticity, implicit association, self-control depletion

Under the Veil of Tolerance: A Justification-Suppression Approach to Anti-Islamic  
Implicit Bias in Reaction to Terrorist Attacks

In the book *You Will Not Have My Hate*, Leiris (2016), who lost his wife in the Bataclan theatre terrorist attack, describes his struggle to control the immediate reaction of hate and prejudice in the face of painful loss (see also Abuelaish, 2012). To date, this struggle to either suppress or overcome feelings of prejudice towards the perpetrator group following a terrorist attack has not been systematically studied in social psychology. We propose that if prejudice is suppressed, it can be detected using implicit measures, but if it is truly absent then it will not leave any discernible trace. In the present paper, we aim to directly address the question of spontaneous hostile reactions towards Arab-Muslims instigated by the terrorist attacks, and their interplay with controlled attempts to manage such reactions.<sup>1</sup>

Terrorism, the use of violence against civilian targets to achieve political aims, is a widespread tactic used by diverse groups in many nations (Victoroff & Kruglanski, 2009). The high-profile terrorist attacks conducted by Islamic groups in the United States against the World Trade Center in 2001 and against targets in France, such as the Charlie Hebdo magazine and the Bataclan concert venue in 2015, may amplify the association many people make between Islam and terrorism (Park et al., 2007). Following these attacks, pundits, politicians, and scientists expected to see an upsurge in anti-Islamic prejudice. This intuitive expectation for a strong anti-Islamic reaction is grounded in much psychological research that suggests that these terrorist attacks are likely to increase prejudice towards Arab-Muslims for several reasons: First, terrorism exacerbates the sense of existential threat (Pyszczynski et al., 2006), may prompt a preference for conservatism and elevate security needs (Jost et al., 2003), and may lead

to uncertainty (Van den Bos et al., 2005) and subsequent compensatory control (Kay et al., 2009). These psychological mechanisms have all been found to promote prejudicial reactions towards out-groups perceived as threatening.

Terror management studies, for instance, have shown that reminders of death increase rejection of worldview-threatening individuals (Arndt et al., 1997; Greenberg et al., 1990), discrimination against those who are different (Greenberg et al., 1990; Harmon-Jones et al., 1996), and aggression against out-groups (Chatard et al., 2011; Hayes, et al., 2008; Hirschberger, et al., 2016; McGregor et al., 1998; Pyszczynski et al., 2006). Some studies suggest that terrorism reminders and death reminders have similar effects (Das et al., 2009; Landau et al., 2004; Pyszczynski et al., 2006), such that priming both death and terrorism increases support for political violence (Landau et al., 2004) against those believed to be responsible for the attacks.

However, there is a striking discrepancy between research such as that of Landau et al. (2004), conducted in a laboratory setting, that shows a clear link between terrorism reminders and negative reactions towards out-groups, and the lack of such empirical support in surveys conducted immediately after actual terrorist attacks. Whereas several small-scale studies have found an increase in prejudice against Arab-Muslims following terrorist attacks (Cruz et al., 2020; Echebarria-Echabe & Fernández-Guede, 2006; Nugier et al., 2016), the majority of large-scale studies have failed to document a surge in anti-Muslim attitudes following such attacks (Bianquis & Castell, 2020; Brouard et al., 2018; Castanho Silva, 2018; Tiberj, 2017; Zeffman, 2015). For example, data from the European Social Survey indicates no significant increase in xenophobia following terrorist attacks in France (Castanho Silva, 2018). Some surveys even suggest that terrorism may have the opposite effect of increasing reports of tolerant

attitudes (Tiberj, 2020; Zeffman, 2015). To date, the extant literature provides little, if any, evidence for the hypothesis that terrorism heightens society-wide prejudiced reactions against Islam and Muslims. This could either mean that populations in the West are more tolerant than previously assumed, or that most research in this field has used measures that do not adequately capture the socially sensitive and elusive phenomenon of terrorism-induced prejudice. The main aim of the present research is to understand why there seems to be little increase in prejudice in large-scale surveys after terrorist attacks despite the fact that a large body of theory and research predicts such an increase.

### **Self-reported Measures of the Terrorism–Prejudice Link**

An important limitation of virtually all prior studies is their reliance on self-report questionnaires. The problem with such direct measures is that respondents are aware of the attitude that is being assessed and can easily control their responses to answer in a socially acceptable manner. Thus, individuals may conceal their true negative attitudes to maintain a positive identity as non-prejudiced individuals and to conform to prevailing social norms that discourage overt expressions of prejudice (Crandall & Eshleman, 2005; Devine, 1989; Plant & Devine, 1998). Because overt expression of prejudice is highly dependent on prevailing social norms (Crandall et al., 2002), when people are cognizant of the predominant social norm, they tend to be cautious about expressing socially unacceptable attitudes.

Racial prejudice and discrimination have been deemed unacceptable for several decades in many societies. However, the gradual reduction of direct and explicit expressions of prejudice may have given way to more subtle expressions of prejudice that can be equally insidious and damaging. For example, implicit measures of anti-

Black prejudice predicted reluctance to vote for Barack Obama and opposition to his health care program (Lane & Jost, 2011); a follow-up study showed that implicit prejudice predicted opposition to the healthcare program when it was attributed to Obama but not when it was attributed to Bill Clinton (Knowles et al., 2010). Current social movements emphasizing diversity, equity, and inclusion may have made the expression of overt prejudice even less acceptable than in past eras.

Today, many individuals describe themselves as unprejudiced (Crandall & Eshleman, 2005), and the strong motivation to appear unbiased has become an important source of methodological bias that can distort the findings from social and political surveys that rely exclusively on self-report measures. Thus, it is quite possible that the curious absence of an empirical link between terrorism and prejudice is not because people are more tolerant than assumed, but because large-scale surveys using explicit self-report measures underestimate the real effect of terrorism on prejudicial reactions. The aim of the present research was to reexamine the impact of terrorist attacks on prejudice towards Arab-Muslims using self-reported measures, as in previous research, as well as a set of unique implicit and indirect measures that may uncover a previously hidden link between terrorism and prejudice.

### **A Two-Stage Approach to Prejudice**

According to the two-stage approach to prejudice (Crandall & Eshleman, 2005; Devine, 1989; Dovidio & Gaertner, 1986), distinct psychological processes are involved in the experience of prejudice and its expression. The first is an automatic, hostile, and negative attitude toward a given social group, and the second is the motivation to suppress or deny such an attitude. Therefore, the expression of prejudice is often marked by a conflict between negative emotional responses to a group and a desire to

uphold tolerant values that are viewed as morally appropriate. Importantly, the motivation to respond without prejudice may be particularly salient in the aftermath of terrorist attacks because political leaders usually caution the public against conflating Islam with terrorism (Hollande, 2015). This creates strong normative pressure to distinguish the individuals who perpetrated the attacks from the rest of the Muslim community and distance themselves from those who openly promote anti-Islamic prejudice. The external motivation to respond without prejudice may lead to the suppression of overt prejudice in spite of hostile feelings toward the group with which the perpetrators of the attack are associated (Plant & Devine, 1998).

In a related vein, the justification-suppression model of prejudice (JSM; Crandall & Eshleman, 2005) posits that prejudice is a primary and powerful hostile reaction that is not overtly expressed when social norms, personal standards, beliefs, and values push against its expression. Suppressing prejudice is a costly process that requires attention and cognitive effort. As a result, genuine prejudice is often undetectable on self-reported measures that are under direct conscious control, such as survey responses. In contrast, psychological factors that may decrease control over prejudice expression will likely increase the detection of prejudiced reactions. These factors may be related to the characteristics of the measure (e.g., implicit vs. explicit), to the personal characteristics of the individual (e.g., high prejudice vs. low prejudice), or to the context in which prejudiced reactions are measured (e.g., high vs. low control). Our main hypothesis is that terrorist attacks and reminders of terrorism are more likely to increase prejudice against Arab-Muslims when individuals are unlikely to control their affective reactions.

### **Automatic Hostile Reactions and Implicit Bias**



Implicit bias was initially conceptualized as *unconscious* attitudes, reactions, or evaluations that affect behavior in an automatic fashion (Greenwald & Banaji, 1995), and has most often been assessed with behavioral reaction-time measures. More recent research, however, converges to suggest that indirect measures of implicit bias do not reflect only the influence of automatic cognitive processes, but also that of a variety of controlled and non-automatic processes (Conrey et al., 2005; Meissner & Rothermund, 2013; Payne, 2001; Payne et al., 2010; Stahl & Degner, 2007). It is thus important to be clear about what is measured by indirect measures (Corneille & Hütter, 2020; Gawronski et al., 2020).

Whereas expressed prejudice is typically measured with self-reports of subjective evaluation of a social group, indirect measures of prejudice rely on indicators of performance on cognitively demanding tasks that are difficult to monitor or on private, non-verbal behaviors, that individuals are not aware of and thus do not seek to control. Though there are no direct measures of unconscious bias or true attitudes, implicit measures typically tap relatively spontaneous or automatic reactions (e.g., reaction time measures) in interference (response compatibility) paradigms such as the Implicit Association Test (IAT, Greenwald et al., 1998) or the shooter decision task (Correll et al., 2002). Responses to such indirect assessments are difficult, although not impossible, to control and are thus less susceptible to attempts to conceal one's genuine attitudes (Cvencek et al., 2010; Karpinski & Steinman, 2006; Steffens, 2004). Even when individuals *can* accurately identify their own bias (Hahn et al., 2014), they usually do not, and make implicit evaluations without direct awareness of their bias (Hahn, & Goedderz, 2020). However, research that attempted to dissociate controlled and automatic processes has found that indirect measures of prejudice are not process-pure,

but rather that they involve both automatic and self-regulatory processes (Conrey et al., 2005; Meissner & Rothermund, 2013; Payne, 2001; Payne et al., 2010; Stahl & Degner, 2007). Relative to explicit self-report measures, implicit evaluations are thus more automatic and less controlled (but not purely automatic). Implicit bias, therefore, refers to a *relatively* private, automatic, and unconscious behavior reflecting a negative affective reaction towards a social group.

In light of these considerations, the present studies were designed to assess the effects of terrorist attacks on implicit Anti-Islamic bias—defined as a relatively automatic hostile reaction against Arab-Muslims. Terrorist attacks, therefore, may elicit a spontaneous reaction of hostility that is generalized from the perpetrators of the terrorist attacks to the Muslim community as a whole, but that is often quickly suppressed when individuals realize that such a reaction is not justified or socially acceptable. The dual-process approach suggests that hostility may be automatically activated whenever individuals are reminded of a terrorist attack, but that its consequences can be controlled if there is a motivation to do so (the justification process), and if one has the cognitive resources to do so (the suppression process). Such a dual-process approach can therefore account for the paradoxical reactions we hypothesize take place after a terrorist attack (i.e., increased implicit bias without a concomitant increase in expressed prejudice). To test this reasoning, we assessed anti-Islamic reactions to terrorist attacks using several indirect measures, in the hope that the diversity of measurement procedures will make up for the ambiguities of any particular indicator and provide a reliable test of our hypothesis.

### **The Present Research**

It was hypothesized that even if terrorist attacks have no discernible impact on expressed prejudice against Arab-Muslims, they may still cause automatic hostile reactions (or implicit biases) against people who appear to be members of this group, when thoughts of these attacks are salient. In the immediate aftermath of the attacks, people are likely to be distraught and preoccupied by negative emotions that are known to interfere with controlled processing (Trémolière et al., 2014; Trémolière et al., 2016). Thus, one can expect the effect of terrorist attacks on implicit bias to be especially pronounced immediately after the attacks. This hypothesis was tested in Studies 1 and 2, using archival data (Heng et al., 2018). It was also predicted that implicit anti-Islamic reactions would be observed when memories of these attacks are reactivated several years later, at least among individuals unlikely to control prejudiced expression. This hypothesis was tested in Studies 3 to 6, using experimental designs. In these experiments, we included a number of personality and situational variables as moderators, which we hypothesized would increase the likelihood of increased implicit bias following terrorist reminders.

In Studies 3 and 4, we assessed individual differences in expressed anti-Islamic prejudice and in the tendency to act automatically (automaticity) as moderating variables. It was expected that people who report relatively high levels of prejudice towards Arab-Muslims (reflecting hostility) would be relatively unmotivated to control their implicit bias, and that those who have a relatively strong tendency to react automatically (reflecting automaticity) would be less capable of controlling their implicit bias. Thus, we predicted that these groups would show a particularly strong surge in implicit bias towards Arab-Muslims following terrorism reminders. In Study 5, we measured individual differences in the tendency to implicitly associate Muslims with

terrorism (reflecting both automaticity and hostility) as a moderating variable. It was expected that people who strongly associate Muslims with terrorism would show a particularly strong increase in implicit bias towards Arab-Muslims when reminded of terrorism. Finally, in Study 6, we manipulated mental fatigue (ego depletion) before asking the participants to report a memory of terrorist attacks. Based on the premise that mental fatigue disrupts self-control and increases automatic processing (Ma et al., 2013), it was expected that people whose cognitive and attentional resources are depleted would be less capable of regulating their responses and thus show a particularly strong implicit bias towards Arab-Muslims after the terrorism recall task. Thus, across the reported studies, we rely on a number of different variables likely to decrease control over prejudice expression: the indirect nature of the measures, the level of overt prejudice, the tendency to act automatically, the strength of the Muslim-terrorist association, and mental fatigue.

In Studies 1 and 2, the participants were not randomly assigned to the times of testing before and after the terrorist attacks, which is an inherent limitation of archival studies. We tried to overcome this limitation in Studies 3-6, by relying on complementary experimental designs with random assignment to conditions. Thus, even if specific limitations apply to each of the studies reported in the manuscript, the convergence across distinct methods may compensate for the shortcomings of each study. This reasoning is based on previous research (Heng et al., 2018) that underscores the value of including both archival studies and experimental research in one package to benefit from the advantages and limitations of each type of research. Overall, using large samples and combining archival and experimental methodologies, the present

studies constitute a comprehensive research strategy that could potentially shed new light on the impact of terrorism on prejudiced reactions.

### **Study 1**

For this study, we recovered international data from the “Project Implicit” website hosted by Harvard University (<https://implicit.harvard.edu/implicit/>). This website made it possible to collect data relevant to both indirectly measured and overtly expressed attitudes toward diverse social groups. We recovered data from the Arab-Muslims IAT (Greenwald et al., 1998), along with a measure of overtly expressed attitudes towards Arab-Muslims from the “Project Implicit” website. We compared implicitly and explicitly measured attitudes before and after three recent terrorist attacks perpetrated in France: the January 2015 Charlie Hebdo terrorist attack ([https://en.wikipedia.org/wiki/Charlie\\_Hebdo\\_shooting](https://en.wikipedia.org/wiki/Charlie_Hebdo_shooting)), the November 2015 Bataclan Paris attacks ([https://en.wikipedia.org/wiki/November\\_2015\\_Paris\\_attacks](https://en.wikipedia.org/wiki/November_2015_Paris_attacks)), and the 2016 Nice truck attack ([https://en.wikipedia.org/wiki/2016\\_Nice\\_truck\\_attack](https://en.wikipedia.org/wiki/2016_Nice_truck_attack)). We focused on these dramatic events because these deadly terrorist acts were widely publicized and made headlines around the world, and because relevant data from Project Implicit were available for before and after these attacks. For example, after the Charlie Hebdo terrorist attacks, which targeted journalists from a satirical newspaper, about two million people, including more than 40 world leaders, met in Paris for a rally of national unity, and 3.7 million people joined demonstrations across France. In Study 1, we tested the hypothesis that the three recent terrorist attacks perpetrated in France in 2015 and 2016 were accompanied by a momentary surge in implicit bias, but not with expressed prejudice against Arab-Muslims.

### **Method**

### ***Transparency and Openness***

Following Heng et al.'s (2018) recommendations for conducting archival studies, we report how we determined our sample size, all data exclusions (if any), and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study's design and its analyses were not pre-registered.

### ***Participants***

A total 276,311 individuals, living in diverse countries, completed the Arab-Muslims IAT available at Project Implicit website between January 1<sup>st</sup>, 2014, and January 1<sup>st</sup>, 2017. All data used for this study are available at <https://osf.io/x7z4f/>, along with more specific information about the demographic characteristics of the sample. All participants voluntarily chose to complete the Arab-Muslims IAT. The average age of the sample was 26.9 years ( $SD = 11.9$ ). Women represented 55.59% of the sample. Approximately one third of respondents were from the USA (33.03%), one third (35.89%) were from diverse countries but in proportions smaller than 2% (e.g., 1.87% from the United Kingdom, 1.74% from Canada, 1.43% from Germany, other percentages being even smaller), while one third (31.08%) failed to specify their country of origin. Within this sample, only 1.13% of respondents since 2016 (i.e., when the question started to be asked,  $N = 247$ ) self-identified as Muslims. Given that this proportion was extremely small, these respondents were not excluded from the analyses.

### ***Procedure and Materials***

Implicit attitudes toward Arab-Muslim individuals were assessed with the Arab-Muslims IAT, tapping into the associations between the concepts of Good/Bad and Arab-Muslims/Other people. The IAT was scored with the D algorithm recommended by Greenwald et al. (2003), based on the average response time in Block 3 (i.e., where

stimuli from the “Arab-Muslims” and “Bad” categories share the same response key: the congruent block), compared to Block 5 (i.e., where stimuli from the “Arab-Muslims” and “Good” categories share the same response: the incongruent block). The validity of Project Implicit data has been established in numerous peer-reviewed articles across a variety of topics (Nosek et al., 2007).

Expressed prejudice towards Arab-Muslims was assessed with one item. Participants were asked to indicate the degree of preference for Arab-Muslims in comparison to other people.<sup>2</sup> Responses were given on a 7-point scale ranging from 1 (“I strongly prefer Arab Muslim to Other People”) to 7 (“I strongly prefer Other People to Arab Muslim”). Participants also provided demographic information (e.g., race, ethnicity, age, gender). The order of the expressed prejudice scale, the implicit bias measure, and demographic information was counterbalanced across participants.

## **Results**

Figure 1 represents the mean implicit bias computed for each week over the relevant three-year period (N = 157 weeks). As shown in Figure 1, implicit bias was greater in the two weeks that followed the terrorist attacks, compared to the other weeks. However, this trend was clear only for the first attack and seemed to weaken after repeated attacks.

Point-biserial correlation analyses (Pearson’s *r*) were used to examine whether expressed prejudice and implicit bias were significantly higher in the two weeks that followed each of the three major terrorist attacks (coded 1), compared to all the other weeks without attacks (coded 0). To reach a sufficient number of data points in the period immediately following the terrorist attacks, we chose the two weeks that followed the terrorist attacks as a critical time point. Indeed, research indicates that two

weeks is the period during which there is the most social sharing after a dramatic event (Pennebaker & Harber, 1993). Thus, there is good reason to believe that terrorism salience would be exacerbated during this relatively short period.

Regarding expressed prejudice, the occurrence of terrorist attacks was not associated with higher levels of expressed prejudice over the relevant three-year period,  $r(157) = .05, p = .525, 95\% CI [-0.11, 0.21]$ . However, as predicted, there was a significant correlation between the occurrence of terrorist attacks and implicit bias such that implicit bias was significantly greater in the two weeks that followed the terrorist attacks, compared to all other weeks,  $r(157) = .29, p < .001, 95\% CI [0.14, 0.42]$ .

To gain further insight into the nature of the effects depicted in Figure 1, we conducted further analyses of the impact of each of the three attacks. For each terrorist attack, we explored whether individuals' responses were significantly different in the two weeks that followed the attack, compared to the two weeks that preceded it. Because assumptions of normality and homoscedasticity were violated, we ran Robust Independent Samples T-Tests (Yuen's test based on the trimmed means with default trimming level of  $\gamma = 0.1$ ; see Mair & Wilcox, 2020) to test mean differences, and we report a measure of effect size  $\xi$ , which does not require equal variances (Wilcox & Tian, 2011).

Regarding the Charlie Hebdo attack, the level of expressed prejudice was lower in the two weeks that followed the attack, compared to the two weeks that preceded it ( $n = 4625, Trimmed M = 4.31, SE = 0.01$ , and  $n = 833, Trimmed M = 4.41, SE = 0.03$ , respectively),  $t(762) = 2.99, p = .003, \xi = 0.08, 95\% CI [0.01, 0.13]$ . In contrast, the level of implicit bias was significantly greater in the two weeks following the attack, compared to the two weeks that preceded it ( $n = 4485, Trimmed M = 0.12, SE = 0.01$ ,



and  $n = 812$ , *Trimmed M* = 0.01, *SE* = 0.02, respectively),  $t(889) = 6.81$ ,  $p < .0001$ ,  $\xi = 0.17$ , 95% *CI* [0.12, 0.24]. Thus the attacks decreased expressed prejudice but increased implicit prejudice.

With respect to the Paris Bataclan attacks, the level of expressed prejudice was not significantly different after the attack compared to before it ( $n = 2471$ , *Trimmed M* = 4.42, *SE* = 0.02, and  $n = 2626$ , *Trimmed M* = 4.37, *SE* = 0.02, respectively),  $t(4056) = 1.71$ ,  $p = .087$ ,  $\xi = 0.03$ , 95% *CI* [0.00, 0.07]. In contrast, the level of implicit bias was significantly greater in the two weeks that followed the attack compared to the two weeks that preceded it ( $n = 2487$ , *Trimmed M* = 0.05, *SE* = 0.01, and  $n = 2719$ , *Trimmed M* = 0.01, *SE* = 0.01, respectively),  $t(4149) = 2.97$ ,  $p = .003$ ,  $\xi = 0.06$ , 95% *CI* [0.02, 0.10].

Regarding the Nice truck attack, the level of expressed prejudice was similar before and after the attack ( $n = 1709$ , *Trimmed M* = 4.36, *SE* = 0.02, and  $n = 1599$ , *Trimmed M* = 4.36, *SE* = 0.02, respectively),  $t(2635) = 0.15$ ,  $p = .880$ ,  $\xi = 0.00$ , 95% *CI* [0.00, 0.06]. The level of implicit bias was also similar before and after the Nice truck attack ( $n = 1655$ , *Trimmed M* = 0.03, *SE* = 0.01, and  $n = 1595$ , *Trimmed M* = 0.01, *SE* = 0.01, respectively),  $t(2586) = 1.02$ ,  $p = .31$ ,  $\xi = 0.03$ , 95% *CI* [0.00, 0.07].

## **Discussion**

In sum, the present findings suggest that the occurrence of terrorist attacks did not increase expressed prejudice. If anything, we found a small reduction of expressed prejudice after the Charlie Hebdo attack. This is consistent with the findings of previous surveys (Brouard et al., 2018; Castanho Silva, 2018; Tiberj, 2017, 2020; Zeffman, 2015). In line with our reasoning, however, a drastically different pattern emerged when examining implicit bias. The results suggest that, overall, terrorist attacks significantly

increased implicit bias towards Arab-Muslims. The measure of effect size suggests a small-to-medium effect. This significant increase in implicit bias was found after the Charlie Hebdo attack and after the Paris Bataclan attacks, but not after the Nice truck attack.

There are several ways to explain the unexpected finding that the effect of terrorist attacks on implicit bias seemed to attenuate from the first to the last attack. One possibility is that as terrorist attacks became more frequent, people habituated to this stressful reality, and their response to such events may have decreased in strength, amplitude, or intensity. This phenomenon of weaker affective responses following repeated attacks has already been observed among Israeli citizens in the context of exposure to unpredictable and repeated terrorist threats (Stecklov & Goldstein, 2010). Another possibility is that the Charlie Hebdo and Paris attacks received more international media coverage than the Nice truck attack. In this case, if people are less familiar with a terrorist attack, it is less likely to affect their evaluations of the group associated with the perpetrator, whether measured implicitly or explicitly. The current data cannot address these speculative explanations, and further research is needed.

Taken together, the results of Study 1 suggest that Islamic terrorist attacks are not without consequence on people's attitudes towards Arab-Muslims. The results of this study support the hypothesis that terrorist attacks are associated with an increase in anti-Arab-Muslim prejudice. However, the results indicate that this prejudice is regulated and concealed and is revealed by implicit but not explicit measures. Results do not support the possibility that people are tolerant and differentiate their reactions between terrorists and the general Arab-Muslim population. To deepen our understanding of this phenomenon, we next focused on an archival index of prejudice

towards Muslims and Islam: the search terms entered in the Google web search engine in the period surrounding the French terrorist attacks.

## **Study 2**

In Study 2, we analyzed weekly Google search terms reflecting negative thoughts and feelings towards Muslims and Islam (e.g., “I hate Muslims”). This approach has strong ecological validity because it focuses on naturally occurring behavior. Google search term volumes have indeed been found to be a reliable indicator of people’s preoccupations and collective thoughts (Ginsberg et al., 2009; Pelham et al., 2018). Because this behavior usually occurs in the privacy of people’s homes without any awareness that entries in the search engine would be analyzed (Heng et al., 2018), it is unlikely to be affected by social desirability or reprobation (De Houwer, 2019). If there is a surge of implicit bias against Arab-Muslims after terrorist attacks, as Study 1 suggested, then negative thoughts against Arab-Muslims would be expected to come to mind more easily. These thoughts may not be rational or deliberate, but they could flash through the mind when individuals are in front of their computer and are Googling to find more information about the news. Following this reasoning, we hypothesized a temporary increase in Google search terms reflecting negative thoughts and feelings towards Muslims or Islam following the same three attacks we focused on in Study 1.

## **Method**

### ***Transparency and Openness***

Following Heng et al.’s (2018) recommendations for conducting archival research, we report how we determined our sample size, all data exclusions (if any), and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study’s design and its analyses were not pre-registered.

### *Harvesting data*

Data available in Google Trends was collected in September 2019. We considered weekly search volumes for the period from January 2014 to January 2017 (n = 157 weeks) in both English (international sample) and French (French-speaking countries). The search volumes are the frequency per week with which a term was typed in the Google search engine. Google Trends does not provide the number of respondents in a given time period or the absolute search volume numbers. Rather, search volumes represent a rate between 0 and 100, where 100 represents the maximum search quantity of the term within the defined period. We targeted expressions that may reflect negative attitudes towards Muslims/Islam. The main dependent variable was a composite measure of negative Google searches towards Muslims/Islam, calculated as the average weekly Google search volume of the terms “Fuck Islam” and “I hate Muslims” (and their French versions, “Islam is shit” (“Islam de merde”) and “Anti-Muslims” (“Anti Musulman”)). We chose these expressions because they were suggested by Google, as they were frequently requested on the search engine. One of the features of Google Trends is to propose keywords related to those sought, but that are more popular. We compared these data to the search volumes of terms reflecting the same negative Google searches towards two other major monotheistic religions (Judaism and Christianity) and towards atheists to verify whether the effects observed are specific to Islam.

### **Results**

Figure 2 represents the mean of the Google searches computed for each week over the relevant three-year period (N = 157 weeks). As shown in Figure 2, internet searches reflecting negative thoughts towards Muslims and Islam were especially

frequent in the two weeks that followed the terrorist attacks, compared to the other weeks. This pattern was not found for negative thoughts towards Christians, Jews, and atheists.

Point-biserial correlation coefficients (Pearson's  $r$ ) were computed to test the prediction that overall hostile Google searches towards Muslims/Islam were more frequent in the two weeks that followed the Charlie Hebdo attack, the Paris attacks, and the Nice truck attack, compared to all other weeks. The occurrence of terrorist attacks was not significantly associated with volumes of negative searches towards Jews,  $r = 0.005$ ,  $p = .949$ , 95%  $CI [-0.15, 0.15]$ , Christians,  $r = -0.007$ ,  $p = .933$ , 95%  $CI [-0.16, 0.15]$ , or atheists,  $r = 0.020$ ,  $p = .809$ , 95%  $CI [-0.13, 0.17]$ . In contrast, there was a significant positive correlation between the occurrence of terrorist attacks and negative Google search terms towards Muslims,  $r = 0.681$ ,  $p < .001$ , 95%  $CI [0.58, 0.75]$ .

This pattern of results for negativity towards Muslims was found for each different term examined in this study. In the two weeks that followed the terrorist attacks, compared to all other weeks, the terms "Fuck Islam" ( $r = 0.547$ ,  $p < .001$ , 95%  $CI [0.42, 0.64]$ ), "I hate Muslims" ( $r = 0.489$ ,  $p < .001$ , 95%  $CI [0.36, 0.60]$ ), "Islam de merde" ( $r = 0.51$ ,  $p < .001$ , 95%  $CI [0.38, 0.61]$ ), and "anti-Musulmans" ( $r = 0.506$ ,  $p < .001$ , 95%  $CI [0.38, 0.61]$ ) were searched more often on the internet. Because we could not be sure that these reactions reflect hostility and not fear we attempted to conduct supplementary exploratory analyses to examine whether Google search terms reflecting fear of Islam and Muslims increased after the attacks. When searching for "Are Muslims dangerous" or related terms, Google trends returns the following message: "*Sorry, there is not enough data for this search to display this page*". These terms were indeed quite rare immediately after the attacks. This suggests that terrorist attacks

increased specifically hostile-related search terms (e.g., “I hate Muslims”), and support the idea that terrorism increases hostile reactions against, not just fearful reactions related to, Muslims and Islam.

### **Discussion**

The results of Study 2 converge with those of Study 1 and suggest that the occurrence of Islamic terrorist attacks is followed by an increase in hostile affective reactions towards Arab-Muslims. Google search terms that reflect a hostile stance toward Muslims increased in the two weeks that followed the terrorist attacks, and this effect was specific to Islam. This finding is consistent with the idea that terrorist attacks increase implicit bias against Arab-Muslims. The fact that this effect was especially pronounced in the two weeks following terrorist attacks is also consistent with the idea that it is more likely to emerge when individuals are unable to downregulate implicit bias due to negative affect and mortality salience (Trémolière et al., 2014, Trémolière et al., 2016).

The main limitation of research based on archival data is that it does not allow unambiguous causal conclusions. The fact that implicit bias increased after terrorist attacks is strongly suggestive, but it does not warrant the conclusion that implicit bias increased *because* of the attacks. However, the fact that this pattern was observed after three different events reduces the plausibility of most of the classic artifacts (e.g., history, maturation, testing) discussed by Campbell (1963). To provide more compelling evidence regarding causality, we next turned to the experimental method to further examine automatic hostile reactions to terrorism. Whereas Studies 1 and 2 are high in ecological validity but lack the ability to determine cause and effect, the next four studies are lower in ecological validity but can reveal the causal direction of

effects. Whereas Studies 1 and 2 examined reactions immediately following terrorist attacks, the next studies test the effects of the memory of terrorist attacks. To the extent that thoughts about events are the proximal cause of attitudinal responses to them (Greenwald, 1968), it has been argued that assessing the effect of reminders of real-world events is an effective way of assessing their impact (Kesebir et al., 2013). This approach enabled us to examine whether the effects of terrorism on negative reactions to Muslims are only immediate or whether they persist over time when participants recall the events. In Studies 3 and 4, we investigated whether memories of a major Islamic terrorist attack (the November 2015 Paris attack at the Bataclan Theatre in Study 3, and the 9/11 terrorist attack in the USA in Study 4) affect implicit anti-Islamic bias. We also tested more directly the hypothesis that implicit anti-Islamic bias reflects an *automatic hostile* reaction against Arab-Muslims.

### Study 3

Using a sample of French citizens, Study 3 assessed whether autobiographical recall of the Bataclan Theatre terrorist attack influences implicit bias against Arab-Muslims in a shooting decision task (Correll et al., 2002; Mekawi & Bresin, 2015). In this study, we relied on a within-participant design, in which two blocks of the shooting task were completed: one after a reminder of terrorist attacks and the other after recalling a personal memory (counterbalanced). Based on the results observed in Studies 1 and 2, we expected stronger implicit bias against Arab-Muslims in the shooter task after the terrorist attack reminder than after a personal memory. In addition, two individual differences were tested as potential moderators of the effect of Islamist terrorist attack reminders on implicit bias in the decision to shoot: pre-existing levels of anti-Muslim prejudice and the tendency to respond automatically. Our theoretical

reasoning suggests that implicit bias is best conceptualized as a *hostile automatic* reaction against Arab-Muslims. Thus, we hypothesized that individuals with high levels of anti-Muslim prejudice are particularly likely to show a hostile response to reminders of terrorist attacks if they also have a tendency to respond automatically. Therefore, we expected implicit bias in the form of the shooter bias following reminders of terrorist attacks to be moderated by both the level of expressed anti-Muslim prejudice and automaticity, such that the higher the level of anti-Muslim prejudice and automaticity the participants report, the more they should show an increase in shooter bias after terrorist attack reminders. These hypotheses are consistent with the JSM of prejudice (Crandall & Eshleman, 2003, 2005), which suggests that highly prejudiced individuals who have a strong tendency to act automatically may find more justification to express prejudice towards Arab-Muslims and may be less motivated and less able to suppress hostile reactions towards them.

## **Method**

### ***Transparency and Openness***

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study's design and its analysis were not pre-registered.

### ***Ethical approval***

This study, as well as Studies 4-6, were conducted in accordance with guidelines of the French Psychological Society and were approved by a local ethical committee (CERTP; Comité d'Ethique pour les Recherches impliquant la personne humaine des Universités de Tours et Poitiers).



### ***Participants***

One hundred and one French psychology undergraduates (4 men and 97 women,  $M_{\text{age}} = 18.3$ ,  $SD_{\text{age}} = 1.04$ ) participated in this study voluntarily in exchange for course credit. A sensitivity analysis shows that a sample this large provides 80% power to detect a small effect size of Cohen's  $d = 0.22$  at the conventional  $\alpha = .05$  threshold, in a regression analysis with three predictors, which is the analysis that was run to test the main hypothesis. Given that the effect size was not known in advance, this sample size was deemed acceptable to the extent that it provided sufficient power to detect a small effect (Cohen, 1988).

### ***Materials and Procedure***

After signing a consent form, the participants completed two scales, presented in counterbalanced order. One scale was a measure of overtly expressed anti-Muslim prejudice, adapted from Imhoff and Recker (2012). This scale included 7 items (representative items: “*Islam is an archaic religion, unable to adjust to the present*”, “*I think Islamic religion and its aggressive sides predispose it towards proximity to terrorism*”, and “*Muslims and their religion are so different from us that it would be naïve to demand an equal access to all positions in society*”). All items loaded on the same factor in a principal components analysis (PCA), and the internal reliability of this scale in the present sample was satisfactory (Cronbach's  $\alpha = 0.78$ ). The original scale included two subscales: Islamoprejudice and secular critique of Islam. However, here we used only a French version of the Islamoprejudice subscale, validated in a pilot study (Arnoult et al., 2021).

The second scale was the Creature of Habit Scale (Ersche et al., 2017; French version by Wyckmans et al., 2020). This measure included two subscales: routine

(16 items,  $\alpha = 0.89$ , representative items: “*I tend to like routine*” and “*I like to park my car or bike always in the same place*”) and automaticity (11 items,  $\alpha = 0.86$ , representative items: “*I often find myself running on ‘autopilot’, and then wonder why I ended up in a particular place or doing something that I did not intend to do*” and “*I often find myself eating without being aware of it*”). The automaticity subscale was of particular interest in the present study. Previous research indicates that this subscale is a valid measure of automaticity<sup>3</sup> (Ersche et al., 2017, 2019, 2021; Wyckmans et al., 2020). No other measures were assessed as moderating variables in this study.

Next, participants were asked to recall two memories: (1) the Paris Bataclan terrorist attacks, which refers to all the events that took place in Paris the evening of November 13, 2015, and (2) an emotionally strong personal memory (control condition). The two memories were presented in random order and counterbalanced across participants. This memory recall protocol was based on procedures used to evaluate flashbulb memories (Conway et al., 1994; El Haj et al., 2016). Further details about the memory recall procedure are available online (<https://osf.io/x7z4f/>).

After recalling each memory, participants carried out the shooter decision task (Correll et al., 2002; see Figure 3). In each trial, a computer program randomly displayed a target. Participants were instructed to press the “I” key on the keyboard, labeled “shoot,” when the displayed target was armed and the “X” key, labeled “Don’t shoot,” when the displayed target was unarmed. The targets (shoulders and face) were all men and had either a North-African (Arab-Muslim) phenotype ( $n = 16$ ) or a Caucasian phenotype ( $n = 16$ ). These targets were selected from the Caucasian and North-African French Faces (CaNAFF; Courset et al., 2018) database, which consists of 147 photographs of individuals with various degrees of prototypicality across the

Caucasian/North African (Arab-Muslims) continuum. These individuals all had the same outfit (a dark sweater) and displayed a neutral facial expression. The average prototypicality scores for the Caucasian and North-African groups were comparable ( $M_{\text{Caucasian}} = -29.6$ ,  $SD = 1.44$  and  $M_{\text{North African}} = 29.1$ ,  $SD = 1.12$ ). These targets were presented on a background depicting a building facade with four windows (adapted from Mange et al., 2012). Each of the 32 targets appeared four times in the game (for a total of 128 trials), twice with a gun (black or silver), and twice with a harmless object of similar size (black bottle or silver thermos), resulting in 128 target images. The object held by the target appeared alternatively to the left or to the right of the target's face, in order to ensure that participants would visually inspect targets' faces. We allowed a time window of 170 ms to 850 ms for a response, and a warning appeared whenever a participant was too slow and/or made an incorrect decision. The task began with six training trials with targets randomly chosen by the computer. The actual test phase consisted of 128 trials.

As in previous studies (Correll et al., 2002), two indicators of implicit bias were computed. The first indicator relied on reaction times, reflecting quicker decisions to shoot armed Arab-Muslims compared to Caucasian targets and slower decisions not to shoot unarmed Arab-Muslims compared to Caucasian targets. Implicit bias in reaction times can be conceptualized as faster responses to stereotype-congruent trials (Arab-Muslims armed and Caucasian unarmed) than to stereotype-incongruent trials (Arab-Muslims unarmed and Caucasian armed). The second indicator relied on false alarm and omission errors, reflecting the tendency to shoot unarmed targets more often if they were Arab-Muslims than if they were Caucasian (false alarms) and not to shoot armed targets less often if they were Arab-Muslims than if they were Caucasian (misses).

Implicit bias in errors can be conceptualized as making relatively few mistakes on stereotype-congruent trials (armed Arab-Muslims and unarmed Caucasians) and more mistakes on stereotype-incongruent trials (unarmed Arab-Muslims and armed Caucasians). In a pilot study using this Arab-Muslim version of the shooter decision task (N = 300), we found both of these indicators of implicit bias to be significant (Arnoult et al., 2021). At the end of the study, participants were thanked and debriefed.

## Results

### *Data Preparation*

The data of the shooting decision task was first screened for outliers. Participants whose data deviated more than 2.5 times the median absolute deviation from the median (Leys et al., 2013) were considered outliers. This represented 2.20% of the data. We also excluded trials on which participants failed to respond within the 170–850 ms response window (9.41% of the trials). For reaction time analyses, we also excluded trials on which participants responded incorrectly (9.53% of the trials).

Two indicators of implicit bias were computed, one based on reaction times and the other on errors. Implicit bias in reaction times was computed as:  $(\text{Reaction Times}_{\text{Arab-Muslims unarmed}} + \text{Reaction Times}_{\text{Caucasian armed}}) - (\text{Reaction Times}_{\text{Arab-Muslims armed}} + \text{Reaction Times}_{\text{Caucasian unarmed}})$ , where higher values indicated stronger implicit bias. Similarly, implicit bias in errors was computed as:  $(\text{False alarms}_{\text{Arab-Muslims unarmed}} + \text{Omissions}_{\text{Caucasian armed}}) - (\text{False alarms}_{\text{Caucasian unarmed}} + \text{Omissions}_{\text{Arab-Muslims armed}})$ , where higher values indicated stronger implicit bias. These computations were similar to those used in prior research (Correll et al., 2002, Study 3). The dependent variable in each of the analyses reported below was the difference in implicit bias between the terrorist attack and the personal memory reminder, such that a positive score indicated

an increase in implicit bias after the terrorist attack reminder compared to the personal memory reminder.

### ***Main Analyses***

To test our main hypotheses, we conducted moderation analyses (Aiken et al., 1991; Frazier et al., 2004). The dependent variable (difference in implicit bias between terrorist attack and personal memory control condition) was regressed on expressed anti-Muslim prejudice (continuous variable, mean centered), automaticity (continuous variable, mean centered), and the interaction between automaticity and expressed anti-Muslim prejudice.

In the regression model predicting implicit bias in reaction times, the intercept was not significant,  $b = -0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.02, 0.01]$ ,  $t = -0.74$ ,  $p = .462$ . Thus, the mean implicit bias in reaction times was not different after the personal memory ( $M = -0.01$ ,  $SD = 0.06$ ) and terrorist attack reminders ( $M = -0.01$ ,  $SD = 0.05$ ). The main effect of expressed anti-Muslim prejudice was marginal,  $b = 0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.00, 0.03]$ ,  $t = 1.71$ ,  $p = .091$ . Participants with higher levels of expressed anti-Muslim prejudice were more biased towards Arab-Muslims after being reminded of terrorist attacks. The main effect of automaticity was not significant,  $b = 0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.00, 0.03]$ ,  $t = 1.64$ ,  $p = .104$ . The predicted interaction, however, reached significance,  $b = 0.02$ ,  $SE = 0.01$ , 95%  $CI [0.01, 0.04]$ ,  $t = 3.03$ ,  $p = .003$ . As expected, the higher the participants were in both anti-Muslim prejudice and automaticity, the more their implicit bias in reaction times increased after recalling the terrorist attack, compared to a personal memory.

Figure 4 depicts the mean increase in implicit bias in reaction times as a function of anti-Muslim prejudice and automaticity. Simple slope tests showed that high

automaticity was associated with increased implicit bias after reminders of terrorist attacks among participants relatively high in anti-Muslim prejudice,  $b = 0.03$ ,  $SE = 0.01$ , 95%  $CI [0.01, 0.06]$ ,  $t = 3.25$ ,  $p = .002$ , but not among those relatively low in anti-Muslim prejudice,  $b = -0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.03, 0.01]$ ,  $t = -0.97$ ,  $p = .334$ .

When the effects of memory reminders on implicit bias in reaction times were tested at different levels of anti-Muslim prejudice and automaticity (computed at  $\pm 1SD$ ), only participants with high levels of both anti-Muslim prejudice and automaticity showed a significant increase in implicit bias after reminders of terrorist attacks compared to after the personal memory reminder,  $b = 0.04$ ,  $SE = 0.01$ , 95%  $CI [0.01, 0.07]$ ,  $t = 2.96$ ,  $p = .004$ . The difference in implicit bias between the two reminders was not significant for any other combination of anti-Muslim prejudice and automaticity levels.

In the regression model predicting implicit bias in errors, the intercept was marginally significant,  $b = -1.08$ ,  $SE = 0.55$ , 95%  $CI [-2.17, 0.01]$ ,  $t = -1.97$ ,  $p = .052$ . The mean implicit bias in errors was lower after terrorist attack reminders ( $M = 0.15$ ,  $SD = 4.10$ ) than after the personal memory reminder ( $M = 1.14$ ,  $SD = 4.14$ ). The main effect of expressed anti-Muslim prejudice was not significant,  $b = 0.09$ ,  $SE = 0.55$ , 95%  $CI [-1.01, 1.19]$ ,  $t = 0.16$ ,  $p = .872$ . The main effect of automaticity was marginally significant,  $b = -1.06$ ,  $SE = 0.55$ , 95%  $CI [-2.16, 0.03]$ ,  $t = -1.93$ ,  $p = .057$ . Overall, participants with higher levels of automaticity displayed fewer shooting errors (were less biased) towards Arab-Muslims after being reminded of the terrorist attacks. Contrary to our expectation, the interaction term was not significant,  $b = 0.46$ ,  $SE = 0.53$ , 95%  $CI [-0.59, 1.52]$ ,  $t = 0.88$ ,  $p = .382$ .

## Discussion

In this study, there was no overall increase in implicit bias after reminders of terrorist attacks. However, consistent with our hypothesis, the results suggest that implicit bias in reaction times increased after reminders of terrorist attacks among individuals relatively high in both overtly expressed anti-Muslim prejudice and automaticity. This is in line with the view that an increase in implicit bias after reminders of terrorist attacks reflects an automatic hostile reaction against Arab-Muslims. Individuals who have strong anti-Muslim prejudice but a low tendency to act automatically may have downregulated their hostile reactions to not show an increase in implicit bias after terrorist attack reminders.

The lack of a main effect of terrorist attack reminders seems to be at odds with the results of Studies 1 and 2. However, contrary to the first two studies, in which individuals' reactions were assessed in the immediate aftermath of the terrorist attacks, the present study was conducted approximately eight years after the Bataclan terrorist attack. It thus might not be that surprising that only the most prejudiced individuals who struggle to contain their hostile reactions actually showed an increase in implicit bias in the shooter task.

Some results of Study 3, however, were unexpected. For instance, implicit bias in errors was marginally lower in the terrorist attack condition, compared to the personal memory condition. Moreover, the predicted interaction was not significant on implicit bias in errors. To ensure that the main finding in Study 3, namely the interaction between anti-Muslim prejudice and automaticity on implicit bias in reaction times against Arab-Muslims, is reliable, Study 4 aimed to replicate these findings with the memory of the 9/11 terrorist attacks in the USA.

#### **Study 4**

Study 4 aimed to replicate and extend the findings of Study 3. In this study, American participants were asked to recall the attacks that took place on September 11<sup>th</sup>, 2001, in the United States. Using a within-participant design, the shooting task was completed twice: once after recalling a personal memory and then again after recalling the 9/11 terrorist attacks. All participants completed the anti-Islamic prejudice scale and the automaticity scale before reporting their memories. As in Study 3, our main hypothesis was that expressed anti-Muslim prejudice and automaticity would interact to predict increased implicit bias in reaction times in the shooter task after recalling 9/11. Participants with relatively high levels of expressed anti-Muslim prejudice and automaticity would show increased implicit bias in the shooter task after recalling 9/11, compared to participants with relatively low levels of expressed anti-Muslim prejudice and/or automaticity. Before data were collected, this study was fully pre-registered on Open Science Framework (OSF).

## **Method**

### ***Transparency and Openness***

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study's design and its analysis were fully pre-registered at <https://osf.io/a2m6g>.

### ***Participants***

Two hundred American participants (82 men, 115 women, and 3 gender-unspecified,  $M_{\text{age}} = 50.8$ ,  $SD_{\text{age}} = 7.61$ ) were recruited on the Prolific platform (<https://www.prolific.co/>) to participate in this study for £7.52 per hour. Following the preregistered plan, we recruited only participants who were at least 20 in 2001 to ensure



that all had a vivid memory of the 9/11 terrorist attacks. This sample size, which was twice as large as the one used in Study 3, thus provided 80% power to detect an effect size of Cohen's  $d = 0.11$  at the conventional  $\alpha = .05$  threshold in a regression analysis with three predictors.

### ***Materials and Procedure***

The study was conducted online on the Pavlovia platform (<https://pavlovia.org>). After signing a consent form, participants completed two scales, presented in random order: the anti-Islamic prejudice scale (Cronbach's  $\alpha = 0.78$ ) and the automaticity scale (Cronbach's  $\alpha = 0.88$ ) used in Study 3. No other measures were assessed as moderating variables in this study.

Next, participants were asked to recall a personally important school-related memory and then answered 15 questions concerning the event (e.g., "How easily do you remember who you were with when this event happened?"). These memory recall questions, adapted from flashbulb memory research (Conway et al., 1994; El Haj et al., 2016), are available online (<https://osf.io/x7z4f/>). After recalling the personal memory, participants carried out the shooter task used in Study 3.

Then, participants were asked to recall the 9/11 terrorist attacks and to answer 15 questions concerning the attacks. They then performed the shooter decision task once more.

In this study, the two repeated conditions (personal memory vs. terrorist attacks) were presented in the same sequential order for all participants (no order effect was found in Study 3). Finally, participants were thanked and debriefed.

## **Results**

### ***Data Preparation***

The criteria for excluding data were the same as in Study 3: 2.74 % of responses were outliers, 11.85% did not fall within the 170–850 ms response window, and 9.29% of responses were incorrect. The average response times were then computed with the remaining responses for each participant.

As in Study 3, implicit bias was computed separately for reaction times and errors with the same algorithm as the one used in Study 3. The dependent variable was the difference in implicit bias after terrorist attack reminders relative to the personal memory control condition.

### ***Preregistered Analyses***

We preregistered a significant interaction between expressed anti-Muslim prejudice and automaticity to predict increased implicit bias in reaction times after the terrorism reminder, similar to the one found in Study 3. In a regression model predicting implicit bias in reaction times, the effect of the intercept was not significant,  $b = 0.01$ ,  $SE = 0.00$ , 95%  $CI [-0.02, 0.00]$ ,  $t = 1.50$ ,  $p = .135$ . Thus, the mean implicit bias in reaction times after the terrorist attack reminder, collapsing across the moderator variables, was not significantly different ( $M = 0.00$ ,  $SD = 0.05$ ) from that after the personal memory reminder ( $M = -0.00$ ,  $SD = 0.04$ ). The main effect of expressed anti-Muslim prejudice was not significant,  $b = -0.00$ ,  $SE = 0.00$ , 95%  $CI [-0.01, 0.01]$ ,  $t = -0.43$ ,  $p = .666$ . There was also no main effect of automaticity,  $b = 0.00$ ,  $SE = 0.00$ , 95%  $CI [-0.00, 0.01]$ ,  $t = 0.95$ ,  $p = 0.344$ . However, the predicted interaction effect reached significance,  $b = 0.01$ ,  $SE = 0.00$ , 95%  $CI [0.00, 0.02]$ ,  $t = 2.19$ ,  $p = .030$ . As expected, the higher the levels of expressed anti-Muslim prejudice and automaticity the participants reported, the more they showed increased implicit bias in the shooter task after 9/11 recall.

Figure 5 depicts the predicted means. Simple slope tests showed that high levels of automaticity were associated with an increase in implicit bias after reminders of terrorist attacks (relative to personal memory control), but only among participants who also reported relatively high levels of anti-Muslim prejudice,  $b = 0.01$ ,  $SE = 0.01$ , 95%  $CI [0.00, 0.03]$ ,  $t = 2.02$ ,  $p = .045$ . This relationship was not found among participants relatively low in anti-Muslim prejudice,  $b = -0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.02, 0.01]$ ,  $Z = -0.94$ ,  $p = .351$ . These findings replicate the findings of Study 3.

As in Study 3, we also examined whether the effect of memory reminders on implicit bias in reaction times was significant at relatively high levels of both anti-Muslim prejudice and automaticity (computed at + 1SD). However, this effect was not significant in this study,  $b = 0.01$ ,  $SE = 0.01$ , 95%  $CI [-0.01, 0.02]$ ,  $t = 0.625$ ,  $p = .533$ .

#### ***Exploratory (Non-Preregistered) Analyses***

Next, we tested the interaction between expressed anti-Muslim prejudice and automaticity on implicit bias in errors. This interaction effect was not preregistered, as it was not significant in Study 3. In a regression model predicting implicit bias in errors, the effect of the intercept was not significant,  $b = -0.16$ ,  $SE = 0.22$ , 95%  $CI [-0.58, 0.27]$ ,  $t = -0.73$ ,  $p = .47$ . There was no main effect of expressed anti-Muslim prejudice,  $b = 0.01$ ,  $SE = 0.22$ , 95%  $CI [-0.42, 0.44]$ ,  $t = 0.05$ ,  $p = .960$ , or of automaticity,  $b = 0.20$ ,  $SE = 0.22$ , 95%  $CI [-0.23, 0.63]$ ,  $t = 0.92$ ,  $p = .359$ . The interaction term, however, was significant,  $b = -0.46$ ,  $SE = 0.20$ , 95%  $CI [-0.85, -0.06]$ ,  $t = -2.28$ ,  $p = .024$ . This interaction showed that high automaticity was related to increased implicit bias among participants relatively *low* in anti-Muslim prejudice,  $b = 0.65$ ,  $SE = 0.28$ , 95%  $CI [0.09, 1.22]$ ,  $t = 2.30$ ,  $p = .023$ , but not among participants relatively *high* in anti-Muslim prejudice,  $b = -0.26$ ,  $SE = 0.30$ , 95%  $CI [-0.86, 0.34]$ ,  $t = -0.85$ ,  $p = .398$ . The effect of

memory reminders on implicit bias in implicit bias in reaction times was not significant at relatively high levels of both anti-Muslim prejudice and automaticity (computed at +1SD),  $b = -0.40$ ,  $SE = 0.40$ , 95%  $CI [-1.19, 0.38]$ ,  $t = -1.02$ ,  $p = .310$ .

Thus, the findings showed that expressed anti-Muslim prejudice and automaticity interact to predict implicit bias. However, the effects differed on implicit bias in errors and on implicit bias in reaction times. Whereas the effects on implicit bias in reaction times support our hypotheses, the effects on implicit bias in errors do not.

### Discussion

In Study 4, the results of the preregistered analyses were consistent with those observed in the previous study. A significant interaction between anti-Muslim prejudice and automaticity emerged to predict increased implicit bias in reaction times following reminders of 9/11 terrorist attacks in the USA. The shape of the interaction was similar to that found in Study 3, as was the significance of the simple slope tests. Taken together, the findings of Studies 3 and 4 suggest that reminders of terrorist attacks are especially likely to increase implicit bias in reaction times when high levels of anti-Muslim prejudice are associated with high levels of automaticity.

Unexpectedly, however, a different pattern of findings emerged regarding implicit bias in errors: low prejudiced individuals with a tendency to act automatically were more biased after the terrorist attack reminder than after a personal memory. As this effect was not preregistered, and not found in Study 3, it may be a spurious finding that should be interpreted with caution. However, it could be speculated that individuals with relatively low levels of expressed anti-Muslim prejudice are especially concerned about appearing prejudiced when reminded of terrorist attacks, which may lead them to make more errors when confronted with armed Arab-Muslim targets.

Despite some inconsistencies, Studies 3 and 4 provided converging evidence for our theoretical reasoning in two different cultures, and for two different terrorist attacks, with remarkably similar effects (see Figures 4 and 5). The fact that, in both studies, increased implicit bias in reaction times after terrorist attack reminders was found only among highly prejudiced individuals who tend to respond automatically is very consistent with the idea that this reaction is both automatic and hostile.

In Study 5, we sought to extend these findings using a different moderating variable: individual differences in the tendency to automatically associate Arab-Muslims with terrorism.

### **Study 5**

In Study 5, we sought to better understand why individuals show a hostile reaction to the entire group of Arab-Muslims, when only a small proportion of Muslim individuals engage in terrorist acts. We suspected that one possible explanation is that individuals form an association between group membership (Arab-Muslims) and terrorism. Indeed, the profusion of Islamic terrorist attacks over the last decades may have led people to automatically associate Arab-Muslims with terrorism through a process of fear conditioning (LeDoux, 2014; Maren, 2001). Individuals who strongly associate Arab-Muslims with terrorism might be especially likely to perceive Arab-Muslims as threatening and thus to show exacerbated hostile reactions towards members of this group when reminded of terrorist attacks.

In the present study, we assessed individual differences in the automatic tendency to associate Arab-Muslims with terrorism using an IAT (Nosek et al., 2007) before asking half of the sample to report a memory of a terrorist attack while the other half reported a personal memory (in a between-participant design). In this context, it

was predicted that terrorist attack reminders would be particularly likely to increase implicit bias against Arab-Muslims in the shooter decision task among individuals with a strong tendency to associate Muslims with terrorism.

## **Method**

### ***Transparency and Openness***

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study's design and its analysis were not pre-registered.

### ***Participants***

The present sample included 368 participants. Ninety-two participants were students recruited from a French university, and 276 were French citizens recruited through the Prolific platform (<https://www.prolific.co/>). We initially planned to recruit the entire sample from our university but had to change our plan due to the COVID-19 pandemic. Participants recruited from our university participated on a voluntary basis, and participants recruited through Prolific were paid £7.52 per hour. For this study, we recruited only participants who were at least 18 years old in 2015 to ensure that all have a vivid memory of the Paris terrorist attacks. The mean age was 33.8 years old ( $SD = 9.60$ ). There were 153 women, 205 men, 3 non-binary people, and 7 unspecified. A sensitivity analysis shows that a sample this large provides 80% power to detect an effect size of Cohen's  $d = 0.06$  at the conventional  $\alpha = .05$  threshold, in a regression analysis with three predictors, as performed to test the hypothesis.

### ***Material and Procedure***

The experiment was performed online. Participants first completed an IAT (Greenwald et al., 1998; Nosek et al., 2007) assessing the automatic tendency to associate Arab-Muslims faces with words related to terrorism.

In this version of the IAT, the “Arab-Muslims” category was contrasted against the “Caucasian” category. Four North-African French faces were used as stimuli for the “Arab-Muslims” category, and four “Caucasian faces” were used as stimuli for the Caucasian category. All stimuli were taken from the CaNAFF database (Courset et al., 2018). The category “Terrorism” (six words were used as stimuli: *attack*, *bombing*, *death*, *victim*, *violence*, and *terror*) was used in contrast to the category “Peace” (six words were used as stimuli: *well-being*, *freedom*, *calm*, *serenity*, *balance*, and *tranquility*). All of the words used for the “Terrorism” and “Peace” categories were pre-tested before the experiment. Depending on the block of the IAT, the “Arab-Muslims” category and the “Terrorism” category shared the same or a different response key. The IAT consisted of seven blocks. Blocks 1, 2, and 5 were training blocks. Blocks 3 and 4 were congruent blocks, and Blocks 6 and 7 were incongruent blocks. The IAT score was computed using the D600 algorithm (Greenwald et al., 2003). Higher IAT scores represent a stronger implicit association between terrorism and Arab-Muslims faces. No other measures were assessed as moderating variables in this study.

Following the IAT, participants were randomly assigned to one of the two experimental conditions. In the *terrorism* condition, participants were asked to recall a memory of the Bataclan terrorist attack that took place in Paris on the evening of November 13, 2015. In the *control* condition participants were asked to recall an emotionally strong personal memory. In these recall tasks (available at <https://osf.io/x7z4f/>), participants were asked 16 questions: four of them assessed the

ease of recalling the event and its encoding circumstances (e.g., “How easily do you remember this event?”); ten questions assessed the intensity of the emotions felt when the participant learned about the event (e.g., “How scared did you feel when you learned about this event?”); and two questions assessed the frequency of reminders (e.g., “How often do you discuss this event with people around you?”).

After recalling each memory, participants were asked to perform the same shooting decision task used in previous studies. They were also asked to complete one item assessing overtly expressed attitudes towards Arab-Muslims: “*I have a positive attitude towards Islam and Muslims living in France*” on a seven-point Likert scale (1 = *totally disagree* to 7 = *totally agree*). At the end of the study, the participants were thanked and debriefed.

## **Results**

### ***Data Preparation***

Based on the same criteria as in the previous studies, 2.51% of the trials were excluded as outliers, 7.82% of the trials were excluded because participants failed to respond within the 170-850 ms response window, and 8.48% of trials were excluded because participants responded incorrectly.

As in the previous studies, implicit bias in the shooter decision task was computed separately for both reaction times and errors.

### ***Main Analyses***

Implicit bias in reaction times on the shooter decision task was regressed on implicit Muslim–terrorism associations (continuous variable, mean centered), experimental condition (memory of Paris terrorist attacks coded 1, personal memory coded 0), and the interaction between implicit Muslim–terrorism associations and



condition. In this analysis, there was no main effect of implicit Muslim–terrorism associations,  $b = -0.00$ ,  $SE = 0.00$ , 95%  $CI [-0.01, 0.00]$ ,  $t = -1.03$ ,  $p = .305$ , and no main effect of memory condition,  $b = -0.00$ ,  $SE = 0.00$ , 95%  $CI [-0.01, 0.01]$ ,  $t = -0.53$ ,  $p = .593$ . The predicted interaction between implicit Muslim–terrorism associations and memory condition was also not significant,  $b = 0.00$ ,  $SE = 0.00$ , 95%  $CI [-0.01, 0.01]$ ,  $t = 0.14$ ,  $p = .891$ .

In a parallel regression model predicting implicit bias in errors, there was no main effect of implicit Muslim–terrorism associations,  $b = 0.08$ ,  $SE = 0.12$ , 95%  $CI [-0.16, 0.32]$ ,  $t = 0.65$ ,  $p = .517$ , and no main effect of memory condition,  $b = 0.17$ ,  $SE = 0.25$ , 95%  $CI [-0.32, 0.66]$ ,  $t = 0.68$ ,  $p = .496$ . However, the predicted interaction between implicit Muslim–terrorism associations and memory condition was significant,  $b = 0.55$ ,  $SE = 0.24$ , 95%  $CI [0.07, 1.02]$ ,  $t = 2.27$ ,  $p = .024$ . Figure 6 displays the predicted means.

Simple slope tests indicated that the terrorist attack reminder, compared to the personal memory reminder, increased implicit bias in errors among participants relatively high in Muslim–terrorism associations,  $b = 0.72$ ,  $SE = 0.34$ , 95%  $CI [0.04, 1.39]$ ,  $t = 2.01$ ,  $p = .037$ . In contrast, there was no effect of terrorist attack reminders among participants relatively low in implicit Muslim–terrorism associations,  $b = -0.38$ ,  $SE = 0.35$ , 95%  $CI [-1.07, 0.31]$ ,  $t = -1.08$ ,  $p = .280$ .

### ***Expressed Attitudes***

We also examined whether the effects found on implicit bias were also found on overtly expressed attitudes towards Arab-Muslims. In a regression model predicting expressed attitudes towards Arab-Muslims, there was a significant effect of implicit Muslim–terrorism associations,  $b = -0.30$ ,  $SE = 0.08$ , 95%  $CI [-0.45, -0.14]$ ,  $Z = -3.67$ ,

$p < .001$ . The more participants automatically associated Muslims with terrorism, the more negative their expressed attitude towards Arab-Muslims. There was no main effect of the memory condition,  $b = 0.06$ ,  $SE = 0.16$ , 95%  $CI [-0.25, 0.38]$ ,  $t = 0.40$ ,  $p = .690$ , and no interaction between implicit associations and memory condition,  $b = 0.07$ ,  $SE = 0.16$ , 95%  $CI [-0.25, 0.39]$ ,  $t = 0.44$ ,  $p = .659$ .

## Discussion

The results of Study 5 were partly consistent with our predictions. Whereas findings provided no support for our hypotheses on implicit bias in reaction times, there was a significant interaction between memory condition and implicit Muslim–terrorism associations on implicit bias in errors. Consistent with our reasoning, the effect of the terrorist attack reminder increased implicit bias in errors only for participants who strongly associated Arab-Muslims with terrorism. It is not entirely clear why findings emerged on implicit bias in errors but not on implicit bias in reaction times, and further research is needed. However, the two focal findings in the present study once again corroborate the idea that implicit bias in the shooter task following reminders of terrorist attacks reflects hostile and automatic reactions towards Arab-Muslims. On one hand, the IAT, which is believed to measure automatic associations, is positively associated with overtly expressed hostility and prejudice towards Arab-Muslims. On the other hand, these automatic associations also facilitate the occurrence of implicit bias in the shooter task after the terrorist attack reminder.

In the sixth and final study, we sought to more directly test our reasoning that implicit bias following terrorist attack reminders is related to an inability to regulate automatic hostile reactions. We did this by manipulating mental fatigue, known to impair self-regulation.

### Study 6

In line with the JSM of prejudice (Crandall & Eshleman, 2003, 2005), implicit bias can be reduced if individuals have ample cognitive resources to regulate automatic reactions. Conversely, research on ego-depletion (Baumeister et al., 2007, 2018) suggests that greater implicit bias in the decision to shoot may be found when individuals are fatigued because self-control is compromised. Consistent with this hypothesis, previous findings have shown that sleep deprivation influences implicit bias in the decision to shoot (Johnson et al., 2021; Ma et al., 2013). However, sleep deprivation is related to confounding variables such as stress and bad mood in addition to mental fatigue. To date, only two studies have directly examined the effect of mental fatigue on implicit bias (Govorun & Payne, 2006; Ma et al., 2013, Study 1). These studies, however, relied on a relatively small sample ( $N = 72$  and  $N = 77$ , respectively), did not include a manipulation check of mental fatigue (Ma et al., 2013), and used a relatively brief cognitively taxing task (about 10 minutes of a response inhibition task) to deplete participants. In recent years, the replicability of studies relying on such brief cognitively taxing tasks has been seriously questioned (e.g., Etherton et al., 2018; Hagger et al., 2016; Lurquin et al., 2016; Xu et al., 2014). Therefore, additional evidence is needed to clearly document the effect of mental fatigue on implicit bias in the decision to shoot.

Recent research suggests that a relatively long, depleting, 30-minute Stroop task (including about 900 trials) is optimal for inducing a state of mental fatigue and cause a disruption of self-control (Mangin et al., 2021). A 30-minute Stroop task is about 3 times longer than the one used in previous studies (Govorun & Payne, 2006; Ma et al., 2013, Study 1) and thus provides a much stronger manipulation of mental fatigue. In the

present study, we used Mangin et al.'s, (2021) procedure to test the hypothesis that mental fatigue exacerbates implicit bias in the decision to shoot when individuals are reminded of a terrorist attack.

In this last study, we also attempted to verify that ego-depletion impacts the balance between automatic and controlled components of the shooter decision task, as implied by our theoretical reasoning.<sup>4</sup> To reach this goal, we used a process dissociation model (Jacoby, 1991; Payne, 2001; Ito et al., 2015). This procedure can be used to estimate the contribution of automatic and controlled processes to performance in any cognitive task including both congruent and incongruent trials. In the shooter task, the automatic processes reflect the influence of the stereotypical association between Arab-Muslims and guns, facilitating stereotype-congruent responses (even if incorrect). In contrast, the controlled processes reflect correct visual discrimination between guns and lures. Controlled and automatic processing can be estimated from the number of errors in the shooting task by using a set of simple algebraic equations (Payne, 2001). Using these equations, we tested the hypothesis that depleted participants would show exacerbated automatic and/or disrupted controlled processing in the shooter decision task when reminded of terrorist attacks.

## **Method**

### ***Transparency and Openness***

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. All data, analysis code, and research materials are available at <https://osf.io/x7z4f/>. This study's design and its analysis were not pre-registered.

### ***Participants***

One hundred and eighty-two French undergraduate psychology students (93.4% women,  $M_{age} = 18.4$ ,  $SD_{age} = 1.10$ ; range of 17 to 23) participated in the experiment in exchange for course credits or a small amount of money (a €10 voucher). A sensitivity analysis showed that this sample size provided 80% power to detect an effect of Cohen's  $d = .41$  or greater, with  $\alpha = .05$  (two-tailed) in an independent samples t-test. Previous meta-analyses on ego-depletion found similar effect sizes of  $d = 0.40$  (Hagger et al., 2010) and  $d = 0.44$  (Dang, 2018) when the Stroop task was used to deplete participants.

### ***Material and Procedure***

In this study, implicit bias on the shooter task was measured only once, after the mental fatigue manipulation. Participants were randomly assigned to either perform a modified Stroop task for 30 minutes or watch a 30-minute documentary video (in the control condition). For the modified Stroop task, participants had to react as quickly and accurately as possible to visual cues by giving a verbal response. Each trial began with a fixation cross in the middle of the screen for 50 ms. Subsequently, a 400 ms prime of a circle or square was displayed around the fixation cross. Following the prime, a word appeared in the center of the screen (i.e., the response signal) until the participants answered. The words displayed on the screen were color names (*red*, *blue*, *yellow*, or *green*) written in incongruent color inks (e.g., *red* written in blue). Participants were instructed that when the prime is a square they should read the target word out loud, and when the prime is a circle, they should name the color of the target word. Responses were recorded with a microphone. The 888 trials took 30 minutes to complete. The control condition was watching a 30-minute documentary that was pre-tested to be

neutral and not boring (Mangin et al., 2021). To ensure that participants paid attention to the video, they were asked to answer 10 simple questions about it.

As a manipulation check, all participants indicated their level of mental fatigue on a visual analog scale ranging from 0% to 100%. Participants answered this question before and after the 30-minute Stroop task.

All participants were then instructed to recall the Bataclan Paris attacks. As in previous studies, participants answered 16 questions regarding their memory and feelings about these events and their circumstances (see <https://osf.io/x7z4f/>). After this, they completed the shooter decision task, as in the previous studies. Finally, participants were thanked and debriefed.

## **Results**

### ***Data Preparation***

Using the same criteria as previous studies, 3.03% of trials were excluded as outliers, 5.38% of trials were excluded because they fell outside the specified time window, and 6.06% of trials were excluded due to incorrect responses. The main dependent variable was implicit bias on the shooter decision task, computed separately for both reaction times and errors.

To assess automatic and controlled components of the shooter task, we relied on the process dissociation procedure (Payne, 2001). This approach uses error rates on stereotype congruent and stereotype incongruent trials to compute separate indicators of automatic and controlled processing. The controlled component is indicated by the subtraction of the proportion of errors reflecting a hostile bias towards Arab-Muslims on stereotype-incongruent trials from the proportion of correct responses in stereotype-congruent trials. The automatic component is indicated by the proportion of false alarms

divided by the quantity [1 –the controlled component], which represents the likelihood of a false alarm when control fails (Payne, 2001).

### ***Preliminary Analyses***

A 2(condition: control vs. depleted) X 2(time: before vs. after) analysis of variance (ANOVA), with repeated measures on the last factor, was conducted on the manipulation check (mental fatigue). A significant effect of the repeated factor was found,  $F(1, 177) = 278.49, p < .001, \eta^2_p = 0.6$ , with participants reporting more mental fatigue after the manipulation than before ( $M = 6.21, SE = 0.14$ , and  $M = 4.26, SE = 0.14$ , respectively). There was also a significant time x condition interaction,  $F(1, 177) = 12.82, p < .001, \eta^2_p = 0.07$ . Tests for simple main effects revealed no difference in mental fatigue between conditions before the manipulation ( $M = 4.22, SE = 0.20$ , and  $M = 4.29, SE = 0.20$ , respectively),  $t(177) = -0.22, p_{\text{tukey}} = 0.99$ . However, after the manipulation, participants reported higher mental fatigue in the depleted condition than in the control condition ( $M = 6.60, SE = 0.20$ , and  $M = 5.82, SE = 0.20$ , respectively),  $t(177) = 2.62, p_{\text{tukey}} = 0.046$ .

### ***Main Analyses***

Mean implicit bias in reaction times and errors are presented in Figure 7. The mean implicit bias in reaction times was not different between the depleted condition ( $n = 88, M = 0.00, SD = 0.04$ ) and the control condition ( $n = 79, M = -0.00, SD = 0.05$ ),  $t(165) = 0.55, p = .586$ , Cohen's  $d = 0.08$ , 95%  $CI[-0.22, 0.39]$ . As predicted, however, the mean implicit bias in errors was significantly greater in the depleted condition ( $n = 86, M = 0.38, SD = 1.79$ ) than in the control condition ( $n = 89, M = -0.26, SD = 1.75$ ),  $t(173) = 2.39, p = .018$ , Cohen's  $d = 0.36$ , 95%  $CI[0.06, 0.66]$ .

A one-sample t-test further showed that the mean of implicit bias in errors was not different from zero in the control condition,  $t(88) = -1.38, p = 0.168$ , Cohen's  $d = -0.147$ . In the depleted condition, the mean of implicit bias in errors was marginally positive,  $t(85) = 1.988, p = 0.050$ , Cohen's  $d = 0.214$ .

### *Supplementary Analyses*

To test whether the ego-depletion manipulation influenced the automatic and controlled components on the shooter task, we used independent sample t-test. The effect of ego depletion was significant on the automatic component,  $t(171) = 2.00, p = .047, \eta^2_p = .047$ , but not on the controlled component,  $t(180) = 0.994, p = .321, \eta^2_p = .005$ . Consistent with the idea that ego depletion fosters automatic processing, the automatic component of the shooter task was higher in the ego depletion ( $M = 0.558, SD = 0.322$ ) than in the control condition ( $M = 0.462, SD = 0.303$ ).

### **Discussion**

The results of Study 6 show that mental fatigue exacerbates implicit bias in errors in the decision to shoot when reminded of terrorist attacks. In addition, the process dissociation procedure allowed us to verify that ego depletion fosters automatic reactions in the shooter task, after the participants were reminded of terrorist attacks. In line with our reasoning, this then leads to stronger shooter bias. This finding is thus consistent with the JSM of prejudice (Crandall & Eshleman, 2003), with research on ego-depletion (Baumeister et al., 2007, 2018), and with the theoretical arguments advanced in the present work. To summarize, when individuals reminded of the terrorist attacks were unable to control their impulsive reactions due to a depleting task, they showed increased automaticity, and increased bias against Arab-Muslims on the shooting task. When individuals are not depleted, however, they seem to downregulate



their hostile reactions so as to not show implicit bias. Taken together, these findings are generally consistent with the idea that many individuals tend to suppress implicit bias towards Arab-Muslims unless their ability to do so is impaired.

Interestingly, in this study, mental fatigue affected implicit bias in errors regardless of the personality variables investigated in Studies 3 to 5. This corroborates the idea that the increase in implicit bias after terrorist attack reminders is related to an incapacity to suppress hostility, whether this incapacity is due to personality variables or contextual factors.

### **Internal Meta-Analysis**

Although the findings of Studies 3-6 provided support for our hypotheses, there were some (relatively minor) inconsistencies in the findings. In particular, the predicted effects emerged on reaction time in Studies 3-4 and on errors in Studies 5-6. Reaction-time based cognitive tasks as the shooter decision task involve a speed-accuracy tradeoff, and it is common in psychological research to find effects only on one of the two indicators (Liesefeld & Janczyk, 2022). It is often difficult to know exactly what prompts participants to prioritize accuracy over rapid responses and vice versa. It is also possible that such inconsistencies are random. In an effort to have a better summary of our findings, we meta-analyzed our 4 experiments (Studies 3-6).

The aim of the internal meta-analysis was to address the following question: do the present data provide evidence for our hypotheses? Since the goal of the meta-analysis was to make a specific inference about our data, rather than to draw broad inferences about the literature, we used fixed effects modeling in which the mean effect size (i.e., mean correlation) was weighted by sample size (effects based on random-effects models are reported in a footnote). For each study, we first computed the effect

size corresponding to the key effect testing our predictions: the interaction between condition, expressed prejudice, and automaticity in Studies 3 and 4, the interaction between condition and implicit association in Study 5, and the main effect of ego depletion in Study 6. All effect sizes were transformed to Fisher's  $z$  for analyses and converted back to Pearson correlations for presentation. For each study, the effect sizes observed on error and reaction time data were averaged to form one effect size (Goh et al., 2016).

The observed Fisher  $r$ -to- $z$  transformed correlation coefficients ranged from  $-0.071$  to  $0.244$ , with the majority of estimates being positive (75%). The estimated average Fisher  $r$ -to- $z$  transformed correlation coefficient based on the fixed-effects model was  $= 0.101$  (95% CI:  $0.029$  to  $0.172$ ).<sup>5</sup> Therefore, the average outcome differed significantly from zero ( $z = 2.772$ ,  $p = 0.006$ ). The funnel plot is depicted in Figure S3 (available here: <https://osf.io/b98vm>). Taken together, these findings indicate that the set of studies reported here provide evidence for our key hypotheses.

### **General Discussion**

Across six studies, we found evidence that the salience of Islamic terrorist acts is associated with an increase in implicit hostile reactions towards Arab-Muslims. The first two studies found robust evidence for immediate and momentary increases in implicit bias towards Arab-Muslims following actual terrorist attacks, as indicated by implicit anti-Islam associations (Study 1) and by Google search terms reflecting hostile attitudes towards Muslims and Islam (Study 2). The next four studies were based on the recollection of terrorist attacks several years after they occurred and found that the effects of terrorist attack reminders on bias against Arab-Muslims were less robust than in Studies 1 and 2 and were moderated by other variables relevant to controlling

prejudiced expression. Specifically, when French participants reflected on the Paris terrorist attacks five years later (Study 3) and when American participants reflected on the 9/11 attacks 20 years later (Study 4), they exhibited an increase in implicit bias in the decision to shoot, but only if they were highly prejudiced and had a strong tendency to act automatically. Study 5 further corroborated the notion that implicit bias reflects an automatic hostile reaction by showing that implicit bias against Arab-Muslims in a shooting task was observed primarily among those with a strong tendency to associate Arab-Muslims with terrorism. Finally, Study 6 indicated that implicit bias towards Arab-Muslims following terrorism reminders increases when cognitive control is challenged and participants are unable to regulate their automatic affective reactions.

Overall, these findings suggest that immediately after terrorist attacks, there is a surge in implicit bias towards Arab-Muslims, but this surge is short-lived. Years after the attack, the automatic tendency to react with hostility may be governed by behavior regulation mechanisms such that it is exhibited primarily among some individuals (chronically prejudiced individuals who tend to act automatically, as well as individuals who strongly associate Muslims with terrorism). However, when regulation mechanisms are challenged, implicit prejudice is clearly present. This suggests that remnants of these hostile feelings persist but are more controlled.

Together, these findings are consistent with several social-psychological theories that predict increased hostility towards Arab-Muslims related to Islamic terrorist attacks, as well as with the JSM of prejudice expression (Crandall & Eshleman, 2003, 2005). Importantly, the reported results challenge previous findings about the effect of terrorist attacks on prejudice that may lead to the unfounded conclusion that people are moderate and tolerant in that they distinguish between the perpetrators of the attacks

and the larger Arab and Muslim communities. In fact, the results of Study 5, that examined the association between terrorism and Arab-Muslim implicit attitudes, suggest that it is precisely the failure to make this distinction that facilitates hostile reactions towards members of the Arab-Muslim community. This research thus provides a new theoretical perspective and novel methodological tools to continue to investigate the timely and important question of the impact of terrorism on anti-Islamic prejudice.

Whereas this research indicates that terrorism increases anti-Islamic implicit bias, the exact nature of this bias is not entirely clear. Terrorism is literally about inspiring fear (terror), not necessarily hostility. It seems plausible that terrorist attacks, especially in one's own country, would inspire more fear than hatred. Terrorist attacks would, thus, be expected to induce fear, especially in the immediate aftermath of an attack, but our studies seem to suggest a response characterized more by hostility. This is evident in Study 2 that found a surge in search terms related to hatred but not to fear following a terrorist attack. Although an explanation in terms of hostility seems to fit the data better than a fear explanation, we can not be entirely sure of the exact emotional tone of the response that we found. This may be important to examine in future research as the difference between feelings of fear and hostility have behavioral and policy implications (Lerner et al., 2003). Although the distinction between fear and hostility is conceptually important, many theories suggest that fear leads to hostility towards threatening out-groups (e.g., Pyszczynski et al., 2003). Thus, fear and hostility are strongly tied and it might be difficult to completely isolate their respective contributions in reactions to terrorist attacks.

### **Theoretical and Practical Implications**

Consistent with prior large-scale surveys (Bianquis & Castell, 2020; Brouard et al., 2018; Castanho Silva, 2018; Zeffman, 2015), we found that terrorist attacks, and the memory of them, have no discernible effect on overtly expressed anti-Islamic prejudice (Studies 1 and 5). Using a variety of indirect measures, however, we found evidence that terrorist attacks and the memory of terrorist attacks can influence implicit anti-Islamic prejudice (Studies 1–6). In fact, the present findings show that terrorist attacks elicited a number of automatic hostile reactions against Arab-Muslims (i.e., implicit anti-Islamic prejudice), even if no effects were observable on explicit measures. This suggests that the influence of terrorism on prejudice is more complex than previously thought. After a terrorist attack, most individuals may find it unjustified to express prejudice against all Arab-Muslims and thus do not overtly express higher levels of prejudice towards them. However, this does not mean that terrorist attacks perpetrated in the name of Islam have no effect on attitudes towards Arab-Muslim communities, as many political surveys seem to suggest (e.g., Castanho Silva, 2018). The present data show that under the apparent guise of tolerance lurks implicit anti-Islamic bias that is heightened after terrorist acts and when individuals are reminded of terrorist violence, especially when control over prejudice and its expression is made difficult. Thus, the present results directly impact existing theories of prejudice and change current knowledge about the link between terrorism and prejudice.

The present findings are consistent with and have implications for the justification suppression model of prejudice (Crandall & Eshleman, 2003, 2005). Extending previous research on this model, we have identified several variables that moderate the expression of genuine or automatic prejudice, presumably by affecting individuals' self-regulation processes. We found evidence that prejudiced reactions are

more likely to appear when suppression processes are weakened, either because prejudice is measured implicitly or because of personality or situational variables. The findings of Studies 3 and 4 are consistent with the idea that implicit bias in the decision to shoot can be kept at bay when either expressed prejudice or the tendency to act automatically is low. However, when highly prejudiced individuals have a high propensity for automatic reactions, the suppression process may be compromised, which then leads to greater implicit bias in the decision to shoot when terrorism is salient. In Study 5, individual differences in the tendency to automatically associate Arab-Muslims with terrorism moderated implicit bias after reminders of terrorist attacks. This is consistent with the idea that the tendency to automatically perceive Arab-Muslims as threatening plays a key role in this phenomenon. Study 6 suggests that the inability to suppress the expression of prejudice due to an ego-depleting task also increases implicit bias in the decision to shoot after reminders of terrorist attacks. Together, the current findings are consistent with the core idea of the justification suppression model that prejudice is often not expressed overtly but remains under the surface and can be reliably detected when self-control is low.

The present research also makes a notable methodological contribution in demonstrating that explicit measures of prejudice, overwhelmingly used in political surveys and questionnaire studies, may not be appropriate for measuring politically sensitive reactions such as overt prejudice. The absence of any effect of terrorism salience on explicit measures of prejudice may not reflect a real psychological immunity to the effects of terrorism but rather the inadequacy of these measures in the detection of subtle psychological reactions. Current social norms view the expression of prejudice in a negative light, and people are motivated to conceal and suppress their

feelings towards other groups if these feelings are perceived to be outside of the range of acceptable social attitudes. In this light, it may be prudent to consider the possibility that some of the failures to replicate effects in social psychology in general (e.g., Świątkowski & Dompnier, 2017), and in the terror management literature in particular (Chatard et al., 2020; Klein et al., 2019; Schindler et al., 2021), may reflect the problem of accurately tapping prejudiced reactions when these reactions have become socially unacceptable.

### **Strengths and Limitations**

The current research provides relatively robust support for our predictions across six studies using correlational and experimental procedures, both natural behavior (online) and laboratory observations, and relying on archival data as well as on new data collected in the laboratory. In the present studies, we sought to maximize construct validity by combining large-scale archival studies (Studies 1-2) with experimental studies; by using within-participants designs, when possible (Studies 3-4); and by increasing the strength of classic manipulations (Study 6). One of the main strengths of archival studies is the use of large data sets, the diversity and inclusiveness of the participants (Heng et al., 2018), and the high ecological validity in such research. The experimental studies, in contrast, enjoy high internal validity at the expense of lower ecological validity. In our experimental studies, we also tested the generality of our findings in two different countries: France (Study 3) and the USA (Study 4). Overall, our findings indicate that the effects we are investigating are robust despite methodological and cultural differences.

These strengths notwithstanding, several limitations should also be considered. For instance, in Study 2, search items such as "I hate Muslims" may either reflect

prejudice towards Muslims or mere curiosity about other people's hate. Only when looking at the results in the context of all six studies can we be relatively confident that the results indicate a prejudiced reaction. In Studies 3–6, there was no overall effect of terrorism reminders on the shooting decision task. In these studies, effects emerged only when moderators such as expressed prejudice and automaticity (Studies 3–4) or implicit associations between terrorism and Islam (Study 5) were taken into account. One way to explain the difference between the robust associations found in Studies 1 and 2 and the moderated effects of Studies 3–6 is to consider the temporal dimension of this research. Indeed, there may be a difference in the intensity of an immediate spontaneous response to a terrorist attack and a response to the memory of an attack that occurred many years earlier: emotions are likely to weaken as the initial shock passes and the memory fades. Moreover, the passage of time not only tempers the immediate rage following a terrorist attack but also fosters more cognitive control over one's response. Because prejudice is an unacceptable social vice, people may exercise greater control in expressing it when reminded of a past attack than in the immediate vicinity of an attack.

A second limitation relates to the discrepant findings in the studies using the shooting decision task. In Studies 3 and 4, the results provided support for our prediction on implicit bias in reaction times, but not on implicit bias in errors, while the opposite was true in Studies 5 and 6. Thus, although we found evidence consistent with the hypotheses in all studies, there were inconsistencies in the exact indicator of bias on which these effects appeared. This pattern of findings is not unusual in research using implicit measures, and effects often emerge only on some indicators of bias but not on others (Mekawi & Bresin, 2015). In the shooter bias paradigm, when both indicators (errors and reaction times) are reported, the effects are often inconsistent from one study



to the next (Ma et al., 2013). This may be the result of a speed-accuracy tradeoff wherein an attempt to respond quickly may increase error, and an attempt to respond accurately may slow down the response (Liesefeld & Janczyk, 2022). Further research is needed to better understand these inconsistencies and when people chose accuracy over speed and vice versa.

### **Conclusion**

Western societies have gone to great lengths to promote tolerance towards minority groups and to make clear distinctions between the few people involved in terrorism and the larger communities that they come from. These efforts, however, are not always successful. Terrorist attacks are dramatic, they capture attention, they are widely publicized, they provoke an array of strong emotions, and they influence government policy (Lerner et al., 2003; Victoroff & Kruglanski, 2009). They also typically provoke strong condemnation from some politicians and pundits of whatever group with which the perpetrators of the attack are affiliated. The results of past research may have painted an overly optimistic picture of the effects of terrorism on prejudice, suggesting that the effects are weak or nonexistent. The results of the current research using indirect and implicit measures reveal the toxic effect of terrorist attacks on prejudice towards Arabs/Muslims immediately after the attack and many years later, that is most likely to appear when control over prejudice expression is weak.

### Footnotes

1 We refer to “Arab-Muslims” because despite the conceptual differences between these two terms (ethnic group and religious identity), people with a North-African physical appearance and Muslim people are very often confounded (Ahluwalia & Pelletiere, 2010) in people’s perceptions.

2 Overtly expressed prejudice toward Arab-Muslims was also assessed with a feeling thermometer scale. Participants were asked to indicate how warm or cold they feel towards Arab-Muslims. Responses were given on a 10-point scale ranging from “extremely warm” to “extremely cold”. The results obtained with this item were very similar to and redundant with those obtained with the item assessing the preference for other people in comparison to Arab-Muslims. To avoid redundancy, we thus report the results observed with only one of the two self-report items.

3 Recent research indicates that the automaticity subscale of the creature of habit scale has excellent psychometric properties (Ersche et al., 2017), it is strongly linked to other self-report measures of impulsivity and compulsion (Ersche et al., 2019), it predicts to the balance between goal-directed behavior and habitual response tendencies in a contingency degradation paradigm (Ersche et al., 2021), it discriminates individuals who have enhanced automatic habitual behaviors such as drug users (Ersche et al., 2020), and it is associated with reduced neural activations in brain structures associated with dysregulation of habits (Ersche et al., 2021). Moreover, the automaticity subscale has been validated in French language before being used in the present research (Wyckmans et al., 2020).

4 We thank an anonymous reviewer for suggesting these exploratory analyses. Although these analyses were not planned a priori, we also performed them on the data issued from Studies 3, 4, and 5 (for related results, see Supplementary Online Material).

5 The estimated average Fisher r-to-z transformed correlation coefficient based on the random-effects model (with maximum-Likelihood estimator) was = 0.109 (95% CI: -0.003 to 0.221), thus, very close to the one found based on the fixed-effects model. When the experimental design of the studies (within-participant design in Studies 3-4 versus between-participant design in Studies 5-6) was included as a categorical moderator in the meta-analysis, the estimated average Fisher r-to-z transformed correlation coefficient based on the random-effects model was = 0.097 (95% CI: 0.002 to 0.190), again, very close to the one found based on the fixed-effects model. The experimental design was not found to be a significant moderator in the meta-analysis ( $zr = 0.049$  (95% CI: -0.045 to 0.143)).

### References

- Abuelaish, I. (2012). *I shall not hate: A Gaza doctor's journey on the road to peace and human dignity*. Bloomsbury Publishing.
- Ahluwalia, M. K., & Pellettiere, L. (2010). Sikh men post-9/11: Misidentification, discrimination, and coping. *Asian American Journal of Psychology, 1*(4), 303–314. doi: 10.1037/a0022156
- Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.
- Arndt, J., Greenberg, J., Pyszczynski, T., & Solomon, S. (1997). Subliminal presentation of death reminders leads to increased defense of the cultural worldview. *Psychological Science, 8*(5), 379–385. doi: 10.1111/j.1467-9280.1997.tb00429.x
- Arnoult, M., Selimbegovic, L., & Chatard, A. (2021). *Validation of a French version of a scale of explicit Islamophobia and a shooter decision task assessing anti-Arab-Muslims implicit bias* [Unpublished manuscript]. University de Poitiers.
- Baumeister, R. F., Tice, D. M., & Vohs, K. D. (2018). The strength model of self-regulation: Conclusions from the second decade of willpower research. *Perspectives on Psychological Science, 13*(2), 141–145. doi: 10.1177/1745691617716946
- Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16*(6), 351–355. doi: 10.1111/j.1467-8721.2007.00534.x

- Bianquis, G., & Castell, L. (2020). Do terrorist attacks terrorize us? The impact of the attacks of November 13, 2015 on French preferences. *Revue économique*, *71*(5), 911-931. doi: 10.3917/reco.715.0911
- Brouard, S., Vasilopoulos, P., & Foucault, M. (2018). How terrorism affects political attitudes: France in the aftermath of the 2015–2016 attacks. *West European Politics*, *41*(5), 1073–1099.
- Campbell, D. T. (1963). Experimental and quasi-experimental designs for research on teaching. *Handbook of Research on Teaching*, *6*, 171–246.
- Castanho Silva, B. (2018). The (non)impact of the 2015 Paris terrorist attacks on political attitudes. *Personality and Social Psychology Bulletin*, *44*(6), 838–850. doi: 10.1177/0146167217752118
- Chatard, A., Hirschberger, G., & Pyszczynski, T. (2020). A word of caution about Many Labs 4: If you fail to follow your preregistered plan, you may fail to find a real effect. *PsyArXiv*. doi: 10.31234/osf.io/ejubn
- Chatard, A., Selimbegović, L., N'Dri Konan, P., Arndt, J., Pyszczynski, T., Lorenzi-Cioldi, F., & Van der Linden, M. (2011). Terror management in times of war: Mortality salience effects on self-esteem and governmental and army support. *Journal of Peace Research*, *48*(2), 225–234.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Second Edition. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Conrey, F. R., Sherman, J. W., Gawronski, B., Hugenberg, K., & Groom, C. (2005). Beyond automaticity and control: The quad-model of behavioral response. *Journal of Personality and Social Psychology*, *89*(4), 469-487.

- Conway, M. A., Anderson, S. J., Larsen, S. F., Donnelly, C. M., McDaniel, M. A., McClelland, A. G., Rawles, R. E., & Logie, R. H. (1994). The formation of flashbulb memories. *Memory & Cognition*, *22*(3), 326–343. doi: 10.3758/BF03200860
- Corneille, O., & Hütter, M. (2020). Implicit? What do you mean? A comprehensive review of the delusive implicitness construct in attitude research. *Personality and Social Psychology Review*, *24*(3), 212–232. doi: 10.1177/1088868320911325
- Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, *83*(6), 1314–1329. doi: 10.1037/0022-3514.83.6.1314
- Courset, R., Rougier, M., Palluel-Germain, R., Smeding, A., Jonte, J. M., Chauvin, A., & Muller, D. (2018). The Caucasian and North African French Faces (CaNAFF): A face database. *International Review of Social Psychology*, *31*(1), 22. doi: 10.5334/irsp.179
- Crandall, C. S., & Eshleman, A. (2003). A justification-suppression model of the expression and experience of prejudice. *Psychological Bulletin*, *129*(3), 414–446. doi: 10.1037/0033-2909.129.3.414
- Crandall, C. S., & Eshleman, A. (2005). The justification-suppression model of prejudice: An approach to the history of prejudice research. In C. S. Crandall & M. Schaller (Eds.), *Social psychology of prejudice: Historical and contemporary issues* (pp. 237–267). Lawrence, Kansas: Lewinian Press.

- Crandall, C. S., Eshleman, A., & O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: The struggle for internalization. *Journal of Personality and Social Psychology*, *82*(3), 359–378. doi: 10.1037/0022-3514.82.3.359
- Cruz, E., D'Alessio, S. J., & Stolzenberg, L. (2020). Decisions made in terror: Testing the relationship between terrorism and immigration. *Migration Studies*, *8*(4), 573–588. doi: 10.1093/migration/mnz014
- Cvencek, D., Greenwald, A. G., Brown, A. S., Gray, N. S., & Snowden, R. J. (2010). Faking of the Implicit Association Test is statistically detectable and partly correctable. *Basic and Applied Social Psychology*, *32*(4), 302–314. doi: 10.1080/01973533.2010.519236
- Dang, J. (2018). An updated meta-analysis of the ego depletion effect. *Psychological Research*, *82*(4), 645–651. doi: 10.1007/s00426-017-0862-x
- Das, E., Bushman, B. J., Bezemer, M. D., Kerkhof, P., & Vermeulen, I. E. (2009). How terrorism news reports increase prejudice against outgroups: A terror management account. *Journal of Experimental Social Psychology*, *45*(3), 453–459. doi: 10.1016/j.jesp.2008.12.001
- De Houwer, J. (2019). Implicit bias is behavior: A functional-cognitive perspective on implicit bias. *Perspectives on Psychological Science*, *14*(5), 835–840. doi: 10.1177/1745691619855638
- Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, *56*(1), 5–18. doi: 10.1037/0022-3514.56.1.5

- Dovidio, J. F., & Gaertner, S. L. (1986). *Prejudice, discrimination, and racism*. Academic Press.
- Echebarria-Echabe, A., & Fernández-Guede, E. (2006). Effects of terrorism on attitudes and ideological orientation. *European Journal of Social Psychology, 36*(2), 259–265. doi: 10.1002/ejsp.294
- El Haj, M., Gandolphe, M. C., Wawrziczny, E., & Antoine, P. (2016). Flashbulb memories of Paris attacks: Recall of these events and subjective reliving of these memories in a case with Alzheimer disease. *Medicine, 95*(46). doi: 10.1097/MD.0000000000005448
- Ersche, K. D., Lim, T. V., Ward, L. H., Robbins, T. W., & Stoehl, J. (2017). Creature of Habit: A self-report measure of habitual routines and automatic tendencies in everyday life. *Personality and Individual Differences, 116*, 73–85. doi: 10.1016/j.paid.2017.04.024
- Ersche, K. D., Lim, T. V., Murley, A. G., Rua, C., Vaghi, M. M., White, T. L., Williams, G. B., & Robbins, T. W. (2021). Reduced glutamate turnover in the putamen is linked with automatic habits in human cocaine addiction. *Biological Psychiatry, 89*(10), 970-979.
- Ersche, K. D., Ward, L. H., Lim, T. V., Lumsden, R. J., Sawiak, S. J., Robbins, T. W., & Stoehl, J. (2019). Impulsivity and compulsivity are differentially associated with automaticity and routine on the Creature of Habit Scale. *Personality and Individual Differences, 150*, 109493.
- Etherton, J. L., Osborne, R., Stephenson, K., Grace, M., Jones, C., & De Nadai, A. S. (2018). Bayesian analysis of multimethod ego-depletion studies favours the



null hypothesis. *British Journal of Social Psychology*, 57(2), 367–385. doi: 10.1111/bjso.12236

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*, 51(1), 115–134. doi: 10.1037/0022-0167.51.1.115

Gawronski, B., De Houwer, J., & Sherman, J. W. (2020). Twenty-five years of research using implicit measures. *Social Cognition*, 38(Supplement), s1-s25. doi: 10.1521/soco.2020.38.supp.s1

Ginsberg, J., Mohebbi, M. H., Patel, R. S., Brammer, L., Smolinski, M. S., & Brilliant, L. (2009). Detecting influenza epidemics using search engine query data. *Nature*, 457(7232), 1012–1014. doi: 10.1038/nature07634.

Greenberg, J., Pyszczynski, T., Solomon, S., Rosenblatt, A., Veeder, M., Kirkland, S., & Lyon, D. (1990). Evidence for terror management II: The effects of mortality salience on reactions to those who threaten or bolster the cultural worldview. *Journal of Personality and Social Psychology*, 58(2), 308–318. doi: 10.1037/0022-3514.58.2.308

Greenwald, A. G. (1968). Cognitive learning, cognitive response to persuasion, and attitude change. *Psychological Foundations of Attitudes*: 147–169.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, 102(1), 4–27. doi: 10.1037/0033-295X.102.1.4

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of*

*Personality and Social Psychology*, 74(6), 1464–1480. doi: 10.1037/0022-3514.74.6.1464

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, 85(2), 197–216. doi: 10.1037/0022-3514.85.2.197

Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass*, 10(10), 535-549.

Govorun, O., & Payne, B. K. (2006). Ego-depletion and prejudice: Separating automatic and controlled components. *Social Cognition*, 24(2), 111–136. <https://doi.org/10.1521/soco.2006.24.2.111>

Hagger, M. S., Chatzisarantis, N. L. D., Alberts, H., Anggono, C. O., Batailler, C., Birt, A. R., Brand, R., Brandt, M. J., Brewer, G. A., Bruyneel, S., Calvillo, D. P., Campbell, W. K., Cannon, P. R., Carlucci, M., Carruth, N. P., Cheung, T. T. L., Crowell, A., De Ridder, D. T. D., Dewitte, S., & Zwieneberg, M. (2016). A multilab preregistered replication of the ego-depletion effect. *Perspectives on Psychological Science*, 11(4), 546–573. doi: 10.1177/1745691616652873

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin*, 136(4), 495–525. doi: 10.1037/a0019486

Hahn, A., & Goedderz, A. (2020). Trait-unconsciousness, state-unconsciousness, preconsciousness, and social miscalibration in the context of implicit

- evaluation. *Social Cognition*, 38(Supplement), s115-s134. doi: 10.1521/soco.2020.38.sup.s115
- Hahn, A., Judd, C. M., Hirsh, H. K., & Blair, I. V. (2014). Awareness of implicit attitudes. *Journal of Experimental Psychology: General*, 143(3), 1369–1392. doi: 10.1037/a0035028
- Harmon-Jones, E., Greenberg, J., Solomon, S., & Simon, L. (1996). The effects of mortality salience on intergroup bias between minimal groups. *European Journal of Social Psychology*, 26(4), 677–681. doi: 10.1002/(SICI)1099-0992(199607)26:4<677::AID-EJSP777>3.0.CO;2-2
- Hayes, J., Schimel, J., & Williams, T. J. (2008). Fighting death with death: The buffering effects of learning that worldview violators have died. *Psychological Science*, 19(5), 501–507. doi: 10.1111/j.1467-9280.2008.02115.x
- Heng, Y. T., Wagner, D. T., Barnes, C. M., & Guarana, C. L. (2018). Archival research: Expanding the methodological toolkit in social psychology. *Journal of Experimental Social Psychology*, 78, 14–22. doi: 10.1016/j.jesp.2018.04.012
- Hirschberger, G., Pyszczynski, T., Ein-Dor, T., Shani Sherman, T., Kadah, E., Kesebir, P., & Park, Y. C. (2016). Fear of death amplifies retributive justice motivations and encourages political violence. *Peace and Conflict: Journal of Peace Psychology*, 22(1), 67–74. doi: 10.1037/pac0000129
- Hollande, F. (2015). *Déclaration de M. François Hollande, Président de la République, sur l'attentat contre l'hebdomadaire "Charlie Hebdo", le meurtre d'une policière et les deux prises d'otages des 7, 8 et 9 janvier 2015, à Paris le 9 janvier 2015* [Discours présidentiel]. Paris, France.

- Imhoff, R., & Recker, J. (2012). Differentiating Islamophobia: Introducing a new scale to measure Islamoprejudice and secular Islam critique. *Political Psychology, 33*(6), 811–824. doi: 10.1111/j.1467-9221.2012.00911.x
- Ito, T. A., Friedman, N. P., Bartholow, B. D., Correll, J., Loersch, C., Altamirano, L. J., & Miyake, A. (2015). Toward a comprehensive understanding of executive cognitive function in implicit racial bias. *Journal of personality and social psychology, 108*(2), 187–218. Doi:10.1037/a0038557
- Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory and Language, 30*(5), 513–541. doi:10.1016/0749-596X(91)90025-F
- Johnson, D. J., Stepan, M. E., Cesario, J., & Fenn, K. M. (2021). Sleep deprivation and racial bias in the decision to shoot: A diffusion model analysis. *Social Psychological and Personality Science, 12*(5), 638–647. doi: 10.1177/1948550620932723
- Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Exceptions that prove the rule—Using a theory of motivated social cognition to account for ideological incongruities and political anomalies: Reply to Greenberg and Jonas (2003). doi: 10.1037/0033-2909.129.3.383
- Karpinski, A., & Steinman, R. B. (2006). The single category implicit association test as a measure of implicit social cognition. *Journal of Personality and Social Psychology, 91*(1), 16–32. doi: 10.1037/0022-3514.91.1.16
- Kay, A. C., Whitson, J. A., Gaucher, D., & Galinsky, A. D. (2009). Compensatory control: Achieving order through the mind, our institutions, and the heavens. *Current Directions in Psychological Science, 18*(5), 264–268.

- Kesebir, P., Pyszczynski, T., Chatard, A., & Hirschberger, G. (2013). Reliving history: Using priming to assess the effects of world events on public opinion. *Peace and Conflict: Journal of Peace Psychology, 19*(1), 51–68. doi: 10.1037/a0031563
- Klein, R. A., Cook, C. L., Ebersole, C. R., Vitiello, C. A., Nosek, B. A., Ahn, P., Brady, A. J., Chartier, C. R., Christopherson, C. D., Clay, S., Collisson, B., Crawford, J. T., Cromar, R., Gardiner, G., Gosnell, C. L., Grahe, J., Hall, C., Howard, I., Joy-Gaba, J. A., ... Ratliff, K. A. (2019, December 11). Many Labs 4: Failure to replicate mortality salience effect with and without original author involvement. *PsyArXiv*. doi: 10.31234/osf.io/vef2c
- Knowles, E. D., Lowery, B. S., & Schaumberg, R. L. (2010). Racial prejudice predicts opposition to Obama and his health care reform plan. *Journal of Experimental Social Psychology, 46*(2), 420–423.
- Landau, M. J., Solomon, S., Greenberg, J., Cohen, F., Pyszczynski, T., Arndt, J., Miller, C., Ogilvie, D. M., & Cook, A. (2004). Deliver us from evil: The effects of mortality salience and reminders of 9/11 on support for President George W. Bush. *Personality and Social Psychology Bulletin, 30*(9), 1136–1150. doi: 10.1177/0146167204267988
- Lane, K. A., & Jost, J. T. (2011). Black man in the White House: Ideology and implicit racial bias in the age of Obama. In G. S. Parks & M. W. Hughey (Eds.), *The Obamas and a (post) racial America?* (pp. 48–69). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199735204.003.0003>
- LeDoux, J. E. (2014). Coming to terms with fear. *Proceedings of the National Academy of Sciences, 111*(8), 2871–2878. doi: 10.1073/pnas.1400335111

- Liesefeld, H. R., & Janczyk, M. (2022). Same same but different: Subtle but consequential differences between two measures to linearly integrate speed and accuracy (LISAS vs. BIS). *Behavior Research Methods*, 1-18.
- Leiris, A. (2016). *Vous n'aurez pas ma haine* [You will not have my hate]. Fayard.
- Lerner, J. S., Gonzalez, R. M., Small, D. A., & Fischhoff, B. (2003). Effects of fear and anger on perceived risks of terrorism: A national field experiment. *Psychological Science*, 14(2), 144–150. doi: 10.1111/1467-9280.01433
- Leys, C., Ley, C., Klein, O., Bernard, P., & Licata, L. (2013). Detecting outliers: Do not use standard deviation around the mean, use absolute deviation around the median. *Journal of Experimental Social Psychology*, 49(4), 764–766. doi: 10.1016/j.jesp.2013.03.013
- Lurquin, J. H., Michaelson, L. E., Barker, J. E., Gustavson, D. E., Von Bastian, C. C., Carruth, N. P., & Miyake, A. (2016). No evidence of the ego-depletion effect across task characteristics and individual differences: A pre-registered study. *PloS One*, 11(2), 1–20. doi: 10.1371/journal.pone.0147770
- Ma, D. S., Correll, J., Wittenbrink, B., Bar-Anan, Y., Sriram, N., & Nosek, B. A. (2013). When fatigue turns deadly: The association between fatigue and racial bias in the decision to shoot. *Basic and Applied Social Psychology*, 35(6), 515–524. doi: 10.1080/01973533.2013.840630
- Mair, P., & Wilcox, R. R. (2020). Robust statistical methods in R using the WRS2 package. *Behavior Research Methods*, 52(2), 464–488. doi: 10.3758/s13428-019-01246-w
- Mange, J., Chun, W. Y., Sharvit, K., & Belanger, J. J. (2012). Thinking about Arabs and Muslims makes Americans shoot faster: Effects of category accessibility

- on aggressive responses in a shooter paradigm. *European Journal of Social Psychology*, *42*(5), 552–556.
- Mangin, T., André, N., Benraiss, A., Pageaux, B., & Audiffren, M. (2021). No ego-depletion effect without a good control task. *Psychology of Sport and Exercise*, *57*, 102033. doi: 10.1016/j.psychsport.2021.102033
- Maren, S. (2001). Neurobiology of Pavlovian fear conditioning. *Annual Review of Neuroscience*, *24*(1), 897–931. doi: 10.1146/annurev.neuro.24.1.897
- Meissner, F., & Rothermund, K. (2013). Estimating the contributions of associations and recoding in the Implicit Association Test: The ReAL model for the IAT. *Journal of Personality and Social Psychology*, *104*(1), 45–69. <https://doi.org/10.1037/a0030734>
- McGregor, H. A., Lieberman, J. D., Greenberg, J., Solomon, S., Arndt, J., Simon, L., & Pyszczynski, T. (1998). Terror management and aggression: evidence that mortality salience motivates aggression against worldview-threatening others. *Journal of Personality and Social Psychology*, *74*(3), 590–605. doi: 10.1037/0022-3514.74.3.590
- Mekawi, Y., & Bresin, K. (2015). Is the evidence from racial bias shooting task studies a smoking gun? Results from a meta-analysis. *Journal of Experimental Social Psychology*, *61*, 120–130. doi: 10.1016/j.jesp.2015.08.002
- Mendoza, S. A., Gollwitzer, P. M., & Amodio, D. M. (2010). Reducing the expression of implicit stereotypes: Reflexive control through implementation intentions. *Personality and Social Psychology Bulletin*, *36*(4), 512–523.
- Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., Smith, C. T., Olson, K. R., Chugh, D., Greenwald, A. G., & Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and

stereotypes. *European Review of Social Psychology*, 18(1), 36–88. doi:  
10.1080/10463280701489053

Nugier, A., Roebroek, E., Anier, N., Kleinlogel, E. P., Chatard, A., & Guimond, S. (2016). The psychological effects of terrorism are moderated by cultural worldviews. *International Review of Social Psychology*, 29(1), 77–84. doi: 10.5334/irsp.61

Park, J., Felix, K., & Lee, G. (2007). Implicit attitudes toward Arab-Muslims and the moderating effects of social information. *Basic and Applied Social Psychology*, 29(1), 35–45.

Payne, B. K. (2001). Prejudice and perception: the role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, 81(2), 181.

Payne, B. K. (2001). Prejudice and perception: The role of automatic and controlled processes in misperceiving a weapon. *Journal of Personality and Social Psychology*, 81(2), 181–192. <https://doi.org/10.1037/0022-3514.81.2.181>

Payne, B. K., Hall, D. L., Cameron, C. D., & Bishara, A. J. (2010). A process model of affect misattribution. *Personality & social psychology bulletin*, 36(10), 1397–1408. <https://doi.org/10.1177/0146167210383440>

Pelham, B. W., Shimizu, M., Arndt, J., Carvallo, M., Solomon, S., & Greenberg, J. (2018). Searching for God: Illness-related mortality threats and religious search volume in Google in 16 nations. *Personality and Social Psychology Bulletin*, 44(3), 290–303. doi: 10.1177/0146167217736047

Pennebaker, J. W., & Harber, K. D. (1993). A social stage model of collective coping: The Loma Prieta earthquake and the Persian Gulf War. *Journal of Social Issues*, 49(4), 125–145. doi: 10.1111/j.1540-4560.1993.tb01184.x



- Plant, E. A., & Devine, P. G. (1998). Internal and external motivation to respond without prejudice. *Journal of Personality and Social Psychology*, 75(3), 811–832. doi: 10.1037/0022-3514.75.3.811
- Pyszczynski, T., Abdollahi, A., Solomon, S., Greenberg, J., Cohen, F., & Weise, D. (2006). Mortality salience, martyrdom, and military might: The great Satan versus the axis of evil. *Personality and Social Psychology Bulletin*, 32(4), 525–537. doi: 10.1177/0146167205282157
- Pyszczynski, T., Solomon, S., & Greenberg, J. (2003). *In the wake of 9/11: The psychology of terror*. American Psychological Association.
- Schindler, S., Reinhardt, N., & Reinhard, M. A. (2021). Defending one's worldview under mortality salience: Testing the validity of an established idea. *Journal of Experimental Social Psychology*, 93, 104087. doi: 10.1016/j.jesp.2020.104087
- Stahl, C., & Degner, J. (2007). Assessing automatic activation of valence: A multinomial model of EAST performance. *Experimental Psychology*, 54(2), 99–112. <https://doi.org/10.1027/1618-3169.54.2.99>
- Stecklov, G., & Goldstein, J. R. (2010). Societal responses to endemic terror: evidence from driving behavior in Israel. *Social Forces*, 88(4), 1859–1884. doi: 10.1353/sof.2010.0027
- Steffens, M. C. (2004). Is the implicit association test immune to faking? *Experimental Psychology*, 51(3), 165–179. doi: 10.1027/1618-3169.51.3.165
- Świątkowski, W., & Dompnier, B. (2017). Replicability crisis in social psychology: Looking at the past to find new pathways for the future. *International Review of Social Psychology*, 30(1), 111–124. doi: 10.5334/irsp.66

- Tiberj, V. (2017). Une France moins xénophobe ? [A less xenophobic France?]. Presses Universitaires de France.
- Tiberj, V. (2020). Dans les têtes: dynamiques autoritaires ou progression de la tolérance? In F. Faucher & G. Truc (Eds.), *Face aux attentats* [Facing the attacks] (pp. 79-93). Presses Universitaires de France.
- Trémolière, B., De Neys, W., & Bonnefon, J.-F. (2014) The grim reasoner: Analytical reasoning under mortality salience, *Thinking & Reasoning*, 20:3, 333-351, DOI: 10.1080/13546783.2013.823888
- Trémolière, B., Gagnon, M. È., & Blanchette, I. (2016). Cognitive Load Mediates the Effect of Emotion on Analytical Thinking. *Experimental psychology*, 63(6), 343–350. <https://doi.org/10.1027/1618-3169/a000333>
- Van den Bos, K., Poortvliet, P. M., Maas, M., Miedema, J., & Van den Ham, E. J. (2005). An enquiry concerning the principles of cultural norms and values: The impact of uncertainty and mortality salience on reactions to violations and bolstering of cultural worldviews. *Journal of Experimental Social Psychology*, 41(2), 91–113. doi: 10.1016/j.jesp.2004.06.001
- Victoroff, J., & Kruglanski, A. W. (Eds.). (2009). *Psychology of terrorism: Classic and contemporary insights*. Psychology Press.
- Wilcox, R. R., & Tian, T. S. (2011). Measuring effect size: a robust heteroscedastic approach for two or more groups. *Journal of Applied Statistics*, 38(7), 1359–1368. doi: 10.1080/02664763.2010.498507
- Wyckmans, F., Chatard, A., Saeremans, M., Kornreich, C., Jaafari, N., Fantini-Hauwel, C., & Noël, X. (2020). Habitual routines and automatic tendencies differential

roles in alcohol misuse among undergraduates. *Frontiers in Psychology*, 11.

doi: 10.3389/fpsyg.2020.607866

Xu, X., Demos, K. E., Leahey, T. M., Hart, C. N., Trautvetter, J., Coward, P.,

Middleton, K. R., & Wing, R. R. (2014). Failure to replicate depletion of self-control. *PloS One*, 9(10), 1–5. doi: 10.1371/journal.pone.0109950

Zeffman, H. (2015). No rise in anti-Muslim sentiment in UK after Paris attacks-poll.

*The Guardian*. <https://www.theguardian.com/uk-news/2015/dec/19/no-rise-in-anti-muslim-sentiment-in-uk-after-paris-attacks-poll>

Figure 1

Means of Implicit Bias (Computed for Each Week) over Time

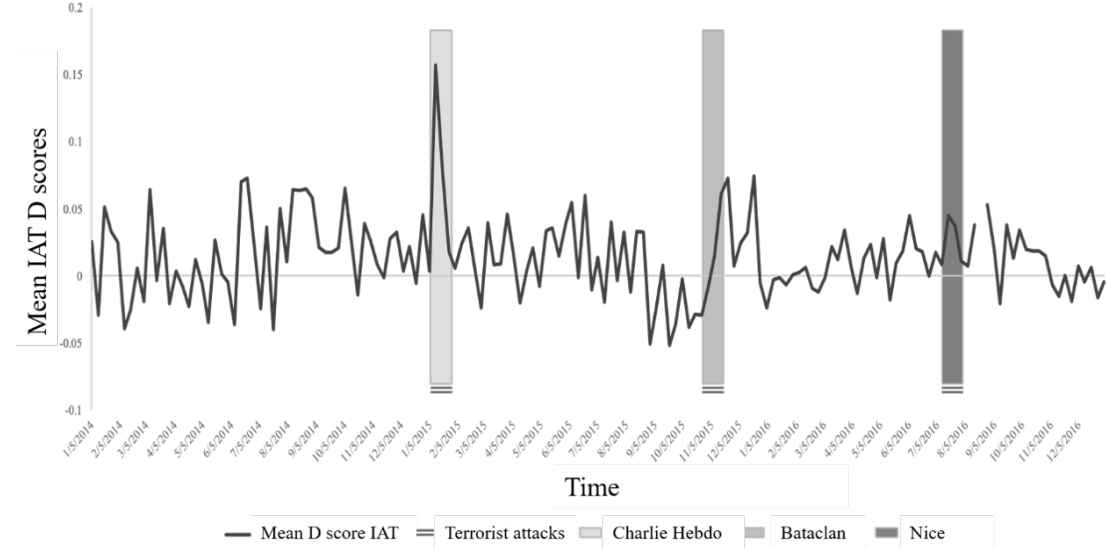
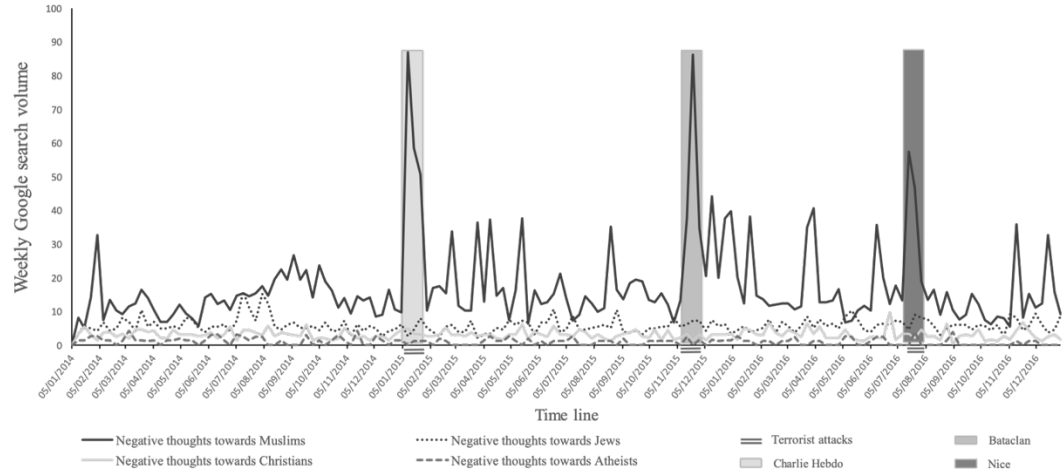


Figure 2

Means of Google Searches (Computed for Each Week) over Time



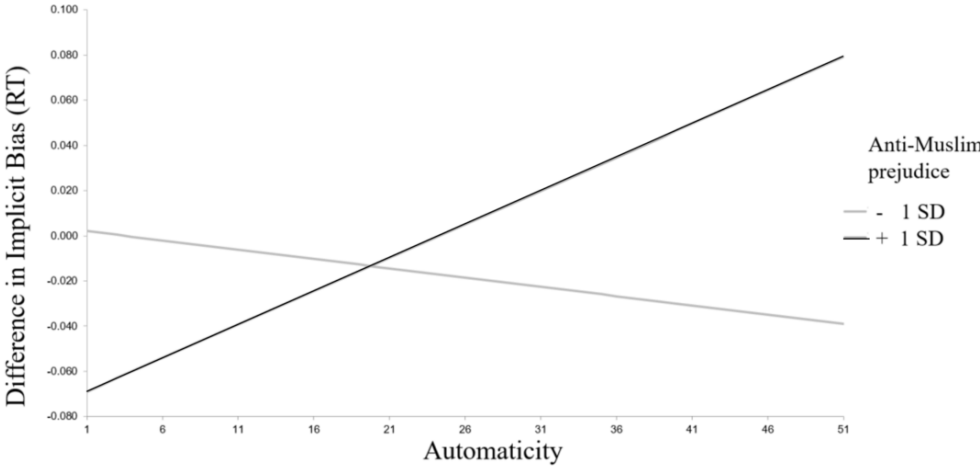
**Figure 3**

*Examples of Caucasian (Top Pattern) and North-African (Bottom Pattern) Targets with a Gun or with a Harmless Object*



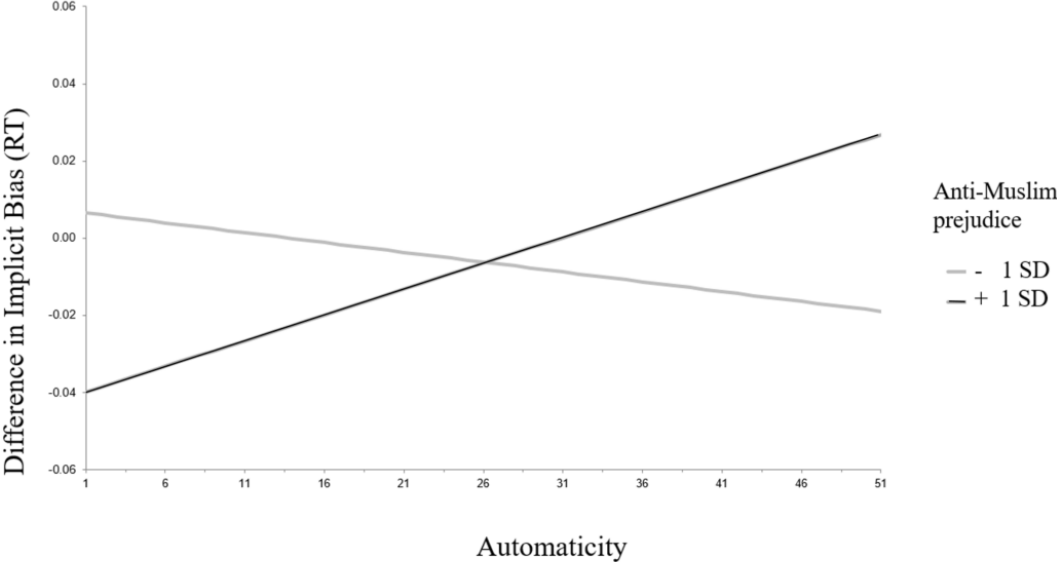
**Figure 4**

*Difference in Implicit Bias in Reaction Times After Recalling the Terrorist Attacks in Study 3*



**Figure 5**

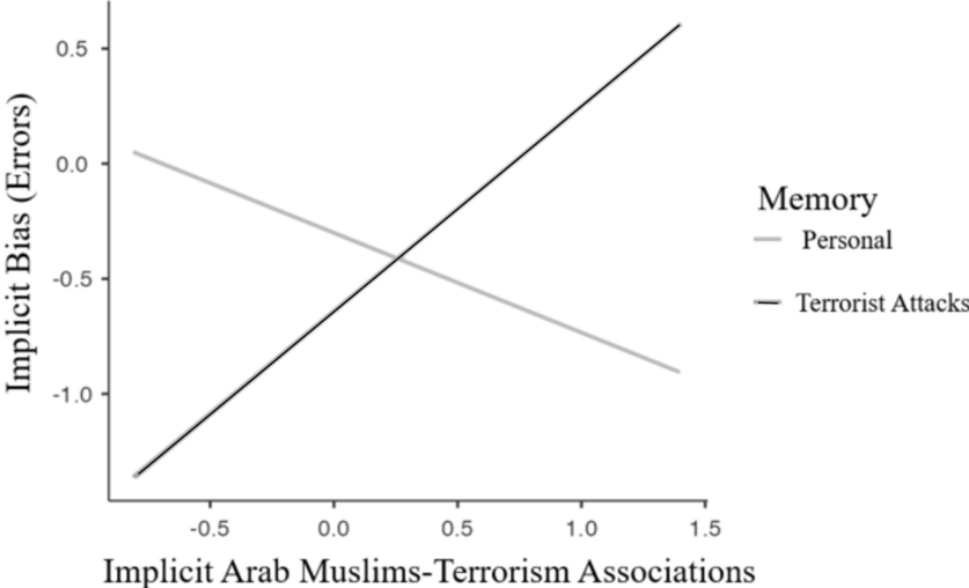
*Difference in Implicit Bias in Reaction times After Recalling the Terrorist Attacks Compared to Personal Memory in Study 4*





**Figure 6**

*Implicit Bias (Errors) in Study 5*



**Figure 7**

*Means Implicit Bias in Reaction times (Left Panel) and Errors (Right Panel) in Study 6*

*Note.* Error bars represent 95% CI.

