

Does International Terrorism affect Public Attitudes toward Refugees? Evidence from a Large-scale Natural Experiment

Online Appendix

Appendix A. Survey data and sample covariate balance

Survey data. The survey data were collected by the public opinion research firm Vox Pop Labs as part of its 2015 Canadian federal election post-election survey, a survey sent to all members of its national online panel. In total, 64,677 respondents completed the post-election survey, of which roughly 30% ($n = 18,763$) received questions regarding Syrian refugees.¹ Because the survey was sent to all members of the research firm's online panel, respondents were not purposefully selected to match the socio-demographic characteristics of the national population. Estimates presented in the Results section are therefore statistically adjusted through regression and survey weighting to match the population's demographic and geographic distribution as indicated by the 2011 national census. Weighting variables include gender, age, education, mother tongue, and region of residence.

Covariate balance. To examine covariate balance, [Table A1](#) presents descriptive statistics for the sample of survey respondents who were invited and responded to the post-election survey less than two days before the November 13, 2015 Paris terrorist attacks and the sample of

¹The size of the survey was the result of the firm's focus on social and political data, and the need to profile respondents for future social and political studies.

Table A1: Balance checks for data collected within 2 days of the Paris terrorist attacks

	Mean ($\mu_{t=0}$) < 2 days before	Mean ($\mu_{t=1}$) < 2 days after	Normalized difference (Δ)
Political ideology (0 = left, 10 = right)	4.13	4.19	-0.03
Female	0.39	0.4	-0.01
Male	0.61	0.6	0.01
Age	49.57	49.97	-0.02
High school or below	0.16	0.14	0.03
College	0.24	0.24	0.01
University degree	0.6	0.62	-0.03
Quebec	0.27	0.26	0.02
West	0.31	0.32	-0.04
Ontario	0.37	0.35	0.03
Atlantic	0.05	0.06	-0.03
English	0.67	0.67	0.01
French	0.16	0.17	-0.02
Other language	0.17	0.16	0.02

This table shows the mean level of pre-treatment covariates (political ideology, gender, age, education, region, mother tongue) from the survey sample collected less than 2 days before the attacks ($n = 1,155$) and that collected less than 2 days after the attacks ($n = 2,465$). The fourth column displays the normalized difference in means between the two samples. Political ideology is an ideological self-placement scale where 0 indicates left-wing and 10 indicates right-wing.

respondents who were invited and responded less than two days afterward. The fourth column displays the normalized difference between the two samples for each covariate (Imbens and Rubin, 2015, 310-313), calculated as follows:

$$\Delta \equiv \frac{\mu_{t=0} - \mu_{t=1}}{\sqrt{(\sigma_{t=0}^2 + \sigma_{t=1}^2)/2}}, \quad (\text{A1})$$

where $\mu_{t=0}$ and $\mu_{t=1}$ denote the sample means calculated from the data collected before ($t = 0$) and after ($t = 1$) the attacks, and $\sigma_{t=0}$ and $\sigma_{t=1}$ denote the respective standard deviations.

As is clear from Table A1, sample characteristics before and after the Paris attacks appear extremely similar across all observed pre-treatment covariates, showing no evidence of mean-

Table A2: Regression results to examine sample composition before and after the Paris attacks

	Response after Paris attacks	
Female	-0.003	(0.076)
Age 30-39	-0.132	(0.130)
Age 40-49	0.023	(0.142)
Age 50-64	-0.095	(0.118)
Age 65+	-0.025	(0.123)
College	0.053	(0.123)
University degree	0.113	(0.108)
Francophone	0.157	(0.157)
Other language	-0.024	(0.137)
Ontario	-0.159	(0.172)
Quebec	-0.289	(0.229)
West	-0.039	(0.174)
Political ideology	0.016	(0.016)
Survey language: French	-0.578**	(0.204)
Intercept	0.964***	(0.208)
N	3,550	

This table presents results from a logistic regression model where the outcome variable indicates inclusion in the sample collected within two days after the Paris attacks (compared to the sample collected within 2 days before the attacks). * $p < .05$; ** $p < .01$; *** $p < .001$

ingful differencess in survey non-response. To test this further, we regress an indicator variable that represents responding to the survey invitation after the attacks on the full set of pre-treatment covariates. As shown in [Table A2](#), none of the model parameters for these covariates significantly differentiate respondents in the pre- and post-attacks samples, providing further evidence that non-response among the random sample of respondents surveyed after the attacks does not meaningfully differ from that of respondents sampled before the attacks.²

²Note that a parameter for the variable `Survey language: French` is included in the regression specification because the proportion of survey invitations to panelists who take surveys in the French language was sampled at a higher frequency in the first wave of the post-election survey by design for reasons unrelated to goal of the refugee questions. The raw

Furthermore, a likelihood ratio test between a model with and without pretreatment covariates does not provide evidence that the covariates jointly differentiate respondents in the pre- and post-attack samples ($p = 0.74$).

We note also that the invitation to the survey referred to it as a post-election study,³ and did not reference either the Paris attacks or refugees. We can therefore plausibly expect that no respondents in the immediate post-attack period would have responded (or not responded) to the survey invitations based on the inclusion of questions regarding refugees. Furthermore, within-survey non-response to the questions regarding refugees is extremely low ($\sim 0.5\%$) and there is no evidence that non-response to the refugee questions varied between the pre- and post-attack periods ($p = 0.57$). In sum, both theoretically, given the construction of the survey, and empirically, given the comparison of observed pretreatment variables, there is a strong case that responding to the survey before and after the attacks is independent of treatment assignment.

Appendix B. Public support for refugee resettlement regression results

For reasons of space, the ordinal regression results provided in Table 2 of the main article do not include parameter estimates for cut points. The full regression result including cut-point estimates is presented in [Table A3](#).

data presented graphically in the main article are weighted by survey language to reflect this.

³As noted in the main article, the survey questions were embedded in a substantially larger post-election study.

Table A3: Support for refugee resettlement ordinal logistic regression results

	Support for resettlement	
	Coef	SE
Paris attacks	-0.301***	(0.070)
Female	0.190**	(0.068)
Age 30-39	-0.215	(0.116)
Age 40-49	0.089	(0.126)
Age 50-64	0.102	(0.105)
Age 65+	-0.026	(0.109)
College	-0.197	(0.108)
University degree	0.435***	(0.097)
Francophone	-0.263*	(0.122)
Other language	-0.292**	(0.110)
Ontario	-0.537***	(0.160)
Quebec	-0.918***	(0.180)
West	-0.539***	(0.161)
Political ideology	-0.384***	(0.016)
κ_1	-5.260***	(0.219)
κ_2	-4.549***	(0.213)
κ_3	-4.079***	(0.210)
κ_4	-3.227***	(0.206)
κ_5	-2.006***	(0.201)
N	3,531	

κ denote cut-point parameter estimates. * p < .05; ** p < .01; *** p < .001

Appendix C. Economic threat

For completeness, we now also examine the effect of the attacks on perceptions of Syrian refugees as an economic threat. We expect that the attacks will have little, if any, effect on the public's perceptions of refugees as a threat to the economy. Theoretically, it is unlikely that large-scale terrorist attacks would provide a meaningful signal to the public concerning the threat to the domestic economy posed by refugee resettlement. If terrorism does increase negative attitudes toward refugees overall, however, the attacks may also affect evaluations of any threat concerning refugees more generally, regardless of their type. To investigate this, we examine

the economic threat index concerning Syrian refugee resettlement, and, for comparison, two retrospective indicators of economic evaluations unrelated to refugee resettlement, which should not be affected by the attacks otherwise. The latter indicators are questions regarding (1) evaluations of respondents' personal financial circumstances over the past year (worse, same, better), and (2) evaluations of the national economy in the past year (worse, same, better) (for complete question text, see Appendix E).

The raw data for the economic threat index is presented graphically in [Figure A1](#) and those for the retrospective national economic and personal financial evaluations are presented in [Figure A2](#). As [Figure A1](#) shows, there appears to be a slight increase in perceptions of Syrian refugee resettlement as a threat to the economy. However, as shown in Table 1 of the main article, the difference in economic threat perceptions between the immediate pre- and post-attack period is not statistically significant. The absence of statistical significance does not, of course, mean that the attacks did not affect perceptions of refugees as an economic threat. However, the estimated magnitude of this effect in standardized units ($\beta = 0.08$) is, as one would expect, substantially smaller than that of anxiety ($\beta = 0.27$), and security ($\beta = 0.39$) and cultural threat ($\beta = 0.19$) (cf. Figures 1 and 2 in main article). Similar to the other indexes, the economic threat index appears to decline, if slightly, to the pre-attack baseline within roughly a week of the attacks.

By comparison, the two retrospective economic indicators show no meaningful difference between the immediate pre- and post-attack period ($p = 0.74$; $p = 0.13$) and demonstrate no clear pattern that would be consistent with an effect that decays in response to the attacks similar to the indicators theoretically related to Syrian refugee resettlement. Although there is more variability in retrospective evaluations of the economy in the weeks after the attacks, we can expect this as a response to economic or related news as a basis for comparison to the previous year's economy.

Figure A1: Economic threat index across time

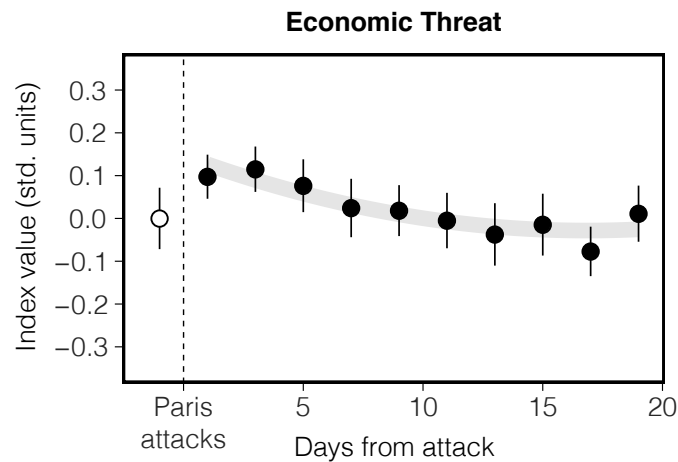
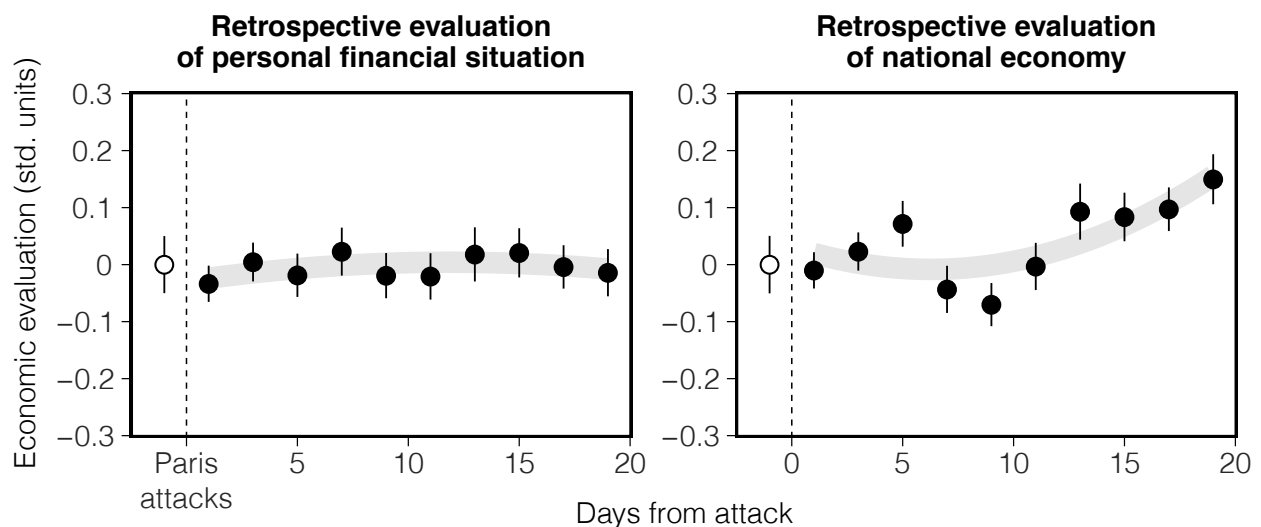


Figure A2: Retrospective economic evaluations across time



Appendix D. Causal mediation sensitivity analysis

The validity of estimates of average causal mediation effects relies on the sequential ignorability assumption (see [Imai, Keele, and Yamamoto, 2010](#); [Imai et al., 2011](#)). This assumption states that (1) the potential outcomes of the mediator and of the outcome are independent of treatment status conditional on pre-treatment covariates, and (2) the potential outcome of the outcome is independent of the observed mediator, conditional on treatment assignment and

pre-treatment covariates.⁴

Although the first assumption holds when treatment assignment is randomized (or is plausibly assigned as-if randomly as in a natural experiment), the second assumption cannot be tested with observed data. Imai, Keele, and Yamamoto (2010, 60-62) therefore propose a sensitivity analysis procedure to quantify the robustness of average causal mediation effect estimates to the presence of an unobserved pre-treatment confounder. The procedure allows researchers to test the degree to which the sequential ignorability assumption must be violated before the average causal mechanism effect estimate would be zero.

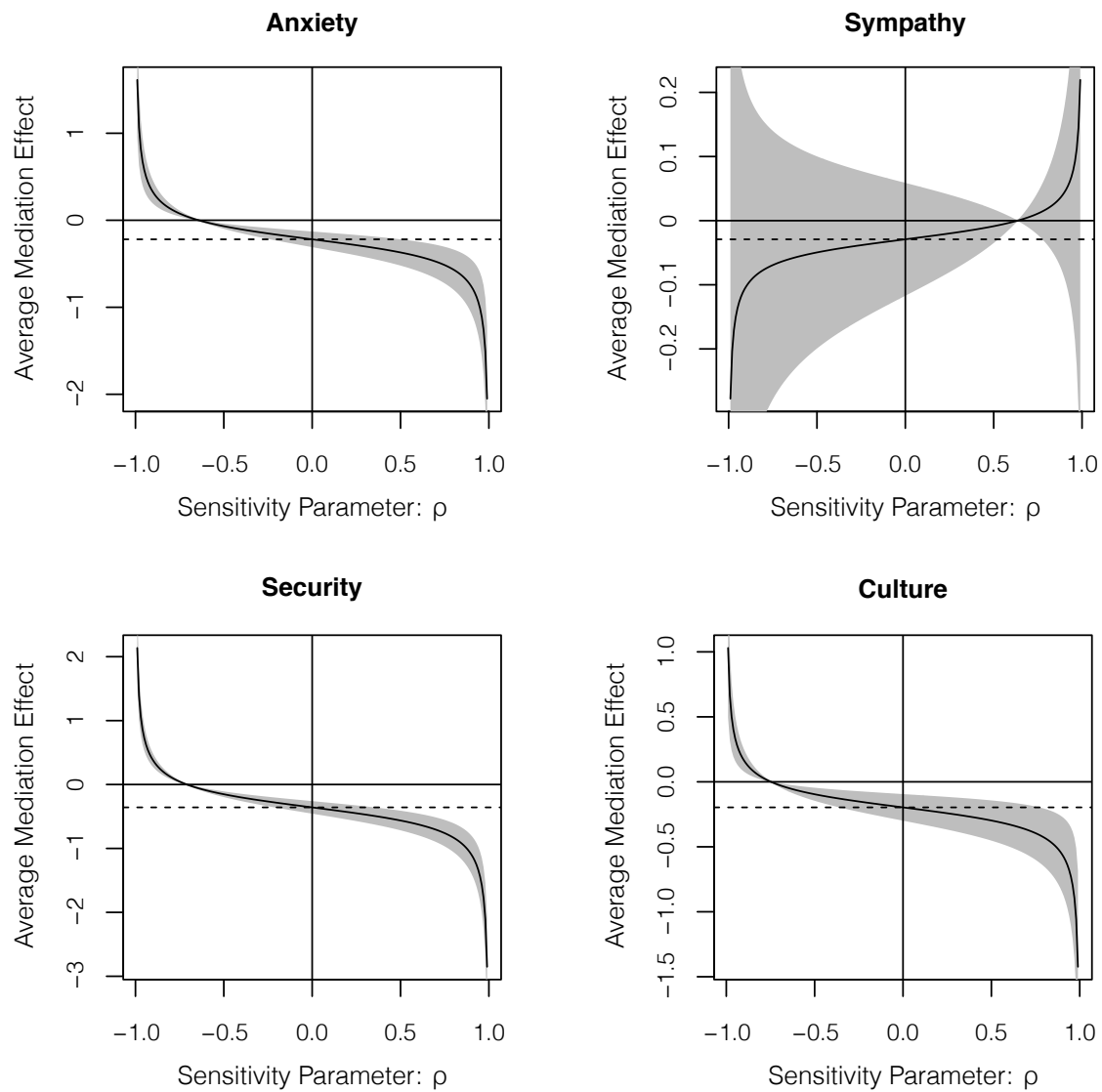
To examine the robustness of our causal mechanism results to an unobserved pre-treatment confounder, we apply this sensitivity analysis procedure to each causal mechanism examined in the article.⁵ Results from this procedure are shown in Figure A3. Each panel presents estimates of the average casual mediation effect in the presence of a confounder that is correlated with the mediator at levels of correlation ρ from -1 to 1 . As the figures shows, the average causal mediation effect estimates for anxiety, security, and culture are each robust to the presence of a strong confounder. In each case, the effects are reversed only when an unobserved confounder is very highly correlated with each mediator of interest: $\rho^{(anxiety)} = -0.64$, $\rho^{(security)} = -0.71$, and $\rho^{(culture)} = -0.75$. In sum, each of the average causal mechanism effect estimates appears highly robust to the presence of unobserved pre-treatment confounders.

A second potential concern is post-treatment confounding, which in applied work is typically left unexamined, but which we account for explicitly in estimating the average causal

⁴Note that these conditional independence assumptions rely on there not being any *post-treatment* confounders.

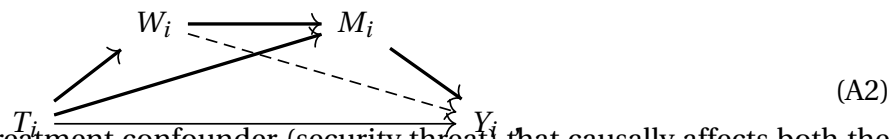
⁵Sensitivity analysis results were generated using the library `mediation` (Tingley et al., 2014) in the statistical package **R** (R Core Team, 2017). Note that sensitivity analysis in the `mediation` package is conducted in a linear model framework, whereas average causal mediation effect estimates presented in the article use an ordinal outcome model to permit estimates to be presented in terms of percentage points.

Figure A3: Sensitivity analysis for sequential ignorability assumption



mediation effect for cultural threat. Theoretically, cultural threat is expected to be causally affected by individuals' perceptions of refugees as a security threat, which itself is affected by

the Paris terrorist attacks.⁶ Post-treatment confounding can be shown diagrammatically as follows (as noted in fn. 28 in the main article):



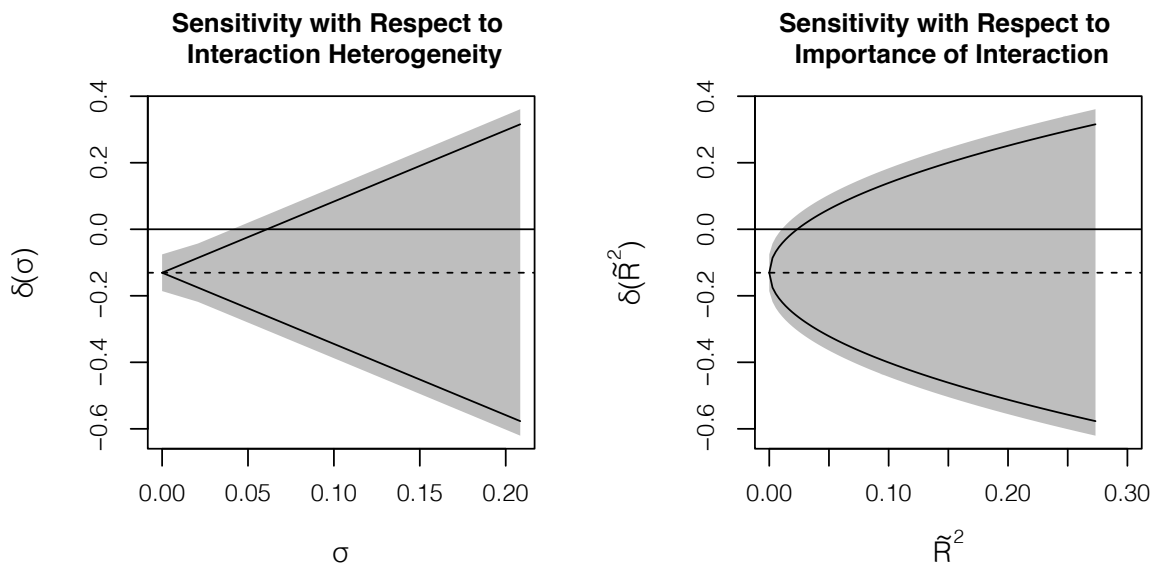
where W_i denotes a post-treatment confounder (security threat) that causally affects both the mediator of interest M_i (cultural threat) and the outcome Y_i (support for refugee resettlement).

Accounting for security as a post-treatment confounder for cultural threat requires assumptions additional to those for identifying the average causal mechanism effect without such confounding. The key untestable assumption is the homogeneous interaction assumption, which states that the interaction between the primary mediator and the treatment is constant across all individuals. In other words, although the magnitude of the relationship between the mediator and outcome can flexibly depend on treatment assignment, the interaction effect is assumed to be constant across all individuals. For further details regarding accounting for post-treatment confounding, see [Imai, Tingley, and Yamamoto \(2013\)](#).

Although violations of the homogeneous interaction assumption are not empirically testable, [Imai, Tingley, and Yamamoto \(2013\)](#) propose a sensitivity analysis procedure to permit researchers to examine how the average causal mediation effect changes with levels of heterogeneity in the treatment-mediator interaction. In this procedure, the sensitivity parameter ρ represents the standard deviation of the individual-level treatment-mediator interaction. Because interpretation of ρ is not necessarily intuitive, [Imai, Tingley, and Yamamoto \(2013\)](#) also allow the sensitivity analysis to be understood through a second parameter, \tilde{R}^2 , which represents the proportion of variation in the outcome that would be explained by allowing for

⁶As we note in the article, we remain agnostic as to whether anxiety may be also be a post-treatment confounder for threat, and vice versa. However, because the measure of anxiety and security threat were collected in two independent sub-samples of the survey, we cannot examine the causal mediation effects of each while accounting for the other as a possible post-treatment confounder.

Figure A4: Sensitivity analysis for homogeneous interaction assumption for cultural threat index



heterogeneity in the interaction term.

Results from this procedure are presented in Figure A4. As the left panel of Figure A4 shows, the bounds on the average causal mediation effect estimate contain zero when $\rho = 0.0625$. This translates to only 2.5% (\tilde{R}^2) of the variation in the outcome (second panel of Figure A4) needing to be explained by heterogeneity in the interaction term before the bounds on the estimate contain zero. The estimate for the cultural threat mechanism is, in other words, fragile to violations of the no-interaction assumption and should therefore be treated cautiously.

Appendix E. Causal mediation outcome regression models

Table 2 in the main article provides coefficients and standard errors for the fitted first-stage model for the causal mechanisms results. In Table A4, we provide the second-stage results. Each model is an ordinal regression model where the outcome is support for refugee resettlement. Each model is specified with a set of pre-treatment control variables as well the causal

Table A4: Second-stage causal mechanism regression models

	Support for refugee resettlement			
	Anxiety (1)	Sympathy (2)	Security (3)	Culture (4)
Index	-1.495*** (0.061)	1.797*** (0.072)	-1.751*** (0.061)	-2.283*** (0.075)
Paris attacks	0.112 (0.110)	-0.323** (0.112)	0.155 (0.105)	-0.141 (0.108)
Female	0.363*** (0.109)	-0.208 (0.111)	0.280** (0.102)	-0.004 (0.105)
Age 30-39	-0.030 (0.175)	-0.005 (0.183)	-0.055 (0.178)	-0.236 (0.183)
Age 40-49	0.046 (0.190)	-0.364 (0.199)	0.144 (0.191)	0.063 (0.199)
Age 50-64	0.390* (0.163)	-0.085 (0.168)	0.180 (0.159)	0.207 (0.164)
Age 65+	0.324 (0.168)	-0.255 (0.173)	0.180 (0.167)	0.069 (0.170)
College	-0.163 (0.168)	-0.165 (0.171)	-0.009 (0.160)	-0.093 (0.165)
University degree	0.398** (0.149)	0.315* (0.152)	0.257 (0.142)	0.214 (0.147)
Francophone	-0.327 (0.184)	-0.370 (0.190)	-0.255 (0.191)	-0.233 (0.198)
Other language	-0.284 (0.173)	-0.121 (0.177)	-0.419* (0.166)	-0.393* (0.172)
Ontario	-0.687* (0.296)	-0.555 (0.291)	-0.529* (0.221)	-0.205 (0.229)
Quebec	-1.200*** (0.319)	-0.617 (0.317)	-0.913*** (0.258)	-0.491 (0.267)
West	-0.727* (0.296)	-0.470 (0.292)	-0.692** (0.222)	-0.251 (0.231)
Political ideology	-0.177*** (0.025)	-0.260*** (0.025)	-0.183*** (0.024)	-0.216*** (0.025)
κ_1	-5.769*** (0.378)	-6.563*** (0.386)	-6.265*** (0.336)	-6.869*** (0.356)
κ_2	-4.675*** (0.363)	-5.453*** (0.370)	-5.132*** (0.320)	-5.550*** (0.336)
κ_3	-4.115*** (0.357)	-4.871*** (0.362)	-4.178*** (0.311)	-4.450*** (0.325)
κ_4	-2.953*** (0.348)	-3.728*** (0.351)	-2.467*** (0.299)	-2.587*** (0.311)
κ_5	-1.097** (0.340)	-1.832*** (0.340)	-0.630* (0.292)	-0.588 (0.303)
N	1,661	1,661	1,795	1,797

Ordinal logistic regression models. κ denote cut-point parameters.* $p < .05$; ** $p < .01$; *** $p < .001$

mechanism of interest.

Appendix F. Survey question text

Below we present the wording for each question analyzed in the article.

Received by all respondents:

The Canadian government is currently considering whether to admit more refugees from Syria. Many of these refugees are [(blank), Muslims, Christians] fleeing from the civil war.

Received by respondents in the threat branch of the survey (security, values/integration, and economic threat):

Imagine that these [(blank), Muslim, Christian] refugees are permitted to settle in your own community. To what extent would you agree or disagree with the following:

- Their presence would be economically costly
- They would help grow the economy
- They would increase competition for jobs

Answer categories:

Strong disagree, Somewhat disagree, Slightly disagree, Slightly agree, Somewhat agree, Strongly agree

Imagine that these [(blank), Muslim, Christian] refugees are

permitted to settle in your own community. To what extent would you agree or disagree with the following:

- They would fit well into Canadian society
- Their values would conflict with those of Canadians
- They would enrich our culture

Answer categories:

Strong disagree, Somewhat disagree, Slightly disagree, Slightly agree, Somewhat agree, Strongly agree

Imagine that these [(blank), Muslim, Christian] refugees are permitted to settle in your own community. To what extent would you agree or disagree with the following:

- Their presence would pose a threat to national security
- Their presence would lead me to fear for my safety
- Some would have links to terrorism

Answer categories:

Strong disagree, Somewhat disagree, Slightly disagree, Slightly agree, Somewhat agree, Strongly agree

Received by respondents in the emotion branch of the survey (anxiety and sympathy):

Imagine now that these [(blank), Muslim, Christian] refugees are permitted to settle in your own community. To what degree do you feel the following toward them:

- Sympathy
- Indifference
- Compassion
- Sadness
- Distress

Answer categories:

0 (None at all), 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (A great deal)

When you think about these [(blank), Muslim, Christian] refugees settling in your community, to what degree do you feel the following:

- Anxiety
- Pride
- Upset
- Worry
- Anger
- Hope
- Fear

Answer categories:

0 (None at all), 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (A great deal)

Received by all respondents:

If it were up to you, would you agree or disagree that these [(blank), Muslim, Christian] refugees should be permitted to

settle in [Canada / your own community]?

Answer categories:

Strong disagree, Somewhat disagree, Slightly disagree, Slightly agree, Somewhat agree, Strongly agree

Would you consider contacting your Member of Parliament regarding this issue?

Answer categories:

No, Yes

If these [(blank), Muslim, Christian] refugees were permitted to settle in your own community, would you be willing to donate to a program that would help them integrate?

Answer categories:

No, Yes

Questions regarding national economy and personal financial circumstances

Over the past 12 months, do you think Canada's economy has become worse, better, or stayed about the same?

Answer categories:

Worse, Stayed about the same, Better

Over the past 12 months, has your own economic situation and that of your family become better, worse, or stayed about the same?

Answer categories:

Worse, Stayed about the same, Better

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