

Supplement for Kiper, “Remembering the causes of collective violence and the role of propaganda in the Yugoslav Wars”

1. Principal Components Analysis

A principal components analysis (PCA) was conducted on the 11 items with oblique rotation (oblimin). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis KMO = .77 (‘good’ according to Kaiser, 1974), and all KMO values for individual items were > .64, which is just above the acceptable limit of .5. Bartlett’s test of sphericity, $\chi^2 (55) = 2,263$, $p > .001$, indicated that correlations between items from the entire set of data were sufficient for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Four components had eigenvalues over Kaiser’s criterion of 1 and in combination explained 66% of the variance. The scree plot was slightly ambiguous and showed inflexions that would justify retaining four components. Given the large sample size, and the convergence of the scree plot and Kaiser’s criterion, four components were retained in the final analysis. Table A1 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents propaganda in war, component 2 the social pressures experienced in war, component 3 the unresolved history of ethnic violence, and component 4 represents violence as a byproduct of self-defense.

Table A1. Summary of exploratory factor analysis results for the R collective violence questionnaire (n = 780)

Item*	Oblique rotated factor loadings			
	Propaganda	Social pressures experienced in war	Ethnic fears and hatreds	Violence as byproduct of self-defense
Legacies of past violence	-.12	.07	.84	.10
Ethnic hatred	.19	-.09	.84	-.11
Controlled news media	.70		.17	-.10
Perturbations of economic decline	.07	.71		-.31
National leaders justified violence	.85	.07		
Hate speeches by political leaders	.90	-.04		.03
Rumors about neighboring populations	.67	.15	-.07	.19
Coercion by peers.	.15	.76	-.12	
Desire to take revenge	-.05	.54	.22	.48
Self-defense against aggressors	.08	-.09		.88
Religious justifications		.51	.31	.03
Eigenvalues	2.64	1.77	1.65	1.19
% of variance	24%	16%	15%	11%

Note: Factor loadings over .50 appear in bold.
*Items abbreviated based on survey instrument.

2. Binary Logistic Regression Models Accounting for Cause of Collective Violence

2.1 Notes on Binary Logistic Regression

Binary logistic regression is a statistical method to predict membership characteristics of two populations by estimating the probability that a characteristic is present given the values of explanatory variables. For this study, multiple variables pertaining to a single categorical variable, $\pi = Pr(Y = 1 | X = x)$, were used to determine which collective violence variables were statistically significant and predictive for two populations within each country: former combatants and the greater population. This approach is consistent with other studies seeking to understand the effects of variables on two populations represented by a categorical variable.

For instance, suppose an epidemiologist is interested in estimating which risk factors matter for juveniles who either develop or do not develop diabetes in a given population. These sections of the population do not have the same probability of becoming diabetic. The same is true here for identified causes of collective violence for former combatants and the greater population.

Here, consider the predictor variable X to be any of the risk factors that are likely to contribute to the disease. Probability of success will depend on levels of the risk factor effecting an individual in the population.

Variables:

Let Y be a binary response variable

$Y_i = 1$ if the trait is present in observation (person, unit, etc...) i

$Y_i = 0$ if the trait is NOT present in observation i

$X = (X_1, X_2, \dots, X_k)$ be a set of explanatory variables which can be discrete, continuous, or a combination. x_i is the observed value of the explanatory variables for observation i . In this section of the notes, we focus on a single variable X .

Model:

$$\pi_i = Pr(Y_i = 1 | X_i = x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1 + \exp(\beta_0 + \beta_1 x_i)}$$

$$\text{logit}(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_1 x_i = \beta_0 + \beta_1 x_{i1} + \dots + \beta_k x_{ik}$$

As such, binary logistic regression assumes that data Y_1, Y_2, \dots, Y_n are independently distributed; that the distribution of Y_i is a binomial distribution; that the dependent variable does not need to be normally distributed; that the relationship between the dependence and independent variable need not be linear; that the homogeneity of variance is unnecessary; and uses the maximum likelihood estimation (MLE) rather than the ordinary least squares (OLS) method to estimate the parameters.

For measuring goodness of fit, the model uses the Pearson chi-square statistic, X^2 , measures deviance, G^2 and likelihood ratio test and statistic, ΔG^2 and test and statistic. Residual analysis is done using Pearson, and the maximum likelihood estimator for (β_0, β_1) is obtained by finding $(\hat{\beta}_0, \hat{\beta}_1)$ that maximizes:

$$L(\beta_0, \beta_1) = \prod_{i=1}^n \pi_i^{y_i} (1 - \pi_i)^{n_i - y_i} = \prod_{i=1}^n \exp\{y_i(\beta_0 + \beta_1 x_i)\} / (1 + \exp(\beta_0 + \beta_1 x_i))$$

The parameter estimates are determined by:

$\exp(\beta_0)$ = the odds that the characteristic is present in an observation i when $X_i = 0$, i.e., at baseline.

$\exp(\beta_1)$ = for every unit increase in X_{i1} , the odds that the characteristic is present is multiplied by $\exp(\beta_1)$.

The above is similar to simple linear regression but instead of aggregated change, it is a multiplicative change rate. This is an estimated *odds ratio*.

$$\exp(\beta_0 + \beta_1(x_{i1} + 1)) / \exp(\beta_0 + \beta_1 x_{i1}) = \exp(\beta_1)$$

The logistic model specifies that the effect of a covariate on the chance of "success" is linear on the log-odds scale, or multiplicative on the odds scale.

If $\beta_j > 0$, then $\exp(\beta_j) > 1$, and the odds increase.

If $\beta_j < 0$, then $\exp(\beta_j) < 1$, and the odds decrease.

Finally, inference for logistic regression are confidence intervals for parameters, hypothesis testing, and distribution of probability estimates (see Field, 2013; The Pennsylvania State University, 2018).

2.2. Logistic Regression Models Accounting for Causes of Collective Violence

Prior accounts on collective violence (Kiper, 2018) were reanalyzed using logistic regression in both SPSS and R, resulting in corrected models that estimated the effects and accuracy of the perceived causes of collective violence for former combatants.

2.2.1 Binary logistic regression model accounting for regional characteristics of former combatants

In table 2 of the main text, the binary logistic regression included demographics and the four principal factors, and used the combination of $\Delta AICs$, variance, and parsimony to infer the most predictive model. Based on these methods, model 2 removed self-reported memory, while model 3 removed the effects of the unresolved history of ethnic violence and model 4 removed social pressures experienced in war. I then examined the $\Delta AICs$ (Mazerolle) to determine the target model. The evidence ratio $\exp([AIC_{c2} - AIC_{cmin}]/2)$ for the $\Delta AICc$ between model 1 and 2 was 2.37, indicating that model 2 was 2.37 times stronger than model 1 at minimizing

information. The evidence ratio between model 1 and 3 was 6.06, and models 1 and 4 had an evidence ratio of 11.92. Accordingly, model 4 best accounted for participants' views and total variance (Nagelkerke R2 = 0.39).

2.2.2 Binary logistic regression models accounting for former combatants' views of collective violence

Using the same methods for determining regional factors, the models outlined in table 3 of the main text were inferred from the following information:

For Bosnia, model 3 had the lowest AICc score. Based on the evidence ratio, it was 2.77 times stronger than model 1. Models 2 to 4 were backward-selected to retain those variables with the greatest effect. Model 3 was 28.04 times stronger than model 2 and 23.84 times stronger than model 4. Model 3 also explained the greatest amount of variance (Nagelkerke R2 = 0.15).

For Croatia, model 3 had the lowest AICc score, despite a lower variance (Nagelkerke R2 = 0.14) than models 1 and 2. While model 2 was 2.99 times stronger than model 1, model 3 was 51.63 times stronger than model 2 and 2.15 times stronger than model 4.

For Serbia, the evidence ratio indicated that model 2 was 3 times stronger than model 1, while model 3 was 12.61 times stronger than model 2, and model 4, in turn, was 1.69 times stronger than model 3. Model 4 also had the lowest AICc score and highest variance (Nagelkerke R2 = 0.19).

The following are the final models for each country sample:

Bosnia Herzegovina

Causes of mass violence	B(SE)	Sig.	95% CI for Odds Ratio		
			Lower	Exp.(B)	Upper
Intercept	0.878(0.838)	0.294		2.407	
Coercion by peers	0.412(0.148)**	0.005	0.127	1.509	0.708
Perturbations of economic decline	-0.415(0.133)**	0.002	-0.683	0.660	-0.159
Religious justifications	-0.305(0.131)*	0.019	-0.567	0.737	-0.053
Hate speeches by political leaders	-0.431(0.139)**	0.002	-0.713	0.650	-0.166

Croatia

Causes of mass violence	B(SE)	Sig.	95% CI for Odds Ratio		
			Lower	Exp.(B)	Upper
Intercept	-0.066(0.683)	0.923		0.936	
Legacies of past violence	0.395(0.135)**	0.003	0.136	1.485	0.668
Desire to take revenge	-0.427(0.137)**	0.002	-0.705	0.652	-0.164
Self-defense against aggressors	0.265(0.141)*	0.060	-0.008	1.304	-0.547
Religious justifications	-0.329(0.131)**	0.012	-0.590	0.720	-0.074

Serbia

Causes of mass violence	B(SE)	Sig.	95% CI for Odds Ratio		
			Lower	Exp.(B)	Upper

Intercept	1.092(0.769)	0.923		2.980	
Controlled news media	-0.483(0.156)**	0.002	-0.797	0.617	-0.185
Rumors about neighboring populations	0.582(0.168)**	0.06	0.262	1.790	0.923
Desire to take revenge	0.378(0.145)**	0.01	0.098	1.459	0.670
Religious justifications	-0.555(0.144)**	0.001	-0.845	0.574	-0.278

* $P \leq .05$

** $P \leq .01$

3. Interview notes

In total I interviewed 168 participants but decided to remove 29 from analysis because they were interviews in which the participant asked not to be audio recorded, resulting in hand-written notes that were more ambiguous and otherwise not as easily coded as other interviews. Several of these were also excluded because the participants were also too young to remember personal experiences in the wars or the participant lived in conditions far removed from the wars. Of the 139 interviews considered here, 78 were audio recorded while 61 were handwritten notes.

The two main interview questions were “If you had to identify the main cause of the wars, what would it be?” and “If you had to identify the main cause of collective violence, what would it be?” In BCS they were respectively, “Ako ste imali identificirati glavni uzrok ratova, što bi to bilo?” and “Ako ste imali identificirati glavni uzrok kolektivnog nasilja, što bi to bilo?” The central focus here was on the latter question, since it concerned crimes against humanity as understood by most participants and followed participants’ discussions about the wars.

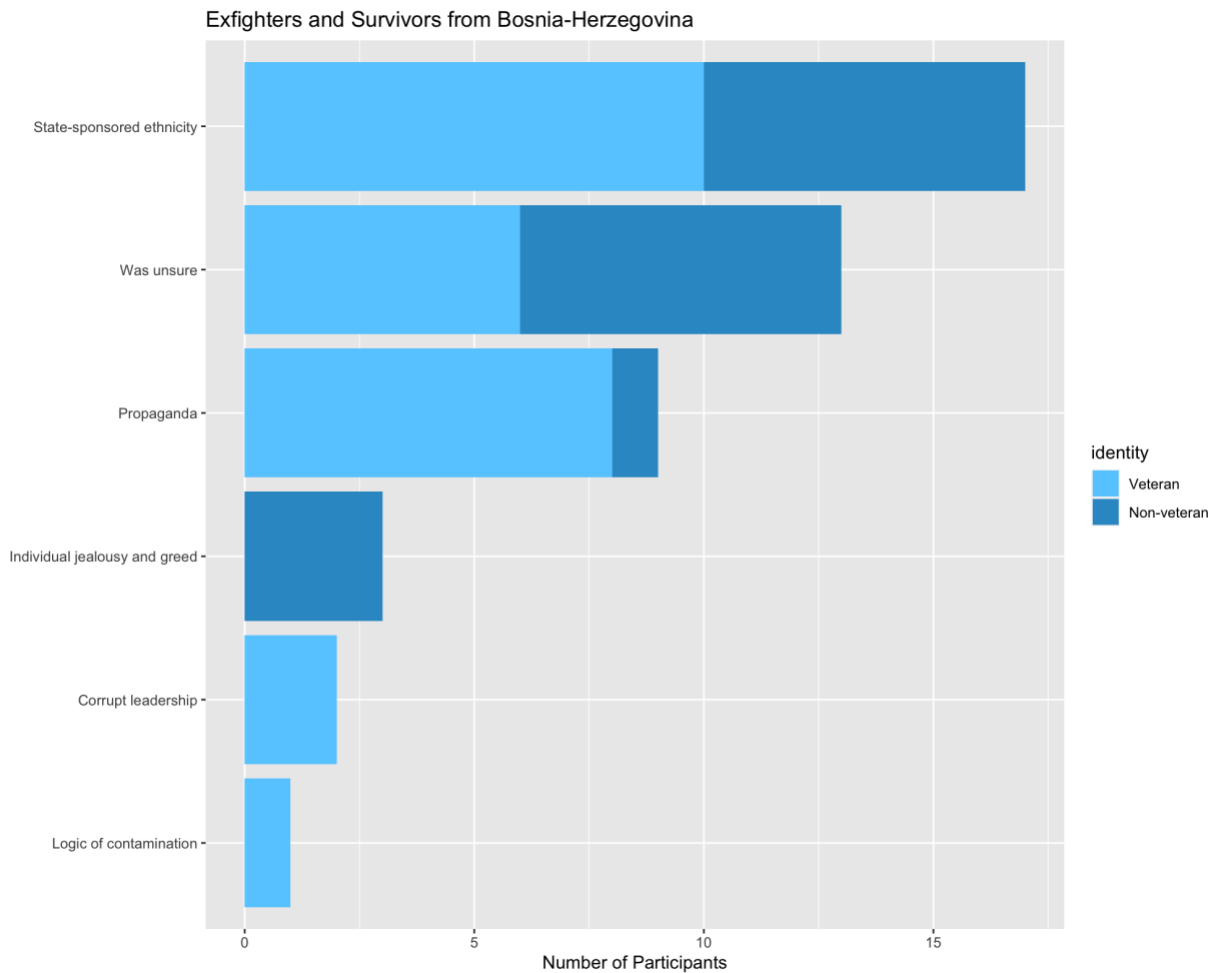
While grounded theory was used to analyze interview data, transcripts were reanalyzed after the original analysis (Kiper, 2018) to ensure consistency. Secondary analyses included attributions of an international conspiracy in 9 Serbian interviews. In addition, multiple imputation (MICE) was used to replace missing interview data for age with the mean value of interviewees.

3.1. Country-Specific Interview Results for Reported Cause of Collective Violence

I include here interview results regarding the main cause of collective violence as reported by participants in each country. As with the model included in the report, each figure depicts the eight most commonly cited causes. The magnitude of each bar represents the numerical count of former combatants and survivors (by color). Information conveyed in each figure includes information detailed in Table 5 of the report.

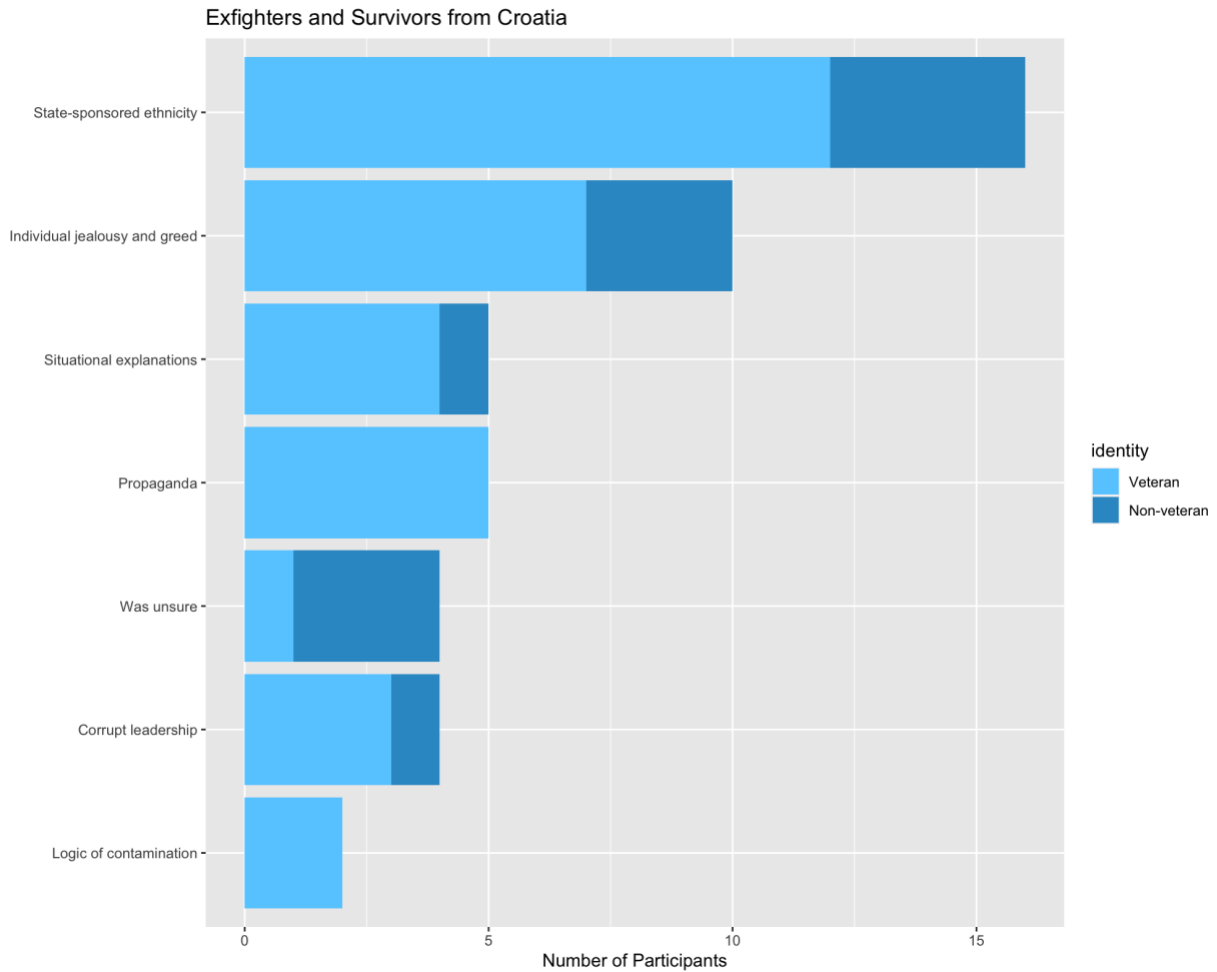
For Bosnians (Figure 3.1.1), 10 former combatants and 7 survivors said collective violence was caused by ethnoreligious nationalism, while 6 former combatants and 7 survivors expressed uncertainty about the main cause, and 8 former combatants and 1 survivor identified wartime propaganda. In addition, 3 survivors reported that collective violence was caused by the material incentives of war, while 2 former combatants blamed corrupt leadership explicitly and 1 survivor blamed violence cadres.

Figure 3.1.1. Main cause of collective violence identified in Bosnian interviews



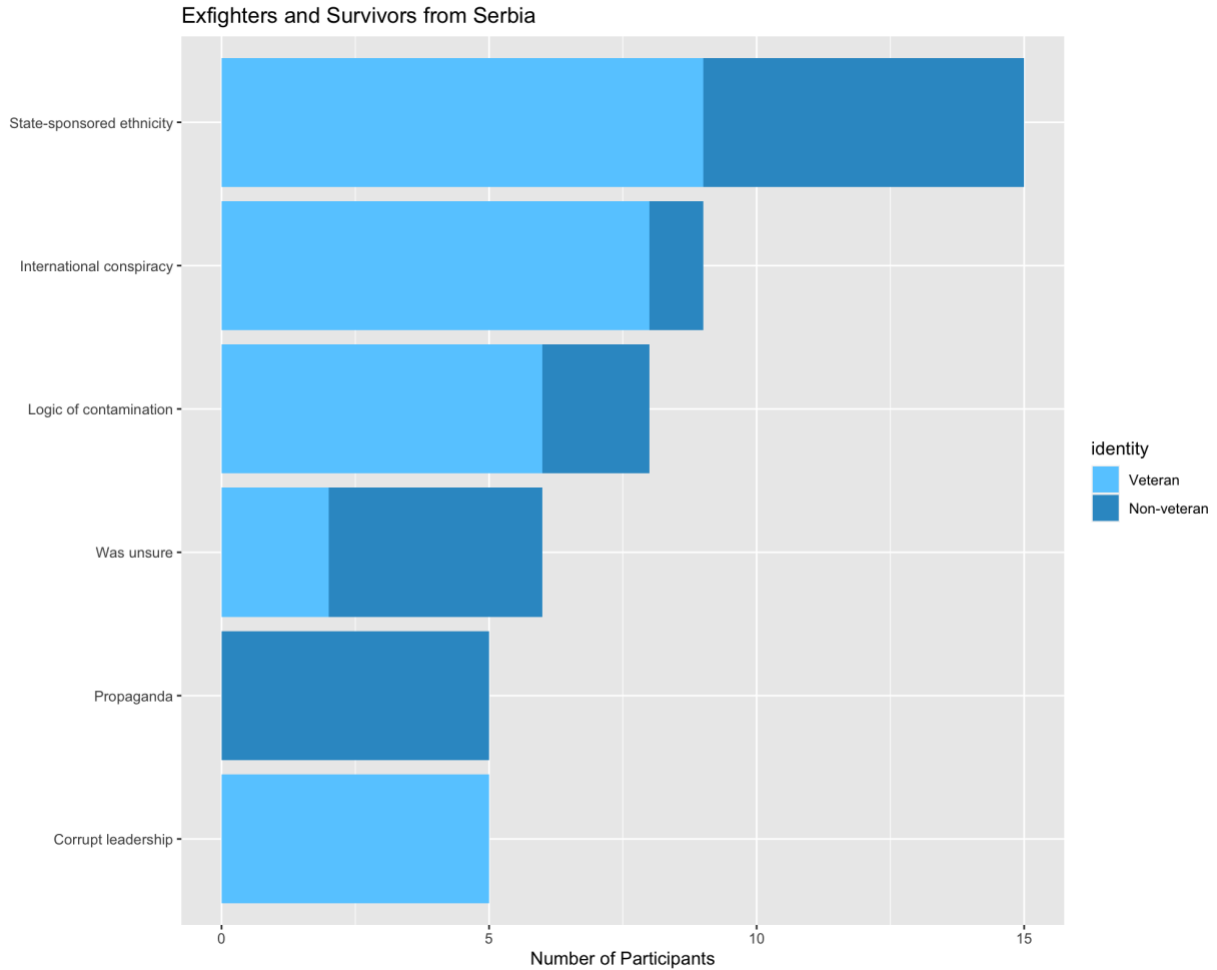
For Croats (Figure 3.1.2), 12 former combatants and 4 survivors identified ethnoreligious nationalism as the main cause of collective violence, while 7 former combatants and 3 survivors focused on material incentives in war. Moreover, 5 former combatants said wartime propaganda was to blame, while 4 former combatants and 1 survivor said collective panic, and 3 former combatants and 1 survivor blamed corrupt leadership. Finally, 1 former combatant and 3 survivors were unsure about what caused collective violence, while 2 former combatants said it was caused by violence cadres.

3.1.2. Main cause of collective violence identified in Croatian Interviews



For Serbs (Figure 3.1.3), 9 former combatants and 6 survivors identified ethnoreligious nationalism as the main cause of collective violence, while 8 former combatants and 1 survivor blamed collective violence on an international conspiracy, and 6 former combatants and 2 survivors said violence cadres were to blame. Further, 2 former combatants and 4 survivors expressed uncertainty about the cause of collective violence, while 5 survivors identified wartime propaganda, and 5 former combatants blamed corrupt leadership.

Figure 3.1.3. Main cause of collective violence identified in Serbian Interviews



4. Religiosity Variables

The following are scale questions used in the present study for assessing religiosity, as adapted from scales such as Koenig and Büssing (2010).

How strongly do you affiliate with your religion?

- 5) Very strongly
- 4) Strongly
- 3) Somewhat
- 2) Not strongly
- 1) Not very strongly

How much of an influence would you say that religion has on your life each day?

- 5) Very strong influence
- 4) Strong influence
- 3) Some influence
- 2) Little influence

- 1) No influence

How often do you engage in religious ritual?

- 5) Very often
- 4) Often
- 3) Sometimes
- 2) Not very often
- 1) Never

How often do you attend religious services?

- 5) Very often
- 4) Often
- 3) Sometimes
- 2) Not very often
- 1) Never

5. Self-Reported Memory Variables

The following are scale questions used in the present study for self-reported memory, which was adapted from scales used by Gilweski, Zelenski, and Schaie (1990).

After I read a novel or newspaper, I sometimes forget the facts after a few days.

- 5) Strongly agree
- 4) Agree
- 3) Neither agree nor disagree
- 2) Disagree
- 1) Strongly disagree

Recalling specific details about events is sometimes difficult for me.

- 5) Strongly agree
- 4) Agree
- 3) Neither agree nor disagree
- 2) Disagree
- 1) Strongly disagree

6. Country Details

The landscapes and economies of these countries are notably diverse. The northwestern-most country of Croatia is hilly and mountainous along its western coast but includes flat plains in its northern regions. By contrast, the most central-most country of Bosnia-Herzegovina is split between forested mountains in the north and arid mountains in the south. Serbia is also mountainous along its western border but is flat in the northern plains of Vojvodina. Each

country's economy is developed but varies significantly, ranging from the relative prosperity of the European Union (EU) nation of Croatia to the moderately developed and service-based economies of Bosnia-Herzegovina and Serbia. While each country's metropolitan centers have grown over the last decade (Plevris, 2019), the countryside of each maintains an active agricultural economy with villages scattered throughout the region.

Religion in the three countries is as diverse as its landscapes, but the wars have rendered each more religiously homogenous than before (Bringa, 1995, 2010). Of the 4.07 million Croats, 87% are Catholic, 5% Serbian Orthodox, 4% nonreligious or atheist, 3% Protestant, and 1% Muslim (Croatian Bureau of Statistics, 2011). Although Bosnia-Herzegovina's is more religiously diverse than Croatia or Serbia (of the 3.32 million, 51% are Muslim, 31% Serbian Orthodox, 16% Catholic, and 2% nonreligious or atheist), the country is mostly segregated by Bosniaks (Muslims) in central Bosnia and Croats (Catholics) in Herzegovina. Additionally, Bosnia-Herzegovina's northern and western flanks are part of the Republika Srpska, where 83% of the population is Serbian Orthodox, 13% Muslim, 2% Catholic, and 2% nonreligious or atheist (Agency for Statistics Bosnia-Herzegovina, 2013). Of the 6.98 million in the country of Serbia, 85% are Serbian Orthodox, 5% are Catholic, 3% Protestant, 3% Muslim, and 4% nonreligious or atheist (Republički Zavod Statistiku, 2015).

7. Images of Former combatants and from Fieldwork



Figure A6.1. The author investigating the location with a participant where a mass crime took place. Photo by Robin Albarano (2015). For more images of exfighers, see Kiper (2019).



Figure A6.2. Photo by Robin Albarano (2015). For more images of exfighers, see Kiper (2019).

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