

# Replication of “Ethnic Riots and Prosocial Behavior: Evidence from Kyrgyzstan”

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## Abstract

Hager, Krakowski, and Schaub (2019) find that exposure to ethnic violence negatively affects prosocial behavior within and across ethnic groups in Osh, Kyrgyzstan. I was largely successful in replicating their main results and use their survey data of Kyrgyz and Uzbeks—the majority and minority ethnic groups of Osh—to expand upon their work. I find that the prosocial behavior of Kyrgyz towards Uzbeks is partially positively affected by exposure to violence. These results contradict the authors’ original findings that exposure to ethnic violence has a homogenous treatment effect. My models demonstrate that on the contrary, ethnic violence can have a heterogenous treatment effect, which warrants further analysis of ethnic violence’s influence on interethnic relations.

## Introduction

I will be replicating the paper “Ethnic Riots and Prosocial Behavior: Evidence from Kyrgyzstan” written by Anselm Hager, Krzysztof Krakowski, and Max Schaub.<sup>1</sup> Using survey data that includes 1200 responses that they gathered in Osh, Kyrgyzstan after the 2010 ethnic riots, this paper explores the question of whether exposure to ethnic riots has a negative effect on prosocial behavior within and across ethnic groups. Previous literature on prosocial behavior following ethnic violence suggests that prosociality towards the aggressor group is negatively affected, while prosocial behavior towards the in-group should improve as a result of shared conflict. The authors’ paper finds, however, that prosocial behavior towards both the in and out groups are negatively affected. They measure prosocial behavior by having their research subjects complete a prisoner’s dilemma (PD) scenario and dictator’s game (DG) hypothetical that involve both the in-group and out-group. After running linear regressions that measure the outcomes of these tests as the results of being exposed to violence during the riots, they find that there is a homogeneous negative effect on prosocial behavior. Using the same models, they test for confounders and explore an instrumental variable—distance to armored personnel carrier (APC)—to improve their robustness. Throughout this testing they find that their original conclusions hold true and they offer theoretical, qualitative reasoning for why prosocial behavior is negatively affected within and across groups.

I have replicated the key models and figures from the original paper using R.<sup>2</sup> The replications use the raw data and code that the authors provided and uploaded at the American Political Science Review Dataverse.<sup>3</sup> My replication code, results, and later extensions are available on Github.<sup>4</sup> My replications that I have included and will discuss in this paper are the key models the authors used to evidence their findings. I would like to note, however, that I have not included additional figures from the original paper that were created using GIS software or other, non-R, programs. I have also not included any models from the author’s Appendix that are not relevant to my own extensions, but I will include a link to their online appendix.<sup>5</sup> I have successfully replicated almost all of the author’s key figures with the exception of certain instrumental regressions that rely on spatial weights. I argue that their findings are sound despite this flaw.

I also argue that there are certain areas of their data that should be more thoroughly explored, which I attempt to address through my own extension models. This is not to say that my extensions are exhaustive, but they illustrate aspects of the original paper I believe warrant greater attention. The author’s models focus primarily on how the Uzbek sample of their survey data was affected by the riots. The majority of their robustness testing focuses on this sample of their survey as well. The authors explored confounders besides victimization such as wealth, community state capacity, community policing, and accessibility. I believe they neglected to include their subject’s general attitude towards outgroup members as a potential confounder even though they measure for this in their survey. In extending their analysis to include this measure, I found that while victimization is still statistically significant, a subject’s set prosocial attitude plays an influential role in their prosociality. I also believe the authors neglected to explore their Kyrgyz comparative sample as extensively as they did their Uzbek sample. Analyzing prosocial behavior among Kyrgyz with the same methodological approach the authors took with Uzbeks, reveals a partial improvement in prosocial behavior towards the outgroup, which is somewhat contradictory to the authors’ findings. While they claim that exposure to ethnic violence has a homogenous treatment effect, I find that this effect can actually be heterogenous.

This paper will include of a review of the relevant literature for understanding both the scholarship on prosocial behavior and the ethnic riots of Osh. It will also introduce and describe the authors survey data. Then I will discuss the author’s key models and findings addressing potential areas of weaknesses and non-replication. Finally, I will present my own extensions and discuss what they contribute to both the original paper’s findings, but also to the broader fields of ethnic violence and Central Asian studies. All replications and code for this paper are included in my appendix available online.<sup>6</sup>

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<sup>1</sup>Hager, Krakowski, and Schaub 2019

<sup>2</sup>R Core Team (2019)

<sup>3</sup>Original Paper’s Code: [Link](#)

<sup>4</sup>Replication Github: [Link](#)

<sup>5</sup>Original Paper’s Appendix: [Link](#)

<sup>6</sup>Replication Github: [Link](#)

## Literature Review

Ethnic riots are defined as sudden bursts of lethal violence by civilians of one ethnic group against the civilians of another, who are attacked specifically because of their ethnic identity.<sup>7</sup> Often these riots are prompted by political competition that is given an ethnic dimension or is linked to resentment regarding societal status.<sup>8</sup> Ethnic riots occur regularly throughout the world and fundamentally affect societal relations. Since 2010, there have been over one thousand fatal riots in Africa and Southern Asia alone and ethnic violence is often the most common form of violence overall.<sup>9</sup> Most of the literature concerning ethnic riots explore the causal factors behind why they occur in the first place.<sup>10</sup> Research that addresses the effects that ethnic riots produce within these communities is less common.<sup>11</sup> Within this area of scholarship, however, the results of researchers vary in terms of how prosocial behavior specifically is affected towards both the in-group and out-group. Early scholarship posited that ethnic riots improve in-group prosocial behavior but negatively affect behavior towards the outgroup.<sup>12</sup> Different scholarship that addresses the effects of wartime violence on cooperation supported this idea.<sup>13</sup> Some have suggested that this effect could be due to increased investments in social capital or because societal preferences shift towards prosociality after ethnic violence.<sup>14</sup> The findings on ethnic violence's effect on prosociality are not universal, however, because another group of scholarship has found that behavior towards the in group is, in fact, negatively affected.<sup>15</sup> These scholars support the theory that prosocial behavior is negatively affected regardless of in-group or out-group status because the violence undermines trust and causes cases of post-traumatic stress disorder.<sup>16</sup> The original paper's authors support this theory based on their study of prosocial behavior in the aftermath of the 2010 Osh ethnic riots.

Osh is the second largest city within the Central Asia Republic of Kyrgyzstan. The area was historically predominantly populated by Uzbeks but began to see a large-scale migration of Kyrgyz in the late Soviet period.<sup>17</sup> Following the fall of the Soviet Union and after Kyrgyzstan's independence, the young Kyrgyz Republic began to develop national identity by drawing on an ethnic, Kyrgyz narrative.<sup>18</sup> This, in addition to some discriminatory Kyrgyz political policies, drove many Uzbeks to seek irredentist behavior in 2003 that would fail and in return prompt retaliatory Kyrgyz ethnic violence. The successful revolution against President Kurmanbek Bakiyev in 2011 created a power vacuum in Kyrgyzstan, which prompted further ethnic violence. Bakiyev was from Southern Kyrgyzstan, where Osh is located, and had pursued discriminatory policies against the Uzbek minority. He also enjoyed high levels of support within Osh's Kyrgyz population.<sup>19</sup> The new government appealed to Uzbeks for support following Bakiev's fall, but local Kyrgyz leaders used this an opportunity to label local political instability as the result of Uzbeks irredentism.<sup>20</sup> Following a violent argument about gambling, an Uzbek mob violently confronted Kyrgyz police officers, which in turn prompted thousands of local Kyrgyz to arm themselves and begin attacking Uzbeks. They even stole APCs and used them to break through local Uzbek barricades. This violence resulted in the deaths of around 470 people, the majority of whom were Uzbek, and over 2,843 properties destroyed.<sup>21</sup> The authors point out that the relative haphazardness of the violence, the use of APCs, and the return of victims after the riots ended makes the 2010 Osh riot a strong case for studying the effect of ethnic riots on prosocial behavior.

To perform this analysis, the authors performed a survey of 880 Uzbeks and 220 Kyrgyz living in Osh between August and September 2017, which corresponds to when many labor migrants are returning to the

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<sup>7</sup>Horowitz 2001

<sup>8</sup>Kopstein and Wittenberg 2018; Wilkinson 2004; Bohlken and Sergenti 2010; Mitra and Ray 2014

<sup>9</sup>Raleigh 2010; Kishi, Raleigh Linke 2016

<sup>10</sup>Kopstein and Wittenberg 2018; Varshney 2002; Wilkinson 2004

<sup>11</sup>Aidt and Leon 2016

<sup>12</sup>Horowitz 2001

<sup>13</sup>Bauer et al. 2016; Bellows and Miguel 2009; Blattman 2009;

<sup>14</sup>Gilligan, Pasquale and Samii 2014; Bauer et al. 2014; Voors et al. 2012

<sup>15</sup>Bauer et al. 2016; Hadzic, Carlson, and Tavits 2017; Rohner, Theonig and Zilibotti 2013

<sup>16</sup>Cassar, Grosjean and Whitt 2013; Cecchi and Duchoslav 2018; Ruttan, McDonnell, and Nordgren 2015

<sup>17</sup>Allworth 2013; Liu 2012

<sup>18</sup>Huskey 2003

<sup>19</sup>Huskey 2003

<sup>20</sup>KIC 2011

<sup>21</sup>KIC 2011

city. Their survey data is split between those affected by the riots and those unaffected. Generally speaking, their data has comparable demographical statistics both between affected and unaffected groups, but also between the two ethnicities involved in their survey. Levels of wealth, education, and background are also adequately comparable between their samples. In terms of measuring prosocial behavior, the authors had participants participate in a Prisoner’s Game Dilemma (PD) to show cooperation and then also a Dictator’s Game (DG) to measure altruism. In the prisoner’s game, respondents could choose between cooperating and not cooperating. Their outcome—a payout between 20 and 100 Kyrgyz Somoni (KGS) — was dependent on both their own and their partners choices. If both chose cooperation, then both received 80 KGS, if they both chose non-cooperation then each would get 60 KGS. If one chose non-cooperation but the other chose cooperation, then the first would receive 100 KGS and the latter 20. The dictator’s game, however, just consisted of the authors giving respondents 50 KGS and then being asked how much, if any, of this amount they would share with another resident of Osh. In both the prisoner’s dilemma and the dictator’s game, the respondents were told the ethnicity of their partner. The outcomes of these two simulations form the prosocial data of the original paper.

## Main Models

The replicable and essential figures of the original paper are Figures 4, 5, 6, 8, and 9, as well as their Table 1. Their Figures 1, 2, 3, and 7 are either made with GIS software or are simply maps of Osh, so I have not attempted to replicate them in my appendix. Figures 4, 5, 8, 9 and Table 1 are fully replicable, but I cannot currently replicate all of their Figure 6 from the original paper. Of these figures, Figure 4 (“Payoff Illustration in the PD”) simply demonstrates the various payoff scenarios of respondents who participated in the prisoner’s game dilemma administered by the authors.

Figure 5 (“Effect of Riot on Prosocial Behavior”) is the model that illustrates the authors’ core findings. In this model, the authors compare Uzbek in the affected and non-affected primary sample units (PSUs). This figure plots the coefficients and confidence intervals of OLS regressions of prosocial outcomes on the destruction dummy, which is simply victimization measured on a binary scale of affected or non-affected. The prosocial outcomes are measured by five categories: Prosociality Index, Dictator Game Outgroup, Prisoner’s Dilemma Outgroup, Dictator Game Ingroup, and Prisoner’s Dilemma Ingroup. While the PD and DG outcomes are self-explanatory, the Prosociality Index is a score that the authors created by combing and scaling the scores of the other four categories. This figure finds that Uzbek respondents in damaged neighborhoods show much lower levels of prosocial behavior. They are around 0.16 standard deviation (SD) less likely to cooperate with Kyrgyz. In the Dictator’s game as well, they tend to allocate 0.47 SD less to Kyrgyz. This reduction in prosocial behavior is also evident in their behaviors towards other Uzbeks. Affected Uzbek respondents are 0.23 SD less likely to cooperate with their coethnics in the PD and 0.46 SD less likely to give them money in the DG. Figure 5, therefore, evidences the author’s fundamental claim that ethnic riots negatively affect prosocial behavior towards both the in and out-group or that exposure to violence has a homogenous treatment effect. All subsequent figures to Figure 5 are the authors’ robustness checks.

The original paper’s Table 1 (“Effect of Destruction on Prosocial Behavior (Controlling for Confounders and Mobilization)”) shows the author’s exploration of potential confounders for Figure 5’s results. They point out that a variety of social, economic, and political forces may explain why certain areas of Osh were affected by the ethnic riots. Relying on interviews and qualitative research, the authors believe that the most likely confounders that might affect both victimization and prosocial behavior outcome would be wealth, state capacity, community policing, accessibility, and voting for the overthrown President’s party. They discuss these confounders in their Appendix, but generally they chose these confounders for the following reasons. First, they believe that the wealth of an area might attract rioters who are seeking monetary benefit or that wealth may positively affect prosocial behavior overall. Second, rioters may have targeted certain areas because they have lower state capacity, which means the risk to the rioters is lower. Also, lower state capacity might affect cooperation between people because the state is unable to properly enforce contracts. Third, lower community policing may attract rioters because of the lower chance of detainment. Lower policing

might also reduce cooperation between people by preventing the punishment of defectors. Fourth, rioters might have targeted areas of Osh that are more accessible and easier to attack. Accessibility might also positively affect prosocial behavior because these areas could have higher levels of interactions. Fifth, they include the vote share of the Ata-Jurt (AJ) political party during the 2010 elections, which they use to measure support for the ousted president Bakiyev.

Their OLS regressions measuring prosocial outcomes as the results of victimization and their five confounders, showed that the victimization coefficient is virtually unchanged, still strongly negative, and continues to be statistically significant. Of note might be, however, that state capacity has a statistically significant positive effect for Uzbeks' dictator game results towards both the in-group and out-group, which is also true for prosociality index. The authors, however, do not comment on this result and instead focus on the fact that including these confounders did not change the consistently negative and significant effect of victimization.

Figure 6 ("Effect of Riot Destruction on Prosocial Behavior (IV)") is the introduction and exploration of an instrumental variable, which is the distance between subjects and armored vehicles (APCs). These APCs were captured from the Kyrgyz military by rioters and used to break through Uzbek barricades. Areas of Osh where rioters did not have access to APCs saw little to no destruction. This suggests that access to APCs might act as an exogenic assignment mechanism that explains post-riot differences across subject responses. They believe that distance to APC locations capture the 'intent-to-treat' effect and therefore they created a closeness instrument by inputting subjects' distance to these APC locations. They create this instrumental variable by invoking five key assumptions. First, they show that distance to APCs is strongly correlated to the destruction dummy with an F-Stat of 271.9. Of note may be that this F-Stat is exceedingly high. Second, they rule out defiers or individuals selecting to be victimized despite being assigned. Third, they present a falsification test which demonstrates the instrument is unrelated to prosocial behavior in a sample of 136 nearby villages, which underlines the exclusion restriction. Fourth, they address SUTVA concerns by estimating spatial error models. Fifth, and finally, they argue that APC location is exogenous and demonstrate that distance to APC is not predicted by aforementioned confounders. Based on these assumptions, the authors perform a series of regular OLS regressions substituting victimization for the closeness variable and also a series of two-stage least squares (2SLS) regressions include both the victimization variable and the instrument. In both of these regressions series they see that their original results hold. Specifically, they find that destruction during the riot—instrumented—has a causal negative impact of 0.55 SD on the Prosociality Index. Overall, the authors use their instrumental variable 2SLS regression to serve as an even more compelling robustness test to their original results from their Figure 5.

While Figure 6 may be the author's most compelling robustness check, there are some replication issues with it as well. This model actually includes three regression series using the instrumental variable. Two of the regression series rely on the survey data that the authors have provided, which I have addressed. They, however, also include a third regression series that relied on spatial weights. These spatial weights are included in a csv file, but when loaded in, their code failed to work with this data. In communicating with the authors, they suggested this might be an issue of csv formatting between Europe and the U.S., but we were not able to find a solution. I chose, therefore, to replicate two of their three regression series because their spatial weight regressions differ little from the other two regression series I did replicate. While this is a replication issue, considering the authors' 2SLS results, I do not believe this non-replication refutes their fundamental findings.

Their Figure 8 ("Randomization Inference") is, as the name implies, a randomization check for Figure 6. The authors develop this inference to further prove the robustness of their findings. They want to see how likely it would be to observe Figure 6's effect size if the location of APCs were randomized. They then simulate pseudo locations where APCs could have been stolen by creating a band around the city center that includes two actual APC theft locations. Through this process they create 10,000 pseudo locations with 5,000 east of the river Ak-Buura and 5,000 to its west. They then re-estimate their reduced-form IV regressions 10,000 times for and for each estimation they draw two pseudo starting points, one from the eastern sample and one from the western. Then they calculate the distance between those two points and the interview location, to finally include them in a regression of the Prosociality Index outcomes. The results of these regressions demonstrate that most pseudo distances do not yield a negative correlation with prosocial behavior. This means that their estimated effect from Figure 6 is unlikely to be a product of chance.

Their Figure 9 (“Effect of Riot Destruction on Losses”) is the last key model in the main paper. The authors use this figure to further prove that their destruction dummy does actually capture the victimized areas of Osh. During their survey they asked respondents to report if they had recently lost or had the following items damaged: their business, money, house, TV, or car. Figure 9 shows the results of OLS regressions that explore each of those loss types as the result of the destruction dummy. They find that for each type of loss there is a significant negative effect, which demonstrates that the destruction dummy correctly captures victimization during the ethnic riots.

## Extensions

A fundamental issue with expanding on this paper’s findings is that the authors’ data is non-observational and published fairly recently. This means that I cannot incorporate additional data or involve new literature that suggests a weakness in the authors’ methodological approach. Even so, there are two areas where I feel more exploration of the data is warranted or where fundamental assumptions can be challenged. These areas would be a more in-depth exploration of confounding variables for the Uzbek data and a far more robust exploration of the Kyrgyz sample.

I believe the author’s exploration of confounding variables for Uzbeks is somewhat limited in its scope. They combine a variety of survey scores together to create confounders that might explain victimization and/or prosocial behavior, but I believe other variables should be included that more directly explain prosocial behavioral scores. Namely, the survey variables of “use of common language” and “ethnicity of employer” should be more robustly tested. The use of the outgroup’s common language directly measures prosocial behavior because individuals choose to opt into or out of this behavior. The ethnicity of one’s employer is also important because it can represent mandatory interaction with the out-group. My Table 1, therefore, demonstrates the OLS regression results of all five prosocial outcomes as the result of victimization, common language usage, and the ethnicity of one’s employer. Of note is that the destruction dummy still has a statistically significant negative correlation to prosocial behavior. That being said, the effect size is diluted across all five measures, which did not occur when the authors tested for their original confounders. Also of note is that common language use has a statistically significant but positive correlation to all five prosocial measures. No employer ethnicity, however, had consistently significant results, which suggests this particular measure does not affect prosociality as strongly as either common language usage or victimization.

**Table 1: Uzbek Confounders**

	<i>Dependent variable:</i>				
	Prisoner’s Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner’s Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	−0.221** (0.068)	−0.428*** (0.066)	−0.143* (0.068)	−0.417*** (0.065)	−0.303*** (0.048)
Common Language Usage	0.054* (0.024)	0.109*** (0.023)	0.050* (0.024)	0.161*** (0.023)	0.094*** (0.017)
Education	−0.014 (0.021)	−0.036 (0.021)	0.002 (0.021)	−0.043* (0.020)	−0.023 (0.015)
Kyrgyz Employer	0.149 (0.129)	0.202 (0.125)	0.158 (0.130)	0.187 (0.123)	0.174 (0.090)
Uzbek Employer	0.259 (0.312)	0.241 (0.303)	0.280 (0.314)	0.304 (0.298)	0.271 (0.219)
Russian Employer	0.131 (0.101)	0.217* (0.098)	0.205* (0.101)	0.283** (0.096)	0.209** (0.071)
Unemployed	0.369** (0.133)	0.180 (0.130)	0.320* (0.134)	0.196 (0.128)	0.266** (0.094)
Constant	−0.365* (0.165)	−0.582*** (0.160)	−0.430** (0.166)	−0.750*** (0.158)	−0.531*** (0.116)
Observations	877	877	877	877	877
R <sup>2</sup>	0.027	0.081	0.016	0.110	0.091
Adjusted R <sup>2</sup>	0.019	0.074	0.009	0.103	0.083
Residual Std. Error (df = 869)	0.990	0.963	0.996	0.947	0.695
F Statistic (df = 7; 869)	3.464**	10.941***	2.077*	15.399***	12.398***

*Note:*

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

I decided to expand on Table 1’s results by isolating just the destruction dummy and common language usage in Table 2. I rerun the OLS regressions from Table 1 isolating only these two variables but include an interaction between the two. These results are interesting because the negative effect of victimization becomes even more muted and for PD outgroup, the coefficient outright loses its statistical significance. Other measures see their significance decreases as well. The same is true, however, for common language usage which is no longer statistically significant for either in or out-group PD scores. None of the interaction coefficients are significant. Overall, I believe that Table 1 and 2 generally further support the author’s initial findings that victimization has a strong negative correlation to Uzbek prosocial behavior. I would argue, though, that common language use is a more valid confounder than the authors’ original confounders and that its inclusion is important to understanding how personal prosociality behavior might affect the results of the paper more broadly.

**Table 2: Uzbek Victimization and Common Language Usage Interaction**

	<i>Dependent variable:</i>				
	Prisoner’s Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner’s Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	−0.350* (0.160)	−0.484** (0.156)	−0.267 (0.161)	−0.389* (0.154)	−0.372*** (0.113)
Common Language Usage	0.062 (0.034)	0.094** (0.033)	0.058 (0.034)	0.123*** (0.033)	0.084*** (0.024)
Interaction	0.039 (0.046)	0.013 (0.045)	0.037 (0.046)	−0.016 (0.044)	0.018 (0.032)
Constant	−0.313** (0.115)	−0.533*** (0.112)	−0.260* (0.115)	−0.625*** (0.110)	−0.433*** (0.081)
Observations	877	877	877	877	877
R <sup>2</sup>	0.018	0.070	0.010	0.093	0.075
Adjusted R <sup>2</sup>	0.015	0.067	0.006	0.090	0.072
Residual Std. Error (df = 873)	0.992	0.966	0.997	0.954	0.699
F Statistic (df = 3; 873)	5.411**	21.927***	2.904*	29.827***	23.619***

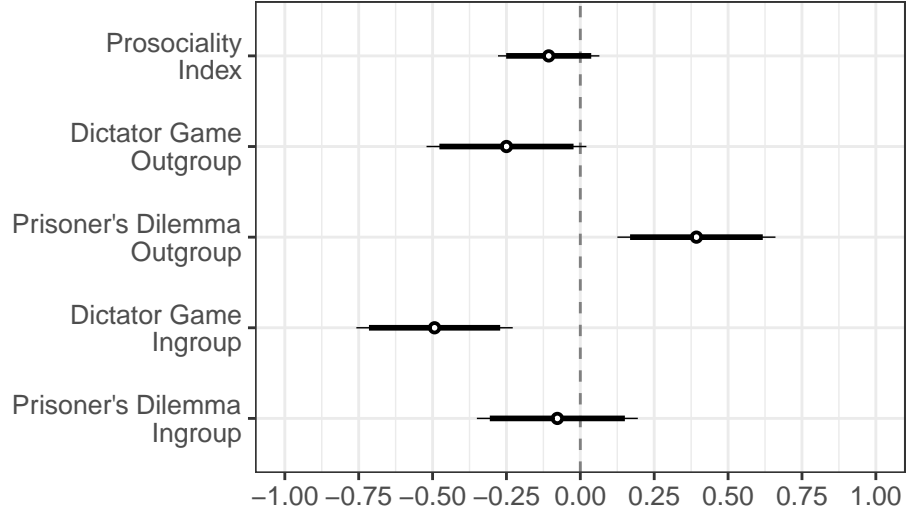
*Note:*

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

While I agree with the paper’s argument that Uzbek prosocial behavior within and across ethnic groups is negatively affected, I argue that the same is not true for their Kyrgyz sample. The survey data includes 222 Kyrgyz citizens of Osh and over a third of them were negatively affected by the ethnic riots. This amount is small, but they form an interesting point of comparison for the study, which the authors themselves note. They explore their Kyrgyz sample by exploring their prosocial behavior outcomes using the regression series that relied on spatial weights, which can be seen in their figure A.17 in their online Appendix. I am critical of this approach partly because those IV regressions were non-replicable for me. Also the authors decided to not test the Kyrgyz sample with same OLS regressions they used for their Figure 5. Similarly, in looking at their figure A.17, the authors chose to only include the results of the Prosociality Index as opposed to showing the results for all five prosocial measures. Between non-replicability issues, the admission of four prosocial measures, and the fact that this comparative model was relegated to the Appendix, despite being referenced as a useful comparison in the paper, I decided that a more robust exploration of the Kyrgyz sample was warranted.

My Model 1 focuses on Kyrgyz prosocial behavior. I use the same code and approach that the original authors used for their Figure 5 but simply for the Kyrgyz subset of the data instead. The results are interesting for a few reasons. Primarily because Kyrgyz prisoner’s dilemma outgroup scores have a positive correlation to victimization. This suggests that Kyrgyz who were affected by the riots on average exhibit higher levels of prosocial behavior towards Uzbeks. The variance is fairly high, but the positive nature of the coefficient is constant. For the other measures the coefficients are negative like the author’s Figure 5, but noticeably less negative. This suggests that at least for the Kyrgyz portion of the authors’ survey, prosocial behavior did not universally decrease and within the prisoner’s dilemma—a measure of cooperation—affected Kyrgyz were actually more willing to cooperate with Uzbeks than non-affected Kyrgyz. This model, therefore, shows that exposure to violence actually has a heterogenous treatment effect.

### Model 1: Kyrgyz Prosocial Behavior



To further explore this trend, I create my Table 3 that measures prosocial outcomes as the result of victimization and the five confounders the authors created in their original paper. The results of my Table 3 are mixed. First of all, almost none of the confounders have statistically significant coefficients and the results are on par with the author's findings for confounder effects. When viewing the destruction dummy, however, a few key differences to the authors' findings are clear. The prosocial behavior of affected Kyrgyz towards Uzbeks is statistically significant and positive, while their behavior towards other Kyrgyz is statistically significant and negative. This suggests that affected Kyrgyz have very different attitudes towards cooperation with their coethnics and non-coethnics. No other measure is statistically significant though, which differs from the authors' original findings for Uzbeks.

**Table 3: Kyrgyz Confounders**

	<i>Dependent variable:</i>				
	Prisoner's Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner's Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	-0.078 (0.143)	-0.522*** (0.138)	0.391** (0.139)	-0.273 (0.142)	-0.121 (0.089)
Wealth index	-0.572 (0.660)	-0.436 (0.639)	0.020 (0.643)	0.039 (0.655)	-0.237 (0.412)
State capacity index	0.112 (0.256)	0.015 (0.248)	0.345 (0.250)	0.255 (0.254)	0.182 (0.160)
Community policing index	0.095 (0.070)	0.132 (0.067)	0.051 (0.068)	0.110 (0.069)	0.097* (0.043)
Accessibility index	-0.534 (0.619)	0.502 (0.599)	1.013 (0.603)	0.276 (0.614)	0.314 (0.386)
AJ Constant	0.252 (0.659)	-0.770 (0.638)	-0.400 (0.642)	-0.885 (0.654)	-0.451 (0.411)
Observations	222	222	222	222	222
R <sup>2</sup>	0.018	0.080	0.068	0.034	0.043
Adjusted R <sup>2</sup>	-0.009	0.055	0.042	0.007	0.016
Residual Std. Error (df = 215)	1.005	0.972	0.979	0.996	0.626
F Statistic (df = 6; 215)	0.654	3.133**	2.624*	1.263	1.614

Note:

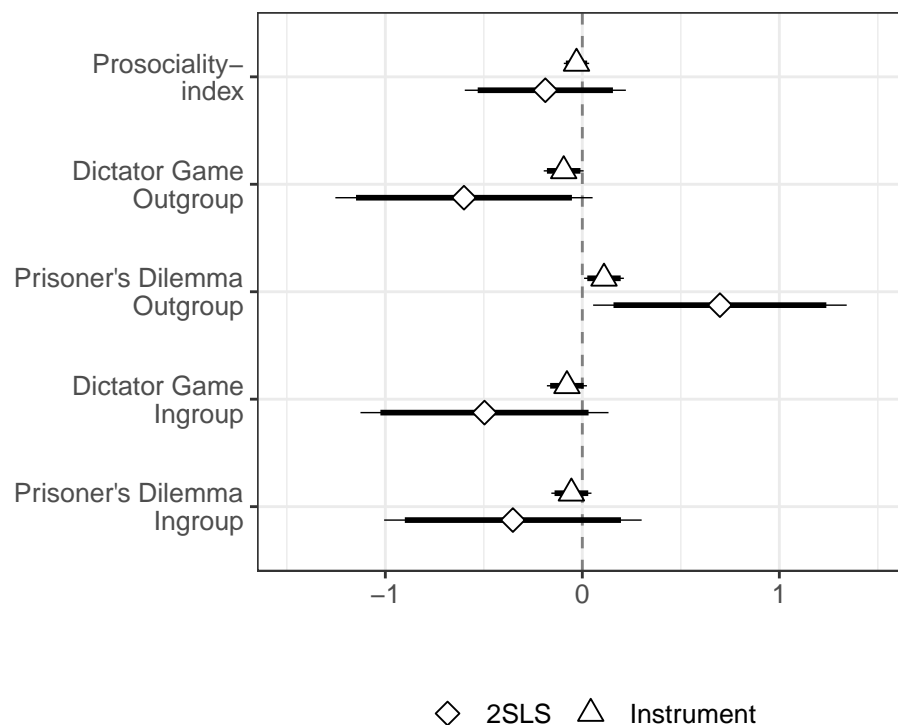
\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Finally, I decided to further test the robustness of my Kyrgyz findings by introducing the instrumental variable of distance to APC. Following the authors' code and procedure, I created my Model 2 that shows both the instrument's OLS regression coefficients and the 2SLS coefficients for each prosocial measurement. This further corroborates Model 1's findings by showing that for affected Kyrgyz, instrumented-victimization



had a positive causal effect on their behavior towards Uzbeks. The other coefficients are still negative, but the range of their variance now include some positive coefficients, which is also contradictory to Figure 5 and the authors' overall argument.

**Model 2: Kyrgyz Prosocial Behavior with Instrumental Variable**



My extensions that focus on Kyrgyz prosociality do not necessarily contradict the findings of the authors. They do, however, suggest that the effects of victimization are more complicated than the authors argued. In further testing the Kyrgyz sample of their survey, I show a positive effect on prosocial behavior towards the out-group. These models might capture a sense of empathy towards the victimized Uzbek minority. They might also capture the degree of antipathy that affected Kyrgyz have towards their coethnics who harmed them during the ethnic riots. Generally speaking, when the other four measures of prosocial behavior are taken into consideration, the authors' claim that prosocial behavior is negatively impacted is generally still true, but the PD out-group results directly contradict their findings. The variance of these results is still high and when aggregated with the other measures in the Prosociality Index, the overall effect is still negative. That being said, my extension results do somewhat contradict the author's argument, even if only within one prosocial measure. At the very least my results suggest further exploration.

## Conclusions

The authors make an important contribution to our understanding of ethnic violence's effect on community relations and prosocial behavior. The literature regarding this area has so far produced a variety of results. The authors use the 2010 ethnic riots in Osh, Kyrgyzstan to add to this larger debate. Their findings support the scholarship that argues ethnic violence decreases prosocial behavior towards within and across groups. The authors evidence the homogenous treatment effect of exposure to ethnic violence through a series of regressions performed on a large sample survey. After OLS regressions, confounder robustness testing, and the inclusion of an instrumental variable, the authors are confident that prosocial behavior is negatively affected regardless of ethnic group status.

After replicating their main tables and figures I found that their models were consistent with their argument in the paper. Despite finding a replicability issue with their Figure 6, I still argue that their results for the Uzbek sample are sound: affected Uzbek prosocial behavior is negatively affected towards both Uzbeks and Kyrgyz. I chose to explore other confounders for this Uzbek sample in my extensions. Using Table 1 and 2, I find that common language usage is a stronger confounder to victimization than the confounders the authors originally used, but that even with this new variable included, overall Uzbek prosocial behavior is negatively affected. I also find that the ethnicity of one's employer had little to no effect on prosociality despite my hypothesis.

My second set of extensions focus on further examining the Kyrgyz portion of their survey. The authors mentioned that the affected Kyrgyz in their survey were a useful comparison to their original results with Uzbeks. They chose to examine Kyrgyz prosocial behavior in Figure A.17 and show that the Prosociality Index of Kyrgyz is negatively affected, but these regressions rely on the spatial weights I was unable to replicate. I chose, therefore, to reexamine Kyrgyz prosociality using the same approaches taken by the authors for Uzbeks. My Model 1, Table 3, and Model 2 demonstrate that for affected Kyrgyz victimization can have a positive causal effect on prosocial behavior towards Uzbeks. In testing for confounders, I also saw that negative prosociality is overall weaker for Kyrgyz than for Uzbeks. Finally, after I include the instrumental variable, I saw that each of the five measures is either positive or has a range of coefficients that include positive values. My extension results, therefore, contradict the authors' overall argument and demonstrate that exposure to violence has a heterogeneous treatment effect.

After my extension I am partly critical of the authors' analysis of Kyrgyz prosociality. Even ignoring the replicability issue with their Figure A.17, their approach has flaws. Had they been as robust in testing Kyrgyz behavior as they were with Uzbeks, they would have had to address the inconsistency that I found in their argument. I am also critical of how they chose to present their Kyrgyz analysis. They only depicted the coefficients of the Prosociality Index, which is a combination of their four other behavioral measures. In choosing to only include this Index, they avoided presenting contradictory results to their main argument. My extensions demonstrate an aspect of ethnic violence's effect on prosocial behavior that the authors did not address, by showing that the victimization of the aggressor ethnic group may generate higher prosocial behavior towards the targeted group.

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## Figures and Tables

**Table 1: Uzbek Confounders**

	<i>Dependent variable:</i>				
	Prisoner's Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner's Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	-0.221** (0.068)	-0.428*** (0.066)	-0.143* (0.068)	-0.417*** (0.065)	-0.303*** (0.048)
Common Language Usage	0.054* (0.024)	0.109*** (0.023)	0.050* (0.024)	0.161*** (0.023)	0.094*** (0.017)
Education	-0.014 (0.021)	-0.036 (0.021)	0.002 (0.021)	-0.043* (0.020)	-0.023 (0.015)
Kyrgyz Employer	0.149 (0.129)	0.202 (0.125)	0.158 (0.130)	0.187 (0.123)	0.174 (0.090)
Uzbek Employer	0.259 (0.312)	0.241 (0.303)	0.280 (0.314)	0.304 (0.298)	0.271 (0.219)
Russian Employer	0.131 (0.101)	0.217* (0.098)	0.205* (0.101)	0.283** (0.096)	0.209** (0.071)
Unemployed	0.369** (0.133)	0.180 (0.130)	0.320* (0.134)	0.196 (0.128)	0.266** (0.094)
Constant	-0.365* (0.165)	-0.582*** (0.160)	-0.430** (0.166)	-0.750*** (0.158)	-0.531*** (0.116)
Observations	877	877	877	877	877
R <sup>2</sup>	0.027	0.081	0.016	0.110	0.091
Adjusted R <sup>2</sup>	0.019	0.074	0.009	0.103	0.083
Residual Std. Error (df = 869)	0.990	0.963	0.996	0.947	0.695
F Statistic (df = 7; 869)	3.464**	10.941***	2.077*	15.399***	12.398***

*Note:*

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Table 1 demonstrates the OLS regression results explaining all five prosocial outcomes as a result of the destruction dummy, common language usage, and the ethnicity of one's employer. Of note is that the destruction dummy has a statistically significant negative correlation to prosocial behavior. That being said, the effect size of victimization is diluted across all five measures in comparison to the when the authors tested for their original confounders. Also of note is that common language use has a statistically significant but positive correlation to all five prosocial measures. No employer ethnicity, however, had consistently significant results, which suggests this particular measure does not affect prosociality as strongly as either common language usage or victimization.

**Table 2: Uzbek Victimization and Common Language Usage Interaction**

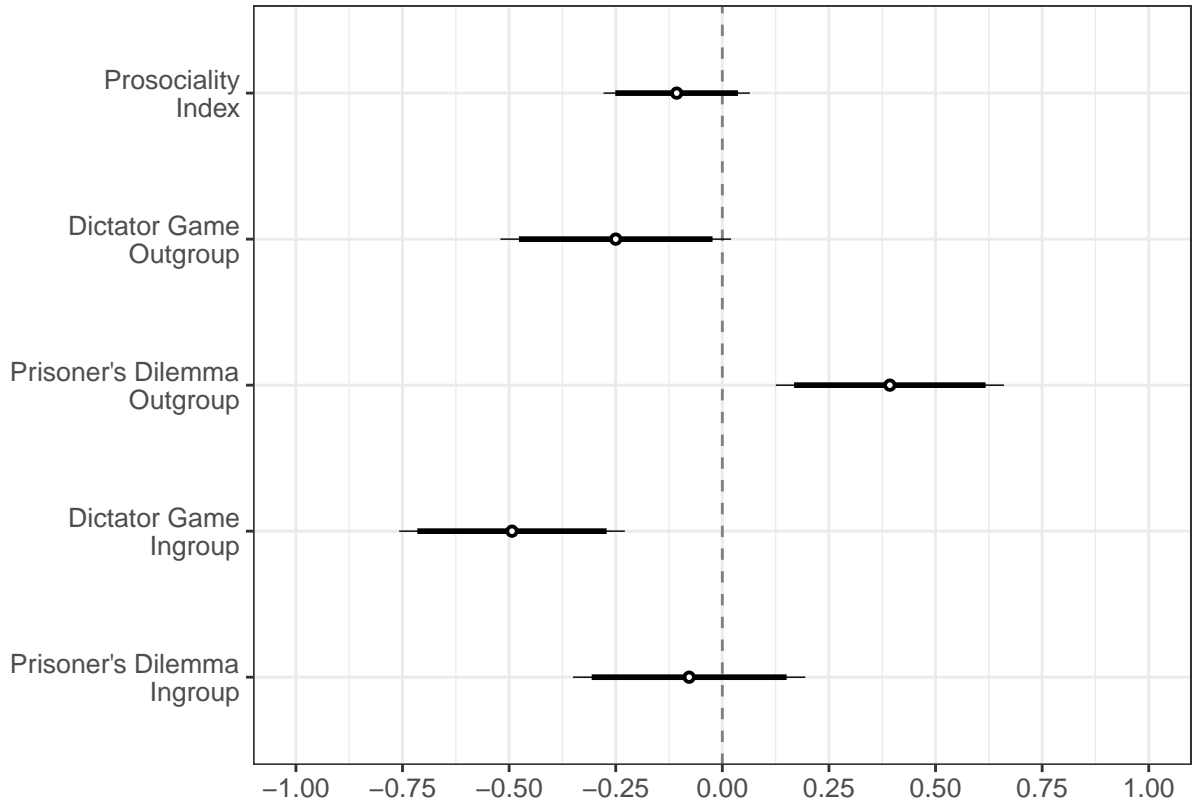
	<i>Dependent variable:</i>				
	Prisoner's Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner's Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	-0.350* (0.160)	-0.484** (0.156)	-0.267 (0.161)	-0.389* (0.154)	-0.372*** (0.113)
Common Language Usage	0.062 (0.034)	0.094** (0.033)	0.058 (0.034)	0.123*** (0.033)	0.084*** (0.024)
Interaction	0.039 (0.046)	0.013 (0.045)	0.037 (0.046)	-0.016 (0.044)	0.018 (0.032)
Constant	-0.313** (0.115)	-0.533*** (0.112)	-0.260* (0.115)	-0.625*** (0.110)	-0.433*** (0.081)
Observations	877	877	877	877	877
R <sup>2</sup>	0.018	0.070	0.010	0.093	0.075
Adjusted R <sup>2</sup>	0.015	0.067	0.006	0.090	0.072
Residual Std. Error (df = 873)	0.992	0.966	0.997	0.954	0.699
F Statistic (df = 3; 873)	5.411**	21.927***	2.904*	29.827***	23.619***

Note:

\*p&lt;0.05; \*\*p&lt;0.01; \*\*\*p&lt;0.001

Table 2 contains OLS regressions that explain prosocial behavior as the result of only two variables: victimization and common language usage. Table 2 also includes an interaction between these two variables. The negative effect of victimization becomes even more muted in comparison to Table 1's results. For PD outgroup, the coefficient is not statistically significant. Other measures see their significance decreases as well. The same is true, however, for common language usage which is no longer statistically significant for either in or out-group PD scores. Finally, none of the interaction coefficients are significant either. Overall, Table 2 further supports the author's initial findings that victimization has a strong negative correlation to Uzbek prosocial behavior. I would argue, though, that common language use is a more valid confounder than the authors' original confounders and that its inclusion is important to understanding how personal prosociality might affect the results of the paper more broadly.

### Model 1: Kyrgyz Prosocial Behavior



Model 1 consists of OLS regressions measuring Kyrgyz prosocial behavior as the result of victimization. Model 1's plot point estimates (dot) and 90/95% confidence intervals(thick and think lines, respectivley) show the coefficients of the OLS regressions. The most noteworthy result is that the prisoner's dilemma outgroup coefficient is positive. This suggests that Kyrgyz who were affected by the riots on average have higher levels of prosocial behavior towards Uzbeks. The variance is fairly high, but the positive nature of the coefficient is constant. For the other measures, the coefficients are negative like the author's Figure 5, but noticeably less strong. This suggests that prosocial behavior did not universally decrease for Kyrgyz and that at least for the prisoner's dilemma, which is a measure of cooperation, affected Kyrgyz are more willing to cooperate with Uzbeks than non-affected Kyrgyz.

**Table 3: Kyrgyz Confounders**

	<i>Dependent variable:</i>				
	Prisoner's Dilemma (In-Group)	Dictator Game (In-Group)	Prisoner's Dilemma (Out-Group)	Dictator Game (Out-Group)	Cooperation-Index
	(1)	(2)	(3)	(4)	(5)
Destruction	-0.078 (0.143)	-0.522*** (0.138)	0.391** (0.139)	-0.273 (0.142)	-0.121 (0.089)
Wealth index	-0.572 (0.660)	-0.436 (0.639)	0.020 (0.643)	0.039 (0.655)	-0.237 (0.412)
State capacity index	0.112 (0.256)	0.015 (0.248)	0.345 (0.250)	0.255 (0.254)	0.182 (0.160)
Community policing index	0.095 (0.070)	0.132 (0.067)	0.051 (0.068)	0.110 (0.069)	0.097* (0.043)
Accessibility index	-0.534 (0.619)	0.502 (0.599)	1.013 (0.603)	0.276 (0.614)	0.314 (0.386)
AJ Constant	0.252 (0.659)	-0.770 (0.638)	-0.400 (0.642)	-0.885 (0.654)	-0.451 (0.411)
Observations	222	222	222	222	222
R <sup>2</sup>	0.018	0.080	0.068	0.034	0.043
Adjusted R <sup>2</sup>	-0.009	0.055	0.042	0.007	0.016
Residual Std. Error (df = 215)	1.005	0.972	0.979	0.996	0.626
F Statistic (df = 6; 215)	0.654	3.133**	2.624*	1.263	1.614

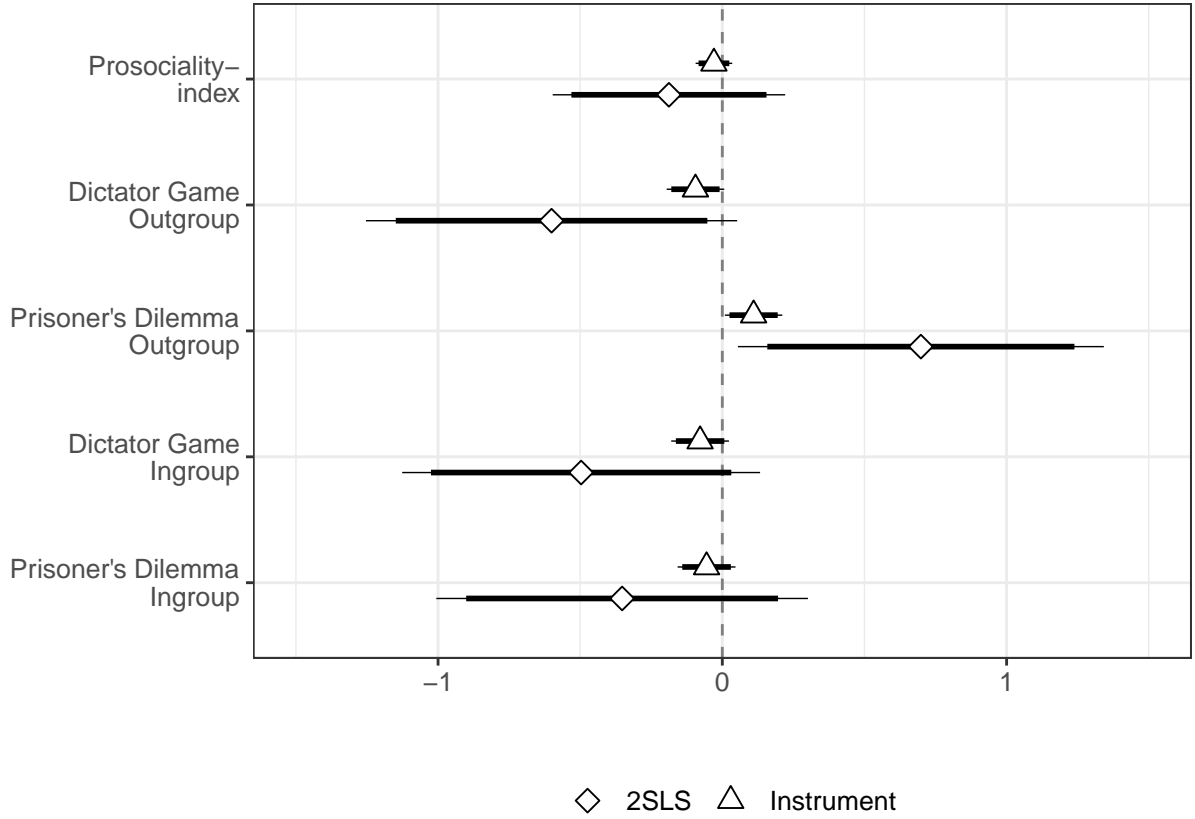
*Note:*

\*p&lt;0.05; \*\*p&lt;0.01; \*\*\*p&lt;0.001

Table 3 measures prosocial behavior through OLS regressions as the result of victimization and the five confounders the authors used in their original paper. The results are mixed. First of all, almost none of the confounders have statistically significant results and the results are similar to the author's original findings in their Table 1. When viewing victimization, however, a few key differences are clear. Similar to my Model 1's results, Prisoner's Dilemma out-group prosocial behavior is statistically significant and positive. Interestingly, PD in-group prosocial behavior is statistically negative, which suggests affected Kyrgyz have very different attitudes towards cooperation with their coethnics and non-coethnics. No other measure is statistically significant, which differs from the authors' original findings for Uzbeks.



Model 2: Kyrgyz Prosocial Behavior with Instrumental Variable



Model 2 further tests the robustness of Model 1's results by introducing the instrumental variable of distance to APC. Model 2's plot point estimates (dot) and 90/95% confidence intervals(thick and think lines, respectively) show both the instrument's OLS regression, where the destruction dummy is replaced by the closeness instrument, and 2SLS coefficients, where the destruction dummy is instrumented with APC location. The results show that both the instrument OLS regression and 2SLS coefficients for PD out-group are positive, which means that instrumented-victimization has a positive, causal effect on prosocial behavior towards the out-group. After viewing the other coefficients, it is clear that the other measures are overall still negative, but their variances now include positive coefficients. This is contradictory to both the authors' Figure 5 findings and their overall argument.