

Justice Provision in Gendered Settings: Evidence from Mexico

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1 Pre-analysis Plan

In this pre-analysis plan, I pre-register a set of primary analyses for my paper tentatively titled, “Justice Provision in Gendered Settings: Evidence from Mexico.” This is an experimental study using a nationally-representative survey experiment (n=1,200) to explore individuals’ civic and political responses to gender-based violence.

By reporting my design, methodological choices, and expectations before seeing the results, I hope to mitigate concerns about these subjective coding decisions and potential “p-hacking”, and therefore enhance the causal credibility of the study’s findings. I also note that I am only pre-registering the paper’s main hypotheses, which I commit to reporting in the paper. Any deviations from the pre-analysis plan will be noted and explained in the paper.

This pre-analysis plan outlines the project’s motivation, the main hypotheses, the data collection procedures, data sources, and the research design to perform the statistical analysis. I attest that at the time this document was registered I have not had access to the survey data (it is still in the field) and thus have not conducted any of the statistical analyses.

2 Motivation

The objective of this study is to investigate whether the severity of gender-based violence (GBV) or the gender/victimization status of an individual impacts their justice preferences. More specifically, this study investigates the conditions under which citizens prefer legal versus extralegal forms of justice following victimization. The existing literature has identified that citizens prefer extralegal forms of justice in states with low state capacity and legitimacy (Jaffrey 2023; Jung and Cohen 2020; Moncada 2023). While prior work demonstrates why citizens may participate in and support vigilantism in general, much less is known about how citizens respond to vigilantism in comparison to other justice outcomes and how these responses may be gendered.

Women all over the world are wary of formal processes to resolve their legal problems regarding gender-based violence. Calls for justice demand a great deal from women who experience gender-based violence and forces them to process their complex victimization at the timeline of the state. In a majority of instances, women—aside from the initial experiences of gender-based violence—are faced with revictimization from those tasked with delivering justice (Bjørnholt 2019; Carranco 2020). In many countries across the world, access to justice for women exists solely on paper. Despite specialized legislation to properly investigate gender-based violence, including femicide and intimate partner violence, gender-based violence has only increased, demonstrating the state’s widespread impunity (UN Women 2022).

In response to the state’s lack of force and punishment, contemporary calls for justice have included vigilantism – the extralegal prevention, investigation, or punishment of offenses (Bateson 2021). Examples of vigilantism include mob violence and lynchings from Latin America (Godoy 2002; Kloppe-Santamaría 2020) to Sub-Saharan Africa (Jung and Cohen 2020; Wilke 2023) to Southeast Asia (Nussio and Clayton 2023). In these extralegal events, citizens will apprehend and brutally punish and sometimes even kill those accused. These cases demonstrate that citizens are willing to take the law “into their own hands” in response to the

state's monopoly or lack thereof on force and punishment. Vigilante acts are fueled by not only those that inflict violence, but also by those who view vigilantism as a last resort for the state's lack of justice procurement.

Why might citizen's responses to justice diverge? Moreover, why might women and victims of gender-based violence prefer extralegal and punitive justice outcomes over legal and non-punitive justice outcomes? I argue that the severity of crimes and individual's prior victimization status will impact which justice outcomes individuals will support. Violent and gender-based violent crimes will garner support for vigilante justice because these crime-level traits have been found to be conditioned by gender and severity of the crime (Dow et al. 2023; Wilke 2023). In Guatemala, work has found that crimes against women by men were more likely to elicit support for vigilantism, as was more severe non-gendered crimes (Dow et al. 2023). Additionally, original, and existing survey data from several countries in Africa suggest that women can and will support vigilantism (Wilke 2023). Moreover, given the state's lack of attention and care to victims of gender-based violence, I also expect women and victims of gender-based violence to support extralegal and punitive justice outcomes over legal and non-punitive justice outcomes. Thus, I expect women and victims of gender-based violence to support, oftentimes, violent means in order to obtain justice.

To answer, this question, I focus on the Mexican case. Mexico offers an excellent and intriguing case for a number of reasons. First, GBV is a major problem in Mexico, with 2 in 3 women experiencing violence at least once in their lifetime (ENDIREH 2021). Second, mechanisms for accessing justice in for GBV are widespread and easily accessible in Mexico. Third, Mexico experiences a number of other types of violence such as criminal and state violence. The high levels of violence, high levels of GBV justice mechanisms, *and* victimization from other sources present a suitable case for disentangling the effects of GBV on justice outcomes.

This topic is substantively important in political science because investigating justice preferences following GBV has important implications for accountability and the rule. In states where state capacity and legitimacy are low, understanding how and when citizens will support vigilantism is important. Thus, my results have implications for the rule of law and the role of gender and victimization in justice-fragile contexts.

3 Theory and Hypotheses

When gender-based violence is concerned, women are reluctant about involving formal justice actors because of the consequences this may have, with many women indicating that problems are worsened by involving state actors (Bjørnholt 2019; Carranco 2020; Kreft 2019; Zulver 2023). The inefficiency of the criminal legal system has exacerbated this issue. In most countries, less than 10 percent of gender-based violent crimes are prosecuted (UN Women 2022). In countries with low state capacity such as Mexico, fewer than 5 percent of victims seek the state for justice due to low confidence and trust in legal institutions (ENDIREH 2021).

While scholarship has demonstrated that women and gendered crime are likely to see support for vigilantism (Dow et al. 2023; Freire and Skarbek 2023; Wilke 2023), there is no accurate assessment of how the severity of gender-based violence mitigates support for vigilante justice. Given that citizens value punishing perpetrators for the harm they have done, it is expected that citizens will support a punishment that 'fits the crime.' This was the case in Western Mexico, where recent work has found that citizens are especially supportive of harsh punishments, including vigilante actions, in response to morally outrageous crimes against the elderly or children (García-Ponce, Young, and Zeitzoff 2023). Moreover, the authors find that respondents

were slightly more supportive of harsh punishments when the crimes involved more severe violence. Building on these findings, I similarly expect citizens to respond differently to more severe violence, specifically severe forms of gender-based violence.

I expect this for a number of reasons. First, perceptions of victimization are distinctly gendered. It has been popularly understood that women tend to be seen as victims and thus conceptualized as more 'deserving' of one's attention and urgency. In this sense, women are ascribed attributes such as innocent, passive, and worthy of protection (Kreft and Agerberg 2023). The imagination of a victim of gender-based violence is thus feminized. Therefore, the feminization of vulnerability is thus highly prevalent in contexts with high levels of gender-based violence and may stereotypically evoke individuals more sympathy and outrage for victims of severe gender-based violence.

Second, the severity of violence may impact the severity of extralegal punishment. As others have found, robbery and petty theft are not as likely to garner support for extralegal violence, however, more severe crimes such as sexual assault (Dow et al. 2023). Although Dow et al. 2023 include sexual assault as a very severe crime (and it is), gender-based violence also includes other, much more common forms of severe crimes, such as intimate partner violence and femicide. Thus, I expect a more gendered range of crimes to constitute different levels of support for extralegal punishment.¹ Thus, the more violent the gender-based violence crime is, the more I expect individuals to prefer extralegal and punitive justice outcomes.² Therefore, my first hypothesis is as follows:

H1: As the severity of gender-based violence increases, individuals will exhibit a greater preference for extralegal justice preferences.

H1a: As the severity of gender-based violence increases, individuals will exhibit a greater preference for punitive justice preferences.

Although vigilantism is the main focus of extralegal preferences for justice in low-capacity states, understanding justice in the context of gender-based violence, can be insightful. Justice for victims of gender-based violence has most commonly been equated with legal and punitive outcomes (McGlynn and Westmarland 2019). Legal here is synonymous with state and formal criminal legal systems based on procedures and mechanisms of legality in a clearly structured pattern: from police investigations to prosecutions to judgement and punishment. Regardless of levels of trust in these institutions, individuals in both Western and Global South countries, wish to use the legal system to secure justice.

Using focus groups in Medellín, Colombia and Santiago, Chile, Hilbink et al. 2019 reveal that low institutional trust does not discourage people from engaging with the judicial system—they nonetheless pursue legal processes to reaffirm their status and agency as citizens, forcing the state to recognize their situation and to create official records of abuse. In Chile, when presented with hypothetical rights violations, citizens stated that it is important for them to “put it on the record” and make sure their actions are not overlooked, even if nothing is achieved.

¹ In the vignette, I purposefully use “murder” of a woman versus “femicide.” This is to circumvent any political undertones associated with the word ‘femicide’ as an attempt to capture true feelings towards the murder of a woman instead of reactions to a politicized term.

² The severity of gendered crimes ranges from nonviolent (theft) to violent (intimate partner violence, sexual violence, and femicide)—increasing in severity from intimate partner violence to sexual violence to femicide.

Similarly in Colombia, respondents supported reporting abuses by the police because “it is protocol” and a way to “leave proof” of the abuse. They expressed that state actors, whose duty it is “to take care of our rights and integrity”, must be held to a high standard and thus must be called out if they abuse their power, even if the complaint “wouldn’t go anywhere.” In other words, negative perceptions did not translate to legal nihilism in these cases.³

Justice in these cases is thus dichotomous—you either get it or you do not. Furthermore, in legal justice processes, definition of justice is rarely (if ever) defined by the victim-survivor of the harm (Goodmark 2015). This is especially the case in countries marked with conflict. But in countries, where the overwhelming majority of gender-based violent crimes go unpunished, extralegal forms of justice may look like an attractive alternative against impunity. Even though only the state is legally authorized to prosecute people, in a country where 95 percent of crimes go unpunished and women’s cases can drag on for years, with no urgency from state authorities to provide any form of assistance, the lack of legal support forces citizens to find justice on their own and at any cost.

Therefore, my second and third hypotheses are as follows:

H2: Women are more likely to support extralegal justice outcomes.

H2a: Women are more likely to support punitive justice outcomes.

H3: Victims of gender-based violence are more likely to support extralegal justice outcomes.

H3a: Victims of gender-based violence are more likely to support punitive justice outcomes.

Research Design

Case Selection

This paper investigates the role of gender and victimization on individual’s justice preferences. Importantly, it focuses on individual’s preferences for justice following gender-based violence and individual victimization. I explore this phenomenon in the Mexican context for three reasons. First, Mexico has some of the highest rates of gender-based violence in the world.⁴ In 2021, the National Institute of Statistics and Geography conducted a survey of +140,000 households across the country and found that over 70 percent of women surveyed reported experiencing violence in her lifetime. There has been a steady increase of gender-based violence in the last 13 years, making it critical to study (ENDIREH 2011; 2016; 2021)

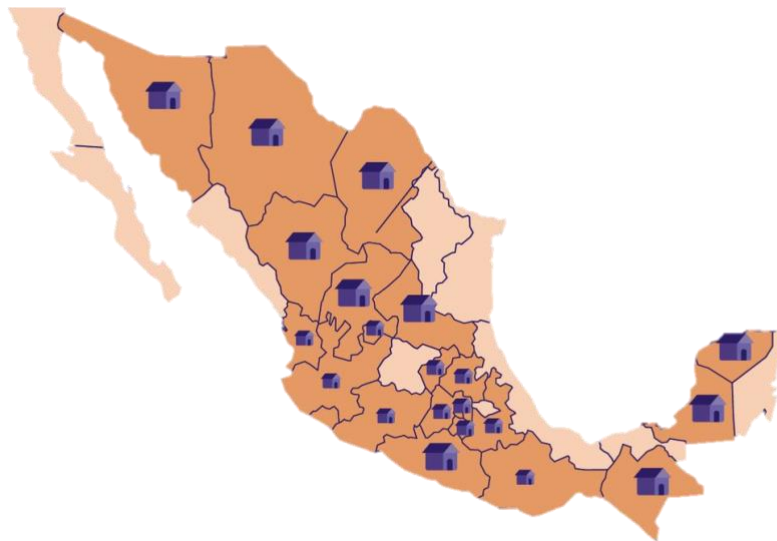
Second, the case of Mexico serves as a hard case for my argument regarding the impact of gender-based violence on justice preferences (Gerring 2004). In order to provide justice for victims of gender-based violence, the Mexican government introduced various initiatives, laws, policies, and programs. In 1994, Mexico signed the Bélem do Pará Convention agreement, which criminalized violence against women. In 2007, Mexico enacted the General Law on Women’s Access to a Life Free of Violence (*Ley General de Acceso de Las Mujeres a Una Vida Libre de Violencia* 2007). In an effort to eradicate violence against women in specific areas, in

³ However, this was only the case in scenarios where the state was the perpetrator of violence.

⁴ Women are also more likely to be victims of gender-based violence (Jaitman and Anauati 2019).

2015, gender violence alerts were introduced in several Mexican states (Instituto Nacional de las Mujeres 2015). In the last decade, 58 women's justice centers, which seek to provide psychological, medical, and judicial help to victims of violence, were created throughout the country (Comisión Nacional para Prevenir y Erradicar la Violencia Contra las Mujeres 2022). Figure 1 displays the various locations in Mexico with a women's justice center. Specialized units within the police, criminal justice system, and judicial system were also created with, more recently, a special prosecutor for the investigation of the crime of femicide being introduced in Mexico City.

Figure 1. Women's Justice Centers in Mexico



Source: INMUJERES 2022.

Third, Mexico experiences a number of other types of violence, including state and criminal, and from a variety of perpetrators that the experimental vignettes reflect current trends in victimization and violence. This variation allows me to identify if different types of victimization, specifically those that are non-violent and not gendered, affect justice preferences.

Vignette Experiment

In the vignette experiment, respondents will be presented with information regarding four different hypothetical crimes. Respondents will be randomly presented with one of the following four crimes: robbery, intimate partner violence, sexual violence, and homicide. The prompt given, in English, is:

We will now provide you with a scenario regarding violence in Mexico. Please read carefully and take note of your feelings and reflections following the prompt. We will ask you a few questions about it afterwards.

Suppose someone from your community was [robbed/beaten by their partner/sexually assaulted/killed]. The victim was a woman, and the perpetrator was a man.

Outcomes: Following the presentation of the vignette experiment, respondents will be asked:

“Which of the following options do you agree or disagree with?”

- a) The perpetrator should provide financial compensation to the victim.
- b) The perpetrator and victim should engage in mediation and conflict-resolution programs.
- c) The perpetrator should go to prison.
- d) The local community should punish the perpetrator.
- e) I don't know.
- f) Prefer not to answer.”

They will then be asked:

“How much do you support or oppose the outcome you chose?”

- a) Strongly support
- b) Support
- c) Neither support nor oppose
- d) Oppose
- e) Strongly oppose
- f) I don't know
- g) Prefer not to answer

Each respondent will only be asked this vignette prompt once. The corresponding justice outcomes are detailed in Table 1.

Table 1. Justice Outcomes

Response Option	Justice Outcome
A	Reparational justice (legal)
B	Restorative justice (legal)
C	Punitive justice (legal)
D	Vigilante justice (extralegal)

In this experiment, I measure the justice preference in response to the description of the GBV crime outlined in the vignette. The primary outcome variables are justice preferences as outlined in Table 1. There are four different vignettes that vary the severity of the GBV crime.

Pre-Treatment Covariates

The survey will include a set of basic demographic questions, including those in which established research demonstrates is highly correlated with the outcome variable (justice preferences) within victimized populations (Dow et al. 2023; Wilke 2023). An important portion of my theorization relies on respondents' gender and victimization status. Thus, alongside pre-treatment questions, I also include a set of questions to measure respondents' gender and prior victimization status.

1. Age
2. Sex
3. Race
4. Education level
5. State

6. Urban versus rural
7. Party ID
8. Presidential approval
9. Feminist ID
10. Media consumption
11. Trust in state institutions
12. Exposure to criminal violence/victimization status

5 Survey Sampling, Implementation Schedule, and Implementation Procedure

Surveys will be administered online using NetQuest. NetQuest is a widely used survey firm that provides nationally representative samples for research in Mexico.⁵ This online platform has access to millions of high-quality respondents across Mexico and has a good reputation of having a high response rate, ensuring inattentive users are not present in our study.

A random sample of panel-members (individuals 18 years and older) will be asked to complete the survey. Because I am interested in women's justice preferences, I will oversample women. Data collection began on September 18, 2023 and will stop once 1,200 respondents have completed the survey (ultimately on October 20, 2023).

6 Analyses

I will rely on linear regressions with independent and interactive effects between the main explanatory variables to identify the effect that they will have on the measurements of justice.

7 Power Analysis

This survey experiment includes one control and three treatments for a total of four combinations. The control and treatment designs are as follows:

Table 2. Arms of the Vignette Experiment

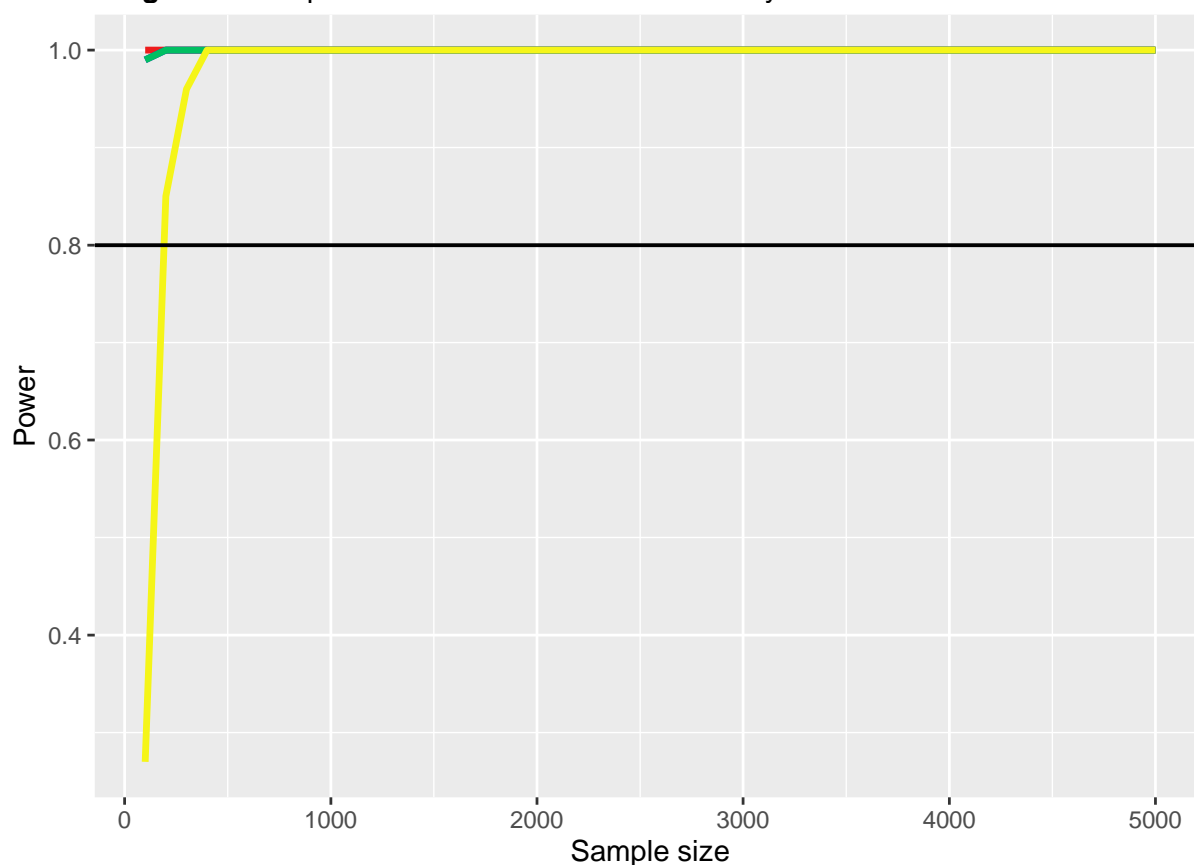
Type	Combination
Control	Robbed
Treatment	Beaten by their partner
Treatment	Sexually assaulted
Treatment	Killed

To estimate the expected levels of justice preferences, I rely on the average value (all responses are scaled from 0 to 100) and standard deviation of respondents' confidence that the judiciary will punish the guilty pooled from the LAPOP Data Playground V3.236.19.⁶ The overall average mean is 36.19 and the standard deviation is 32.42. Relying on these estimates and standard parameters ($\alpha = 0.05$ and $\text{power} = 0.80$), my survey requires 250 respondents for all comparisons to return significant results, if the relationship does indeed exist. See Figure 2. Please see Appendix 1 for the coding procedure for the Power Analysis.

⁵ For more information, please see: <https://www.netquest.com/en/online-surveys-investigation>.

⁶ For more information, please see: https://public.tableau.com/app/profile/lapop.central/viz/LAPOPV3_2/Combination?publish=yes.

Figure 2. Sample Size Estimates Based on Survey and Statistical Parameters



Note: Yellow represents the respondent size necessary for all comparisons to return significant differences, green represents the respondent size necessary for two of the three comparisons to return significant differences, and so forth. The horizontal black line is the standard power level of 0.80.

8 Heterogeneous Treatment Effects

Given Mexico's context as a country with high levels of corruption and violence, I expect age, exposure to criminal violence (prior crime victimization), institutional trust, and past experiences with corruption to be negatively associated with individuals' justice preferences. I will therefore include additional analyses which treat these control variables as interaction terms.

9 Research Ethics

As a researcher with expertise in gender and violence, I understand the ethical concerns that arise with asking questions regarding victimization and hypothetical scenarios of violence. Institutional review board (IRB) is the minimum requirement necessary to meet our institutions' ethical standards in order to conduct research. The survey questionnaire was reviewed by Cornell University's IRB (IRB0145443) and several Mexican civil society organizations that specialize in justice provision.

In order to make sure that I am not re-traumatizing respondents or causing harm, I took a number of steps to ensure that the survey questions we ask are in line with ethical guidelines. First, I emulated victimization questions in line with previous academic and government surveys that have been conducted in the country. Second, I shared the survey questionnaire and

instrument with a number of regional and thematic experts and incorporated their feedback when necessary. And third, I shared the survey questionnaire with numerous women's organizations and activists in order to make sure that the questions we are asking are in line with local understandings of these scenarios. Relatedly, respondents were able to skip or not answer any questions with which they were uncomfortable. Furthermore, to mitigate potential trauma for participants who may have experienced victimization themselves, the experiment intentionally provided concise and vague descriptions of the crimes.

Any additional analyses that are not specified in this PAP will be clearly noted in the paper to clarify that they were not pre-registered.

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Appendix 1 Power Analysis

```
rm(list=ls())
library(randomizr) # randomizr package for complete random assignment
library(ggplot2)
library(foreign)

# https://egap.org/resource/script-power-analysis-simulations-in-r/
# https://egap.org/resource/10-things-to-know-about-statistical-power/

## overall average mean from LAPOP Data Playground V3.2: Democratic support: Confidence
that the judiciary will Punish the Guilty (1-4): 36.19
## overall std. dev. (1-4): 32.42

### 4 Arms: 1 control + 3 Treatment Combos

possible.ns <- seq(from=100, to=5000, by=100)
power.atleastoneutr <- rep(NA, length(possible.ns))
power.atleastonecomp <- rep(NA, length(possible.ns))
power.alltr <- rep(NA, length(possible.ns))
power.all <- rep(NA, length(possible.ns))
alpha <- .05 #(one-tailed test at .05 level would be 0.1)
sims <- 100
##### Outer loop to vary the number of subjects #####
for (j in 1:length(possible.ns)){
  N <- possible.ns[j]
  p.T1vsC <- rep(NA, sims)
  p.T2vsC <- rep(NA, sims)
  p.T3vsC <- rep(NA, sims)
  p.T1vsT2 <- rep(NA, sims)
  p.T1vsT3 <- rep(NA, sims)
  p.T2vsT3 <- rep(NA, sims)
  c.T1vsC <- rep(NA, sims)
  c.T2vsC <- rep(NA, sims)
  c.T3vsC <- rep(NA, sims)
  c.T1vsT2 <- rep(NA, sims)
  c.T1vsT3 <- rep(NA, sims)
  c.T2vsT3 <- rep(NA, sims)
  ##### Inner loop to conduct experiments "sims" times over for each N #####
  ### baseline here for calculating tau difference is the "lowest" score estimate
  for (i in 1:sims){
    Y0 <- rnorm(n=N, mean=36.19, sd=32.42)
    tau_1 <- 1.2
    tau_2 <- .9
    tau_3 <- .6
    Y1 <- Y0 + tau_1
    Y2 <- Y0 + tau_2
    Y3 <- Y0 + tau_3
```

```

Z.sim <- complete_ra(N=N, num_arms=4)
Y.sim <- Y0*(Z.sim=="T5") + Y1*(Z.sim=="T1") + Y2*(Z.sim=="T2") + Y3*(Z.sim=="T3")
frame.sim <- data.frame(Y.sim, Z.sim)
fit.T1vsC.sim <- lm(Y.sim ~ Z.sim=="T1", data=subset(frame.sim, (Z.sim!="T2" &
Z.sim!="T3")))
fit.T2vsC.sim <- lm(Y.sim ~ Z.sim=="T2", data=subset(frame.sim, (Z.sim!="T1" &
Z.sim!="T3")))
fit.T3vsC.sim <- lm(Y.sim ~ Z.sim=="T3", data=subset(frame.sim, (Z.sim!="T1" &
Z.sim!="T2")))
fit.T1vsT2.sim <- lm(Y.sim ~ Z.sim=="T1", data=subset(frame.sim, (Z.sim!="T5" &
Z.sim!="T3")))
fit.T1vsT3.sim <- lm(Y.sim ~ Z.sim=="T1", data=subset(frame.sim, (Z.sim!="T5" &
Z.sim!="T2")))
fit.T2vsT3.sim <- lm(Y.sim ~ Z.sim=="T2", data=subset(frame.sim, (Z.sim!="T5" &
Z.sim!="T1")))

### Need to capture coefficients and pvalues (one-tailed tests, so signs are important)
c.T1vsC[j] <- summary(fit.T1vsC.sim)$coefficients[2,1]
c.T2vsC[j] <- summary(fit.T2vsC.sim)$coefficients[2,1]
c.T3vsC[j] <- summary(fit.T3vsC.sim)$coefficients[2,1]
c.T1vsT2[j] <- summary(fit.T1vsT2.sim)$coefficients[2,1]
c.T1vsT3[j] <- summary(fit.T1vsT3.sim)$coefficients[2,1]
c.T2vsT3[j] <- summary(fit.T2vsT3.sim)$coefficients[2,1]
p.T1vsC[j] <- summary(fit.T1vsC.sim)$coefficients[2,4]
p.T2vsC[j] <- summary(fit.T2vsC.sim)$coefficients[2,4]
p.T3vsC[j] <- summary(fit.T3vsC.sim)$coefficients[2,4]
p.T1vsT2[j] <- summary(fit.T1vsT2.sim)$coefficients[2,4]
p.T1vsT3[j] <- summary(fit.T1vsT3.sim)$coefficients[2,4]
p.T2vsT3[j] <- summary(fit.T2vsT3.sim)$coefficients[2,4]
}
power.atleastonetr[j] <- mean(c.T1vsC>0 & c.T2vsC>0 & c.T3vsC>0 &
(p.T1vsC < alpha/2 | p.T2vsC < alpha/2 | p.T3vsC < alpha/2))
power.atleastonecomp[j] <- mean(c.T1vsC>0 & c.T2vsC>0 & c.T3vsC>0 &
c.T1vsT2>0 & c.T1vsT3>0 & c.T2vsT3>0 &
(p.T1vsC < alpha/2 | p.T2vsC < alpha/2 | p.T3vsC < alpha/2 |
p.T1vsT2 < alpha/2 | p.T1vsT3 < alpha/2 | p.T2vsT3 < alpha/2
))
power.alltr[j] <- mean(c.T1vsC>0 & c.T2vsC>0 & c.T3vsC>0 & p.T1vsC < alpha/2 & p.T2vsC
< alpha/2 & p.T3vsC < alpha/2)
power.all[j] <- mean(c.T1vsC>0 & c.T2vsC>0 & c.T3vsC>0 &
c.T1vsT2>0 & c.T1vsT3>0 & c.T2vsT3>0 &
p.T1vsC < alpha/2 & p.T2vsC < alpha/2 & p.T3vsC < alpha/2 &
p.T1vsT2 < alpha/2 & p.T1vsT3 < alpha/2 & p.T2vsT3 < alpha/2)
print(j)
}

onetr<-as.data.frame(power.atleastonetr)
onetr$ID <- seq.int(nrow(onetr))

n<-as.data.frame(possible.ns)

```

```
n$ID <- seq.int(nrow(n))

oneall <- as.data.frame(power.atleastonecomp)
oneall$ID <- seq.int(nrow(oneall))

alltr <- as.data.frame(power.alltr)
alltr$ID <- seq.int(nrow(alltr))

all <- as.data.frame(power.all)
all$ID <- seq.int(nrow(all))

data <- merge(onettr, n, by=c("ID"), all=TRUE)
data <- merge(data, oneall, by=c("ID"), all=TRUE)
data <- merge(data, alltr, by=c("ID"), all=TRUE)
data <- merge(data, all, by=c("ID"), all=TRUE)

plot1 <- ggplot(data=data) +
  geom_line(aes(x=possible.ns, y=power.atleastonettr), color="#ed1c1c", size=1.2) +
  geom_line(aes(x=possible.ns, y=power.atleastonecomp), color="#1628c9", size=1.2) +
  geom_line(aes(x=possible.ns, y=power.alltr), color="#00bf62", size=1.2) +
  geom_line(aes(x=possible.ns, y=power.all), color="#f5f518", size=1.2) +
  theme_grey() +
  xlab("Sample size") +
  ylab("Power") +
  geom_hline(yintercept=0.8, color="black", size=0.7)

plot(plot1)
```

