Emily Donofrio

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An Analysis of Officer Perceptions of Police and Women's Cases

Background and Motivation

Gender based violence (GBV) is a worldwide issue. Studies have been conducted to investigate the role of police in the reporting and end result of GBV cases. In 2022, Sandip Sukhtankar, Gabrielle Kruks-Wisner, and Akshay Mangla published a study that implemented Women's Help Desks in police stations in India and found increased reporting of GBV at these stations. Throughout the study the researchers collected various forms of data including surveys of the officers about their perceptions of the police's role in women's cases. This data can be used to explore additional research questions and hypotheses.

Officer perceptions is an important subject to study as it plays an important role in women's cases. The opinions of an officer can have an impact on the interactions between the police and victim. In fact, negative victim/police interactions in SA cases are attributed primarily to police officers holding problematic attitudes about sexual assault victims (R. Campbell et al., 1999; Ullman & Filipas, 2001). This means that perceptions of officers do leak into the way they handle cases and treat victims. One of the most common reasons for attrition in SA cases is victim participation withdrawal (Feist, Ashe, Lawrence, McPhee, & Wilson, 2007). Thus, the perceptions of officers has an effect on whether the case will continue through the system and be fully investigated. According to RAINN, out of every 1000 sexual assaults in the United States, 310 will be reported to the police and only 50 will result in an arrest of any kind. There is a significant area of opportunity to improve those numbers by better understanding officer perceptions of women's cases and how to change them.

This opportunity motivated me to explore the officer perception survey data in the Sukhtankar, Kruks-Wisner, and Mangla study. Officer attitudes are a strong indicator of if a victim will have a positive

or negative experience with the police so it is useful to know what factors contribute to these perceptions. Additionally, this study presents a unique opportunity to investigate the incidental effect of implementing a Women's Help Desk in a police station on the opinions of the officers. Typically this initiative would be separate from bias training and other programs focused primarily on the officers' perceptions. However, if the study indicates that a byproduct of introducing Women's Help Desks is improved officer attitudes towards women's cases, then it could indicate opportunities for focused efforts and avoid the duplication of resources and funds.

Research Questions

These motivations led me to two specific research questions I aim to answer through analysis of the police perception survey data.

1. *Is there a relationship between officer gender and baseline perceptions of police's role in Crimes Against Women (CAW) cases?*

Question 1 focuses on the role of gender in officer perceptions. Gender is an important piece of CAW cases, as the crimes are against women and majority of the time inflicted by men. I hypothesized that due to this, female officers would have different perceptions on these cases and police's role in them than male officers. An important aspect of this question to call out is that it is about baseline perceptions, which is the officers' answers to questions at the very beginning of the study prior to any treatment.

2. *Does having a WHD impact the officers' perceptions of police's role in CAW cases?*
    a. *Can we predict change in perception based on treatment and other officer/station features?*

Question 2 looks at the change of officer perceptions from baseline to endline and whether there is a treatment effect from the Women's Help Desks. The goal of this question is to determine if officers significantly changed their perceptions and if so, if introducing Women's Help Desks to their stations had an effect on this change. If significant perception changes are seen with Women's Help Desks then it

would show that the program had incidental effects on the officer's attitudes towards women's cases. The second part of the questions asks about who specifically is most susceptible to experiencing this perception change. This question could be useful for allocating programming in order to have the greatest impact.

Data Description

The primary data sources for these research questions came from the officer surveys. For the first research question I utilized the baseline officer survey dataset. There are nine variables related to officer perceptions regarding women's cases that I chose to look into. Detailed descriptions of these variables are in Appendix Table 1. A relevant feature of this data is that it is largely unbalanced in survey responses from male and female officers (Figure 1).

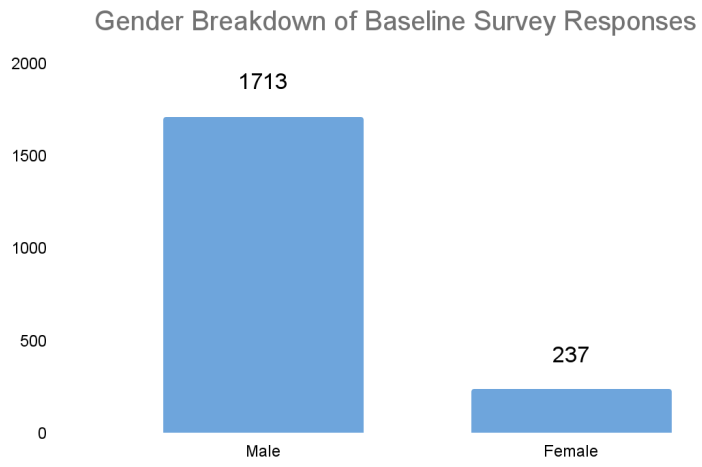

Figure 1: Gender Breakdown of Baseline Survey Responses

The full officer survey data contains data for both the baseline and endline surveys. However, the full data imputed values for baseline data when it was missing for the officer. I chose to inner join the baseline dataset onto the full data using the survey taker id in order to only get the records for which the officer completed the survey both at baseline and at endline. This is because I am interested in looking at the officer level differences and therefore do not want to compare a real datapoint to an imputed one. This resulting dataset contained 1068 rows. Both the full and baseline data had over 1900 rows, meaning they

each had about 800 records that did not have a match in the other dataset. Further investigation into which records did not have matches could be interesting and informative about the population as attrition is not negligible.

For both research questions, the perception variables needed to be transformed from the categorical survey answers to numbers. The dictionaries for mapping the responses to the numbers can be seen in Appendix Table 2.

Using the numerical perception variables, early data exploration was done to look at the distributions of the baseline perception variables, as well as the mean of each variable broken into gender. This gave insight into officer perception variables that had common answers versus ones with wider distributions, and gave a first look into which perceptions may differ by officer gender. Initial summary statistics showed the importance of women's cases to the officer as a variable that appeared to differ between genders (Figure xxx).

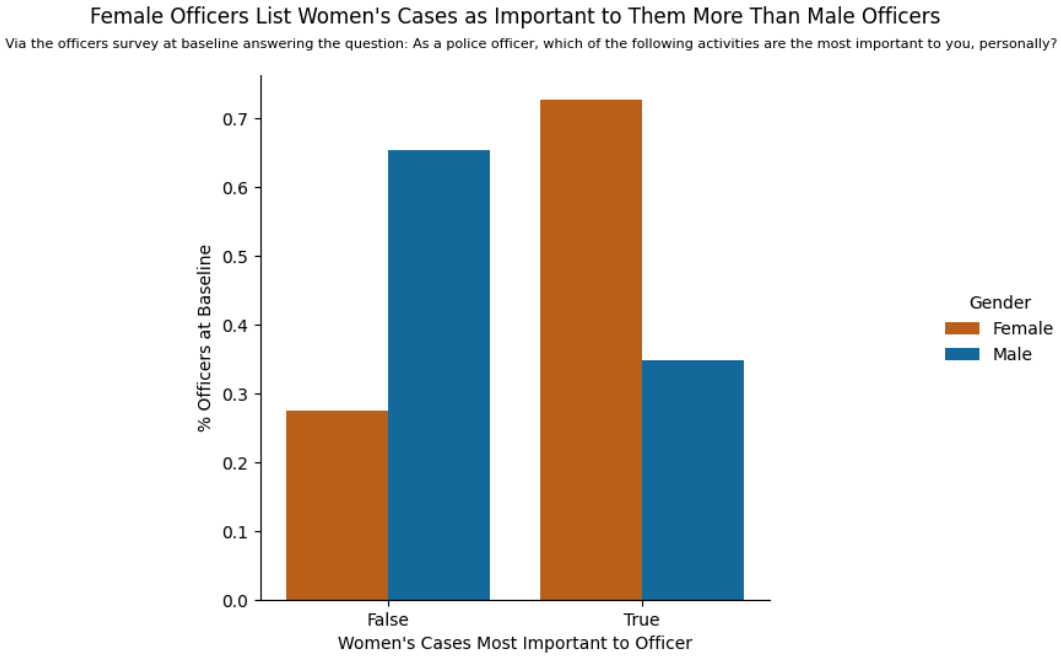

Figure 2: Female Officers List Women's Cases as Important to Them More Than Male Officers

For the second research question which focuses on change in perception from baseline to endline, I created the change in perception variables by subtracting the numerical baseline perception from the numerical endline perception. There were six change in perception variables, which is a decrease from the nine perception variables investigated in the first part of this research. I chose these variables due to their clear interpretability and numerical nature which allows us to see the magnitude and direction of change. Exploratory data analysis on these variables showed that at least 75% of officers surveyed had no change in their response from baseline to endline regarding officer perception of: attention to women's cases, police effectiveness, police helpfulness, and female officers being more effective (Table 1).

	Δ Attention to Women's Cases	Δ Police Effectiveness	Δ Police Helpfulness	Δ Effectiveness of Hiring More Officers	Δ Effectiveness of Hiring More Female Officers	Δ Female Officers More Effective
mean	0.04	-0.05	0.03	0.21	-0.92	-0.01
min	-2.00	-4.00	-3.00	-3.00	-3.00	-2.00
25%	0.00	0.00	0.00	0.00	-1.00	0.00
50%	0.00	0.00	0.00	0.00	-1.00	0.00
75%	0.00	0.00	0.00	1.00	-1.00	0.00
max	2.00	4.00	4.00	4.00	3.00	2.00

Table 1: Summary Statistics of Perception Changes

The endline to baseline changes show most officers did not have major changes in perception from baseline to endline. However, we are still interested in exploring if the officers that did report changes have features in common. Specifically, we want to use statistical techniques to investigate if those in treatment groups experience different changes in perception than those in control.

Methods

I used permutation hypothesis tests to examine whether the differences in male and female officers were statistically significant. I utilized a decision threshold of 0.05, meaning that the difference in

genders for each perception would be considered significant if the permutation tests find a difference as or more extreme as the observed difference in 5% or less of the permutations. The variables for which this is true, we can reject the null hypothesis that there is no difference in gender of officers.

Following these hypothesis tests, I ran a logistic regression to predict gender from the baseline perception variables. My goal was to reaffirm that the perceptions are significantly different between genders, enough that the gender of an officer can be predicted from their answers to the survey questions. I chose to only include the variables that are significant from the hypothesis test as my feature selection for this model.

To answer the second question, I once again started with permutation hypothesis tests. These tests were to determine if the change in perceptions from baseline to endline were significantly different whether the officer experienced the treatment of the women's help desk or not. For each perception change variable, if the permutation tests find a difference as or more extreme as the observed difference in 5% or less of the permutations then we can reject the null hypothesis that there is no difference in change of perception due to the implementation of Women's Help Desks.

The final step of this analysis was building a linear regression model to predict the change in perceived attention paid to women's cases to the officer at a station level. The features chosen were station level variables including population, total staff, percent of female staff at the station, and the treatment group assigned to the station.

Results

Six variables showed a significant difference between male and female officer's responses: Importance of Women's Cases to the Officer, Perceived Importance of Women's Cases to the Station, Perceived Police Helpfulness, Perceived Effectiveness of Hiring More Female Officers, Perceived Female Officers Better with Women's Cases, and Perceived Police Sensitivity (Table 2). From these significant differences we can make some observations about the differences of perception between male and female officers. Female officers list women's cases as an issue most important to them personally and to the

station more than male officers. Female officers perceive the police to be less helpful than male officers. Female officers perceive female officers to be better at handling women's cases more than male officers do.

Perception	Male mean	Female mean	True Difference	P-value
***Importance to Police**	0.35	0.73	-0.38	0.001
***Importance to Station**	0.40	0.47	-0.07	0.035
Attention to Women's Cases	2.68	2.63	0.05	0.134
Police Effectiveness	4.59	4.60	-0.01	0.830
***Police Helpfulness**	4.61	4.53	0.08	0.049
Effectiveness of Hiring More Officers	4.44	4.39	0.05	0.252
***Effectiveness of Hiring Female Officers**	4.51	4.64	-0.13	0.009
***Female Officers More Effective**	2.70	2.80	-0.10	0.015
***Police Sensitivity**	6.98	7.47	-0.49	0.004

Table 2: Perception variable means and difference by gender; permutation test p-values. * = p-value < 0.05

The logistic regression model that uses these six perception variables as predictors for gender of the officer reiterates the differences between genders. The overall accuracy of the model is 66%. Precision was high for males (94%) but low for females (21%) meaning it rarely predicted a female as male but often predicted males as females. 69% of females were accurately identified as females by the model, and 65% of males were accurately identified as males by the model. Overall, the model would need further tuning prior to implementing any predictive use cases. However, the performance of the model does appear to be better than random with an AUC of 0.71, indicating that these features are significantly different between male and female officers.

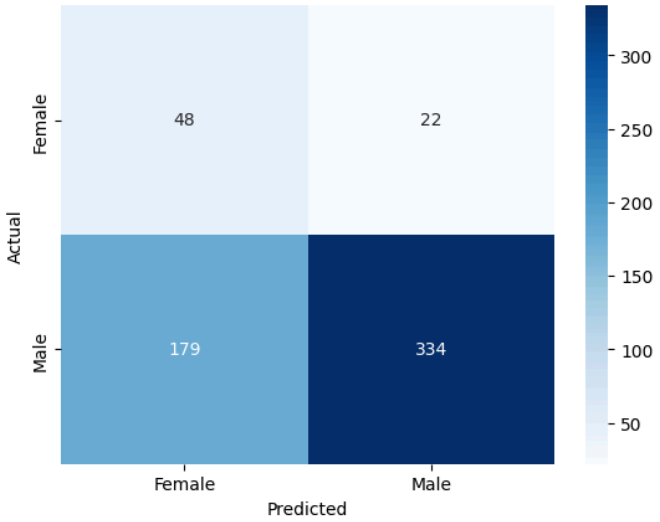

Figure 3: Logistic regression of officer gender confusion matrix

The only perception change from baseline to endline that shows significant differences between stations with and without Women's Help Desks, is the Perceived Attention to Women's Cases. There was an average treatment effect of -0.12 meaning that officers in the treatment group were more likely to change their answer to lower perceived attention paid to women's cases than they had perceived at baseline.

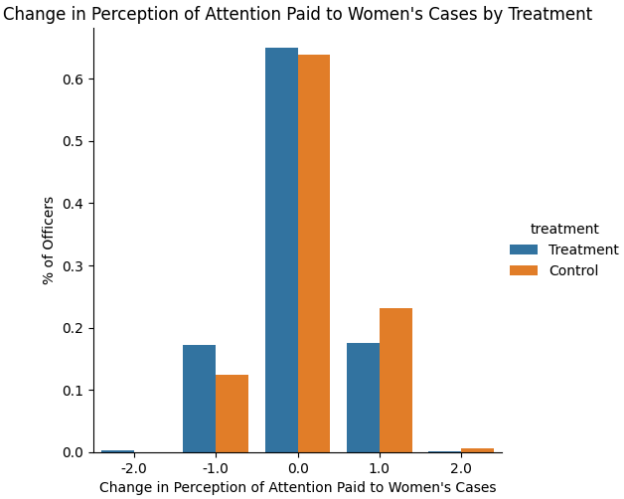

Figure 4: Change in Perception of Attention Paid to Women's Cases by Treatment

I was not able to build a successful linear regression model to predict change in attention paid to women's cases. The model's R-squared score is 6%. Based on the R-squared values and looking at Figure 5 it appears the model is performing essentially at random. Therefore, with current data limitations, change to perceived attention to women's cases was not able to be predicted. This means we cannot claim that these factors are significant in determining this change.

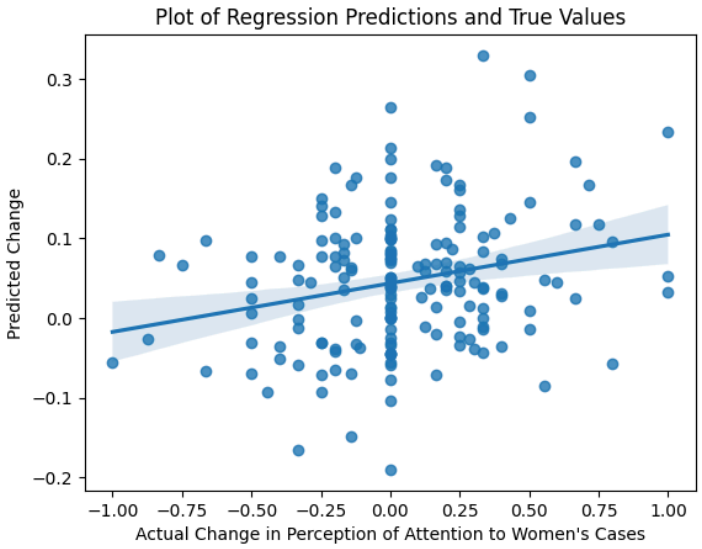

Figure 5: Plot of Linear Regression of Change in Perception of Attention to Women's Cases and True Values

Discussion

I experienced multiple challenges while investigating these research questions. One initial roadblock was the unbalanced gender breakdown of the data. Due to the heavy favoring of male officers, a logistic regression with the default parameters predicted all officers' genders to be male. The solution I chose to mitigate this was to add the parameter that balanced the class weights. This essentially changes the model from weighting each record equally to weighting male records less and female records more so that despite the uneven breakdown both genders are considered equally in the model.

I also encountered challenges while building the linear regression to predict change in perceived attention paid to women's cases. My first attempt for this model was at the officer level of granularity. However, there were only a few discrete values possible for the variable that was being predicted.

Looking at plots it was clear that linear regression may not be the ideal modeling technique for this data in this format. There were a few options to address this concern. One possibility was to change the model type to an ordinal logistic regression, or break the outcome variable into a few groups such as ‘increase’, ‘decrease’, and ‘no change’ and use a classification model. However, I decided to still utilize a linear regression but convert change in perceived attention paid to women’s cases into a more continuous variable. I did this by aggregating to the station level and taking the mean of the variable. This successfully made the outcome variable more suited for linear regression based on the shape when plotted, however it also resulted in some additional challenges. Inevitably, officer level variables such as gender were no longer able to be included as features in the model. Also, data size decreased from over 1000 records at the officer level to 180 records at the station level. This limits the model’s ability to detect patterns. Due to this lack of data, I chose to forgo a training and test data split for this model.

I also encountered ethical considerations throughout this project. GBV is a concerning issue that should be treated with caution and care. Victim well-being should be at the center of all programs and initiatives. This is relevant to my research because I use officer centered data. Previous studies show connections between officer attitudes and victim experience, however the victim experience as a whole should be considered in decision making. For example, the officer data showed statistically significant differences in perception between genders of officers. However, victim data should also be analyzed to determine if victims had better experiences with certain gendered officers and officers with certain perceptions. Also, the implementation of programs needs to be done in an ethical and fair way. Even if certain stations are predicted to have more benefit, that does not mean that others should not receive it as each of these stations have GBV victims who deserve improved experiences.

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Appendix

Appendix Table 1: Perception Variable Descriptions

Variable Name	Description
Importance to Police	True when "Pursuing cases related to women" is chosen as an answer to survey question: "As a police officer, which of the following activities are the most important to you, personally?"
Importance to Station	True when "Pursuing cases related to women" is chosen as an answer to survey question: "Which of the following activities are given the most importance in your current thana?"
Attention to Women's Cases	Answer to survey question: "Do you think cases related to women receive too much, too little, or just the right amount of attention by the police, relative to other crime and law and order issues?"
Police Effectiveness	Answer to survey question: "How effective do you think the MP police is, in general, in handling cases of crimes against women?"
Police Helpfulness	Answer to survey question: "How helpful do you think the police are in providing support to women who have been victims of violent crime?"
Effectiveness of Hiring More Officers	Answer to survey question: "Do you think hiring additional officers will make the police more or less effective in dealing with cases related to women?"
Effectiveness of Hiring Female Officers	Answer to survey question: "Do you think hiring additional female officers will make the police more or less effective in dealing with cases related to women?"
Female Officers More Effective	Answer to survey question: "Who do you think is more effective in dealing with cases related to women?"
Police Sensitivity	Index for perceptions of police's sensitivity in dealing with cases related to women

Appendix Table 2: Survey Response and Numerical Value Mappings

Category	Response Options	Value
Attention to Women's Cases	Not enough attention	1
	Too little attention	1
	Enough attention	2
	Too much attention	3
Police Effectiveness	Very ineffective	1
	Ineffective	2
	Neither effective nor ineffective	3
	Effective	4
	Very effective	5
Police Helpfulness	Very unhelpful	1
	Unhelpful	2
	Neither helpful nor unhelpful	3
	Helpful	4
	Very helpful	5
Effectiveness of Hiring More Officers	Much less effective	1
	Less effective	2
	No difference	3
	More effective	4
	Much more effective	5

Effectiveness of Hiring Female Officers	Much more effective	1
	More effective	2
	No difference	3
	Less effective	3
	Much less effective	5
Female Officers More Effective	Male	1
	No difference	2
	Female	3