

Seattle Police Department Gender Disparity in Promotions Report

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Background

Gender disparity in policing has garnered considerable attention over the previous several years, given that women are substantially underrepresented among police leadership. According to the 30X30 initiative (a nonprofit organization seeking to increase female police recruits to 30% by 2030) women currently make up about 3% of police leadership in the United States (<https://30x30initiative.org/about-30x30/>). Research indicates that gender bias exists within the promotions process, supported by broad assumptions within policing that men are more competent leaders (Todak, 2023). Female police employees have reported feeling less likely to fit in, less likely to be mentored for leadership positions, more likely to experience hostility in the organization, and more likely to face active discrimination or harassment than their male peers (Rief & Clinkinbeard, 2020).

Other reasons for under representation of women in police supervisor, management, and leadership positions are structural or systemic, for example challenges around childcare. In formal and informal interviews/focus groups, female police employees frequently cite incompatibility between professional and life goals. For example, women report being less willing to promote due to concerns about childcare or care of other dependents such as parents or elderly relatives (James, 2023). Rising to senior ranks appears to be highly dependent on adhering to the traditional long work hours culture, with a necessary insurance that family does not reduce work capacity. Researchers have described this gendered phenomenon as a “child tax” specific to female policing leaders (Alexander & Charman, 2024).

Gender disparities within policing is Global, with police organizations around the world calling for strategies and initiatives to increase the numbers of women in policing at all levels including leadership. Ample evidence exists that women bring unique benefits to the profession, such as increased ability to empathize with victims, de-escalate agitated community members, and generally promote public trust in police (Huff & Todak, 2023). The 30X30 initiative has made great strides towards identifying potential solutions that could engage more women in policing including police leadership. These include creating recruitment materials that highlight roles that are not gender specific, alleviating concerns about fitness requirements, fostering mentorships that engage women, fostering belonging, and instituting family-friendly accommodations that allow recruits to balance work and home life (DeWitt & [Gasparini](#), 2024).

The Seattle Police Department (SPD) has been concerned about issues of gender bias within the department and has taken several investigative steps to determine the extent and impact of this bias. One of these steps was to conduct a series of interviews with female officers and staff members as part of the 30*30 initiative (see separate report prepared by Dr. Lois James). Another step was to analyze promotions data over a period of approximately nine years to determine

whether male and female employees promote at different rates and to different ranks. This report documents the findings of that analysis.

Methods

The assessment of disparity is complex and multivariate. The method employed in the course of this study was selected for its rigor and accessibility. Propensity Score Weighting (PSW) methods function to produce a “statistically preprocessed quasi-experimental condition” closely approximating a Randomized Controlled Trial, generally regarded as the “gold standard” in research methodology (Maryland Scale 5). The result enables a simple comparison between groups (treatment and control – or in this instance being a female or male officer), where any observed difference is a real and true difference, “all things being equal.” A full technical appendix, including computer code enabling full transparency and replicability, is attached.

Data

This study analyzed data from the Seattle Police Department on promotions over the prior 9 years. All sworn members for this time period were included in the data, with a total of 2015 current and former employees who were active during the study period. Of these, 307 employees (15%) were women. Apart from gender, also included in this dataset were the following variables:

Table 1: Study Variables

Control Variables	Target Variables
Age	Number of Promotions
No. Of I/O Reports Written	Highest Rank Achieved
No. Of Certifications	Total Gross Earnings
No. Of Units the Employee has been part of	Complaints
Maximum Compensation Rate	
No. of Dispatched Calls for Service	
Military Experience	
Race	
Total Hours Worked	
Last Year Worked	

All variables are collected from SPD’s Data Analytics Platform (DAP). The “number of promotions” and “highest rank achieved” variables are constructed based on the title rankings shown in Table 2. Specifically, every time an officer’s positional rank increases (even if temporarily), it is considered a promotion. However, “acting” or “interim” positions are ranked lower than permanent assignments of the same position. Although SPD considers “detective” to be an assignment, they recognize the opportunity afforded by time in this role and treat these assignments as a rank increase. Other titles held by the sworn employees not included in Table 2 (such as community service officer or evidence warehouse) were excluded.

Table 2: Rank Structure

POLICE RECRUIT	1	ACTING POLICE LIEUTENANT	11
POLICE STUDENT OFFICER	2	POLICE LIEUTENANT	12
POLICE OFFICER PROBATION	3	ACTING POLICE CAPTAIN	13
POLICE OFFICER	4	POLICE CAPTAIN	14
ACTING POLICE OFFICER DETECTIVE	5	ACTING ASSISTANT CHIEF	15
POLICE OFFICER DETECTIVE	6	ASSISTANT CHIEF OF POLICE	16
ACTING POLICE SERGEANT	7	INTERIM DEPUTY CHIEF OF POLICE	17
POLICE SERGEANT	8	DEPUTY CHIEF OF POLICE	18
ACTING POLICE SERGEANT DETECTIVE	9	INTERIM CHIEF OF POLICE	19
POLICE SERGEANT DETECTIVE	10	CHIEF OF POLICE	20

Of particular interest for this analysis was whether “number of promotions”, “highest rank achieved”, “total gross earnings” and “complaints” were significantly different for men and women. Given the disparity in numbers, balancing was required within the dataset to estimate true disparity. For this, Propensity Score based statistical preprocessing technique, Propensity Score Weighting (PSW) was used to address the extreme imbalance in the minority class. This technique is commonly applied to prevent the formation of a Simpsons Paradox (inversion of the treatment effect) (Posner & Ash, 2012).

PSW is a statistical method that matches people in different groups based on similar characteristics to reduce bias and estimate the impact of belonging to that group on a variable of interest. In this case, the propensity of each employee to be female was used as a weight, which balances the sample on all variables (age, race, work hours, complaints etc.) that might explain any differences in number of promotions or highest rank achieved. PSW is important because it helps ensure that groups are comparable before comparing outcomes. For example, if women in the sample (hypothetically) were more likely to have sustained complaints, that might be responsible for any observed differences in promotion rates. Or, if men in the sample (hypothetically) worked more hours that might also explain differences in promotion rates. PSW helps to balance out other factors to estimate the true “treatment” effect—in this case the effect of gender.

Once PSW was completed on the dataset, a new “balanced” gender variable was created that was then used as the predictor in regression models to see whether gender significantly predicted both: 1) number of promotions; and 2) highest rank achieved. Additional models were also run for “total gross earnings” and “complaints” to determine whether gender significantly impacted these variables.

Results

Table 3: Results of regressions models testing the impact of gender (following propensity score weighting) on target variables

Target Variable	EST	SE	Significance	95% CI
Number of Promotions	0.004	0.08	0.96	(-0.147, 0.155)
Highest Rank Achieved	0.146	0.12	0.24	(-0.096, 0.389)
Complaints Received	-0.530	0.58	0.36	(-1.657, 0.596)
Gross Income Received	-36,391	11,859	<.001	(-59635.4, -13148.2)

The number of promotions received between men and women was not significantly different following propensity score weighting ($p=0.96$). Both men and women in the sample promoted an average of two times over the 9-year period. Neither was the difference between highest rank based on gender significant ($p=0.24$). The average “highest rank” in the sample for both men and women was police officer detective. Although women did receive fewer complaints than men on average (approximately 25% fewer), this difference was not significant following weighting ($p=0.36$).

Finally, the gross income received was higher for men than women across the study period (on average a \$37,000 difference across the 9-year time frame). Following propensity score weighting (which accounts for hours worked) the disparity in gross income received was 3.7%. This difference was statistically significant ($p=0.002$) and is represented in figure 1 and table 4. Reasons for this potential disparity are discussed in the next section.

Figure 1: Scatterplot of hours worked and dollars earned (raw data)

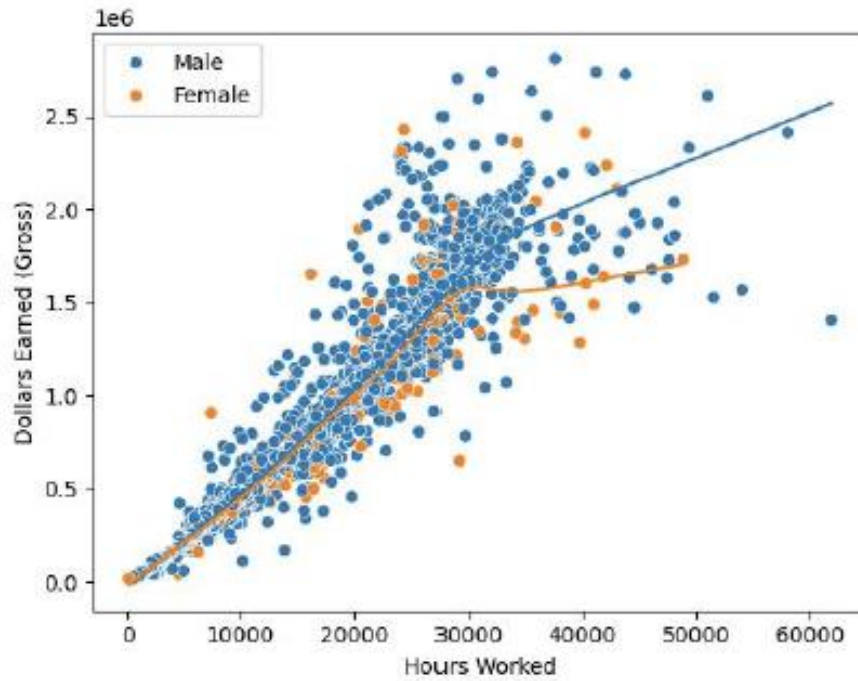


Table 4: Dollars earned per hour by highest rank and gender.

Highest Rank	Males			Females		
	Max. Comp. Rate			Max. Comp. Rate		
	count	mean	std	count	mean	std
Police Recruit (1)	2	43.1	2.5	1	50.0	-
Police Student Officer (2)	96	46.8	5.8	15	46.1	5.8
Police Officer Probation (3)	33	49.3	5.7	3	49.5	6.7
Police Officer (4)	839	74.2	15.8	126	69.3	15.2
Acting Police Officer Detective (5)	77	75.1	12.8	21	76.2	14.4
Police Officer Detective (6)	192	88.1	12.3	78	87.7	11.9
Acting Police Sergeant (7)	64	83.2	12.8	5	82.5	17.5
Police Sergeant (8)	148	93.1	12.7	17	94.3	14.3
Acting Police Sergeant Detective (9)	30	92.4	9.4	4	88.3	13.6
Police Sergeant Detective (10)	51	96.7	12.1	10	90.6	9.6
Acting Police Lieutenant (11)	32	99.0	13.0	2	110.9	4.2
Police Lieutenant (12)	73	102.7	12.0	14	99.2	8.0
Acting Police Captain (13)	16	110.1	8.2	2	98.3	13.0
Police Captain (14)	37	112.6	15.1	2	113.7	14.9
Acting Assistant Chief (15)	4	127.3	11.9	1	107.4	-
Assistant Chief of Police (16)	11	123.6	16.0	3	128.2	7.0
Interim Deputy Chief of Police (17)	1	105.6	-	0	-	-
Deputy Chief of Police (18)	1	141.3	-	0	-	-
Interim Chief of Police (19)	0	-	-	1	167.6	-
Chief of Police (20)	1	162.8	-	2	136.0	6.8

Discussion

That women in the sample received approximately equivalent number of promotions and rose to approximately equivalent ranks was encouraging. It is possible that this speaks to SPD awareness of gender disparities and represents attempts to prevent or even counter those disparities. Caution should be taken in interpreting this finding as evidence of a lack of any gender bias within the organization, especially in light of differences observed in total dollar earnings between men and women.

Previous research suggests that gender bias exists within the promotion process and that women are less likely to put themselves forward for promotion. The current study indicates that within the SPD during this time frame women promoted at equivalent rates and to equivalent ranks. Whether they experienced more difficulty doing so is unfortunately beyond the scope of this data. Behery and colleagues (2017) describe a “glass ceiling effect” as invisible barriers applying to women that are more challenging for them to overcome than for their male counterparts. Barriers such as bias (for example within selection committees), structural factors (for example lack of childcare options), or personal reasons (for example wanting less hours). Again, this would require qualitative data to investigate however we caution against assuming it did not exist based on these findings.

The third finding in this study—that women were approximately 25% less likely to receive community member complaints than men—is supported by substantial evidence from the research literature (Hickman et al., 2000; Lonsway et al., 2002; [Porter & Prenzler, 2017](#)). Although apparently meaningful, this finding was not statistically significant, indicating that it cannot be ruled out that women received fewer complaints by chance than based on their gender. A gender effect on complaints has been found in prior studies on women in policing and has been attributed to the “ethic of care” that women tend to be more empathetic, more prone to de-escalation, less likely to use coercive force, and more likely to peacefully problem solve than male officers (Rabe-Hemp, 2008). Other studies have found that women promote public trust in police (Barnes et al., 2018), treat victims of crime more caringly (Lockwood & Prohaska, 2015), are more organizationally efficient (Shuck & Rabe-Hemp, 2016), and are less likely to be involved in misconduct and brutality (Spillar et al., 2000).

The final study finding was that women earned significantly less gross pay over the study period. After adjusting for hours worked, a 3.7% gender disparity was observed. It is important to note that adjusting for hours worked does not account for differences in pay between regular salary (it is very unlikely that there is a base pay disparity between men and women in the SPD) by rank and overtime rates. Men in the sample did work more hours than women, which indicates increased overtime at an increased pay rate. This speaks to the potential “kid tax” mentioned in the introduction section—men are taking advantage of overtime opportunities more than women. It is also possible that men were more likely to receive particular assignments that may have been more lucrative. This however is next to impossible to determine in the absence of qualitative data, for example interviews with women officers to determine whether they tend to work less hours than men because of kids, because they wanted to, or because they weren’t

offered attractive overtime assignments. If the latter, then that could speak to a broader pay disparity within the department.

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Appendix A: Propensity Score Weighting Technical Report

Data Cleaning

Given the nature of the data, we assume that missing counts of dispatched calls for service, reports written, and sustained complaints imply a value of zero for a given employee. Missing values of the “military experience” indicator are also assumed to be zero. It is important to note that a missing value in this indicator could be due to a lack of reporting by the employee.

Estimation of Gender Differences

Inverse Probability Weighting (IPW) is implemented to balance gender groups on potential confounders, creating groups that are comparable on observed characteristics. The balanced groups are compared on number of promotions, highest rank held, and dollars earned (gross).

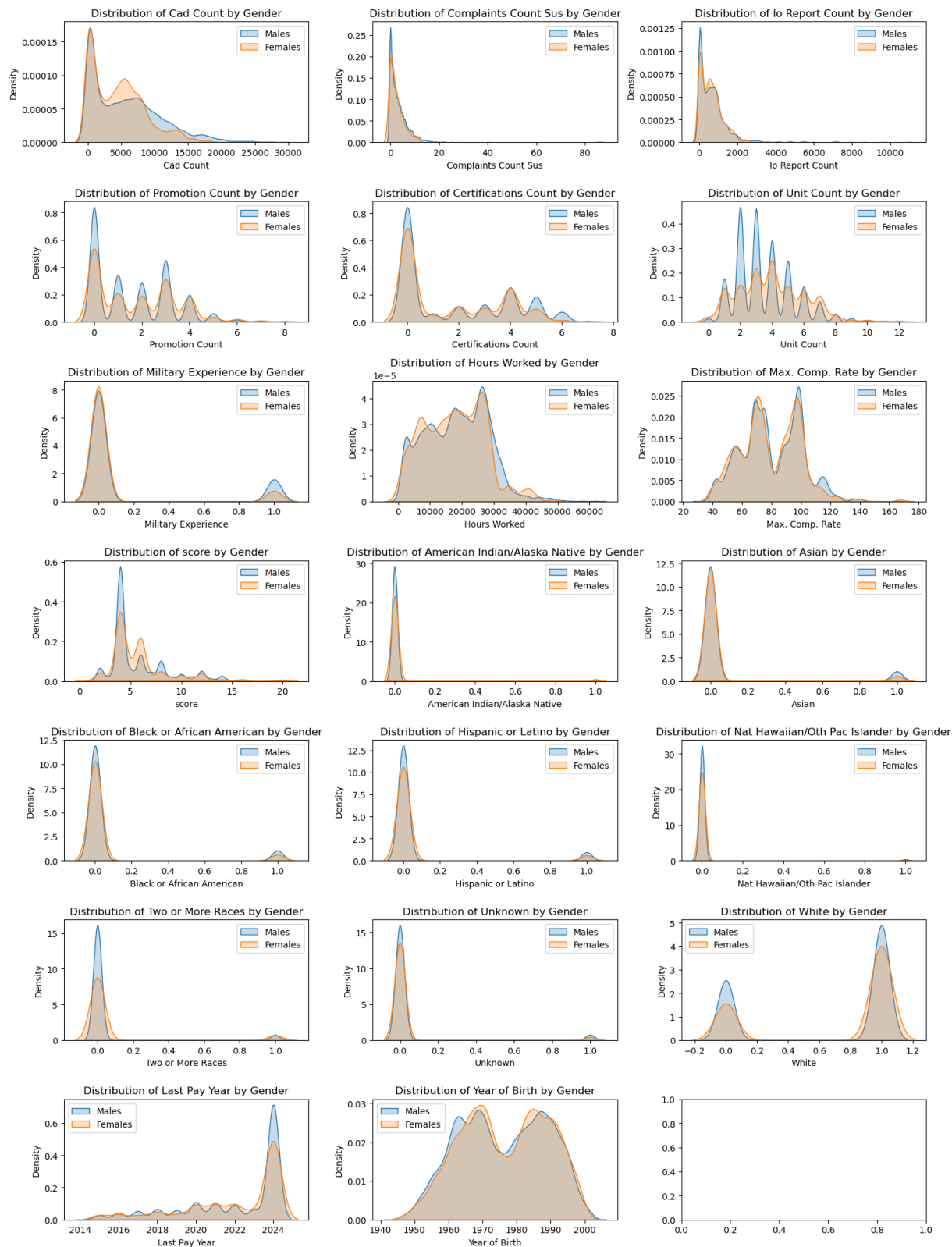
We take a theoretical approach to model specification, including a mix of variables that confound the relationship between each outcome variable and gender, as well as other variables that are associated with the outcome variables in the propensity score estimation model for each of the outcome variables. Specifically:

- 1) The propensity of each employee to be female, $p(\text{Gender}_i)$ given a set of characteristics is estimated through a logistic regression of gender as a function of these covariates. The included covariates are race, year of birth, number of dispatched calls for service, number of sustained complaints against them, number of certifications, number of units an employee has been part of, an indicator of military experience, the total number of hours worked to date, number of incident/offense reports written, maximum compensation rate, last pay year, and the remaining two outcome variables not used as the dependent variable in the given model.
- 2) We trim the sample by removing employees whose propensity scores are extremely high or low since it makes it unlikely to find comparable employees in the opposite group. We present results with trimmed and untrimmed samples.
- 3) A weighted least squares regression is employed to estimate the average difference between genders, where the weights for females are calculated as $\frac{1}{\hat{p}(\text{Gender}_i)}$ and the weights for males are equal to $\frac{1}{1-\hat{p}(\text{Gender}_i)}$.

Results

Dollars Earned (Gross)

Covariate Distributions before balancing



Standardized Mean Differences before balancing and raw difference in outcome

	Male (N=1708)		Female (N=307)		
Variable	Mean	S.d.	Mean	S.d.	Raw-diff
Dollars Earned (Gross)	984,647.022	583608.38	893,654.1	541859.8	-90,992.9
Variable	Mean	S.d.	Mean	S.d.	SMD
Cad Count	5711.241	5197.321	4508.176	3949.58	-0.261
Complaints Count Sus	3.192	3.74	2.736	5.582	-0.096
IO Report Count	653.06	774.331	642.134	744.662	-0.014
Promotion Count	1.597	1.599	1.752	1.674	0.095
Certifications Count	1.852	2.125	1.619	1.91	-0.116
Unit Count	3.508	1.782	3.977	2.109	0.24
Military Experience	0.166	0.372	0.085	0.279	-0.246
Hours Worked	18535.941	9815.994	17750.4	9593.474	-0.081
Max. Comp. Rate	80.108	20.231	79.172	20.484	-0.046
Highest Rank	5.763	3.006	5.831	3.025	0.022
American Indian/Alaska Native	0.014	0.118	0.013	0.114	-0.009
Asian	0.077	0.267	0.042	0.202	-0.148
Black or African American	0.08	0.272	0.055	0.229	-0.099
Hispanic or Latino	0.068	0.252	0.052	0.223	-0.066
Nat Hawaiian/Oth Pac Islander	0.012	0.108	0.01	0.099	-0.019
Two or More Races	0.046	0.209	0.075	0.264	0.123
Unknown	0.046	0.21	0.033	0.178	-0.07
White	0.657	0.475	0.72	0.45	0.136
Last Pay Year	2022.004	2.644	2021.977	2.62	-0.01
Year of Birth	1975.94	12.812	1976.469	12.577	0.042

Difference in Outcome (from weighted least squares) – No trimming (i.e., entire sample)

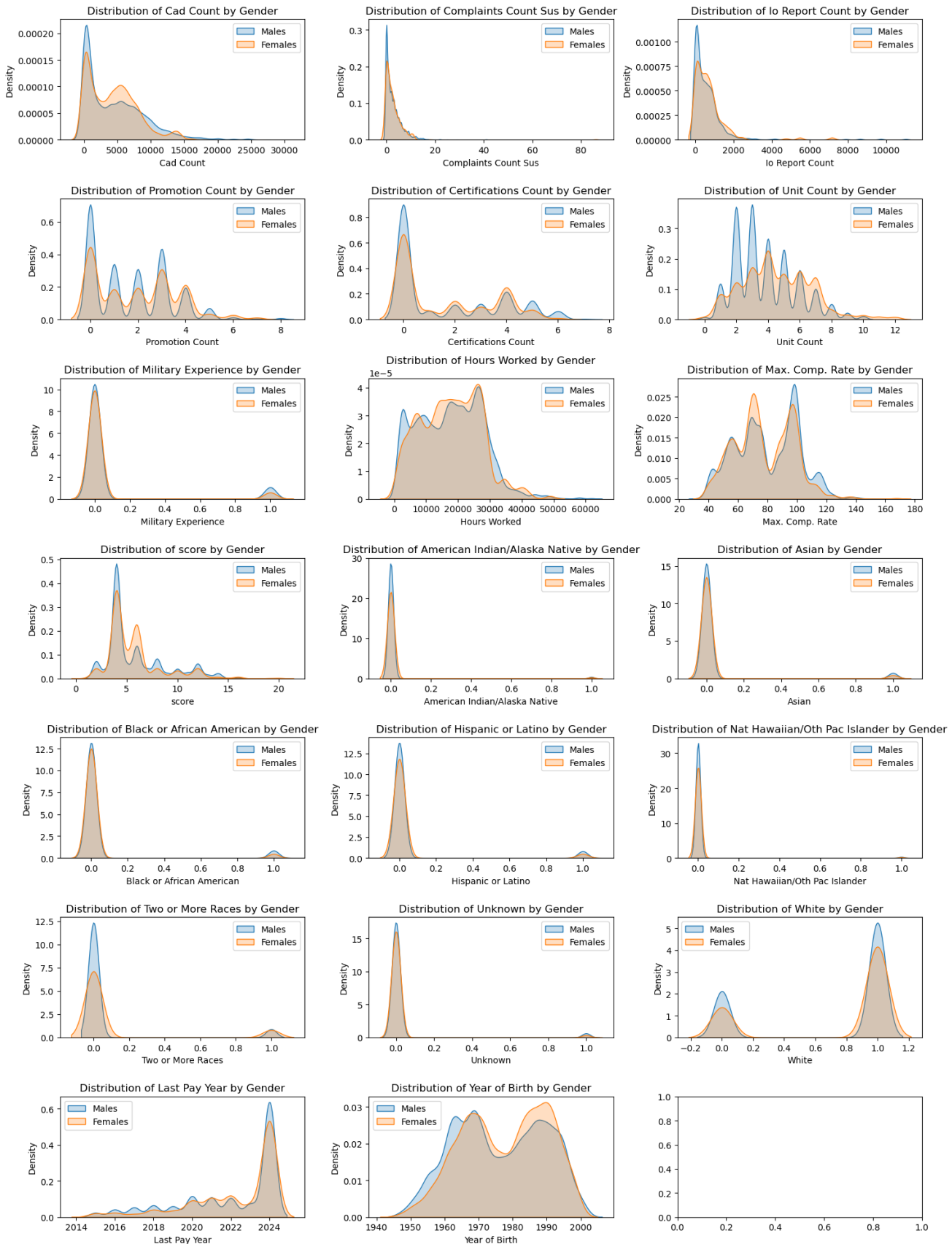
	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	-36,391.8	11859	-3.069	0.002	(-59635.4, -13148.2)

As a percentage of the non-conditional unbalanced dollars earned average, females make (36,391.8/984,647.02) 3.7% less dollars than males.

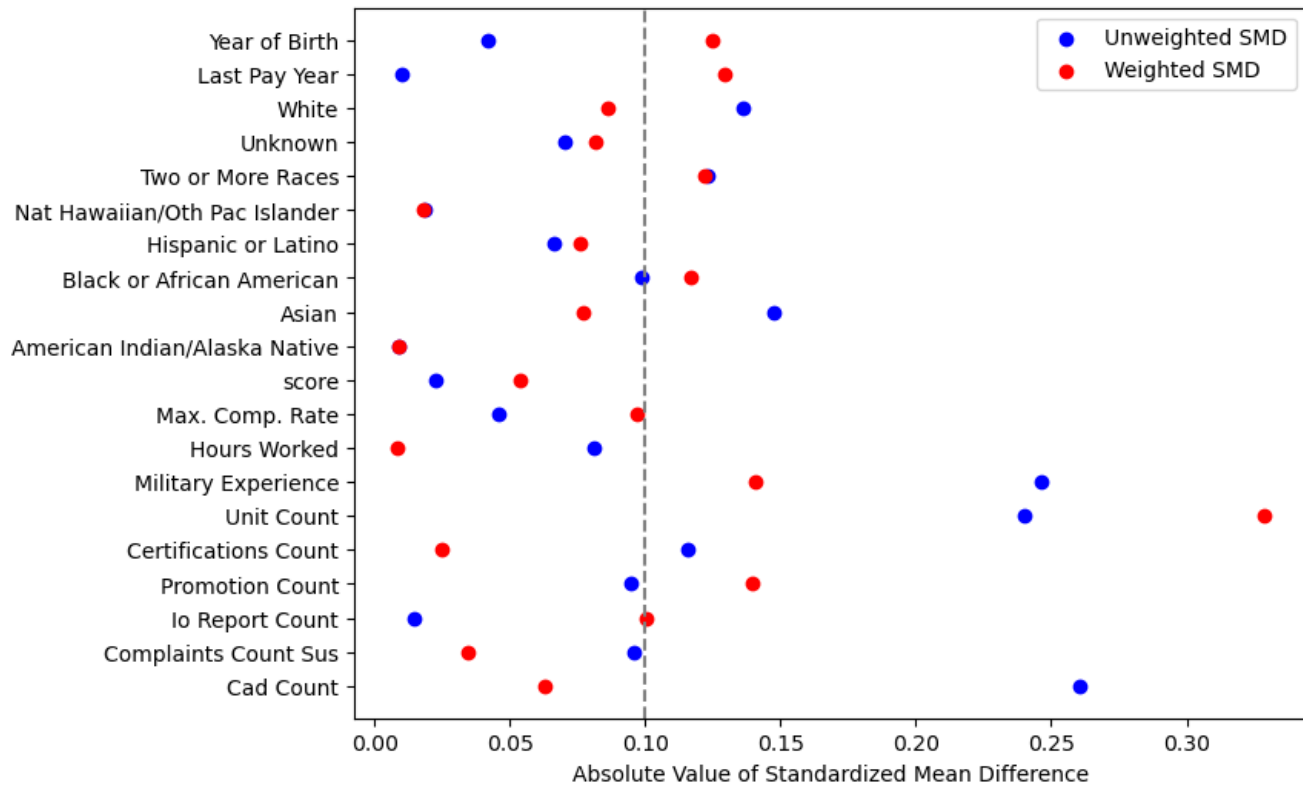
Difference in Outcome (from weighted least squares) – Trimmed Sample (1,467 Males and 295 Females)

	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	-30,473.2	11476.5	-2.655	0.008	(-52967.1, -7979.2)

Covariate Distributions after balancing

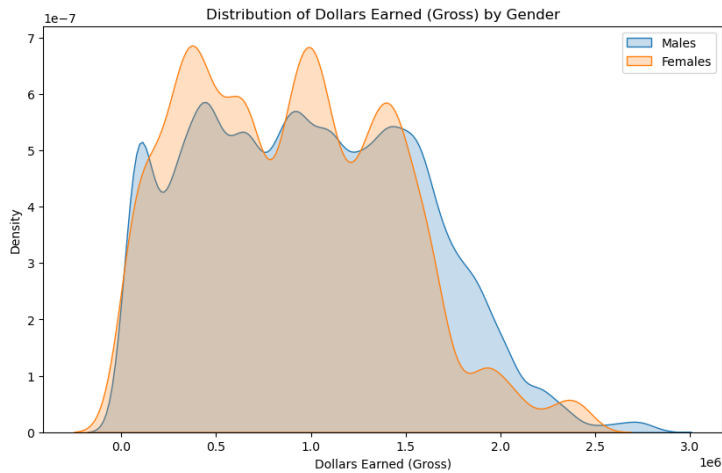


Love Plot of Standardized Mean Differences



Promotions Count

Distributions are the same as above, adding dollars earned to covariates and removing promotion count:



Standardized Mean Differences before balancing and raw difference in outcome

	Male (N=1708)		Female (N=307)		
Variable	Mean	S.d.	Mean	S.d.	Raw-diff
Promotion Count	1.597	1.599	1.752	1.674	0.155
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Dollars Earned (Gross)	984647	583608.4	893654.1	541859.8	-0.162
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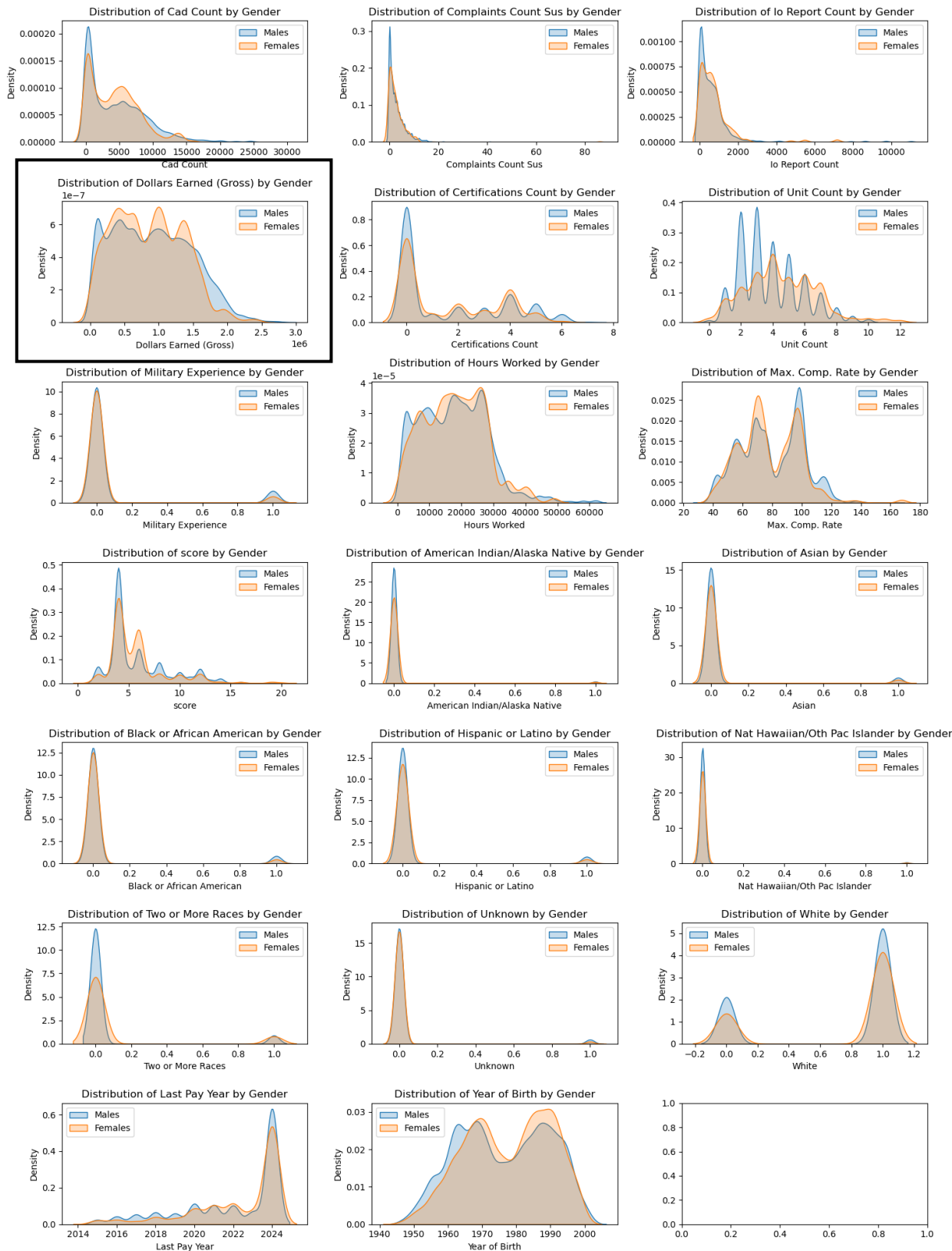
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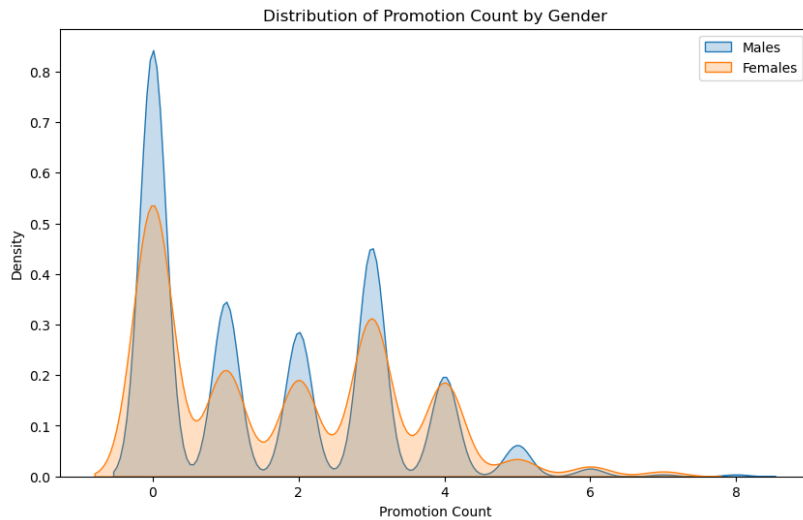
	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	-0.033	0.070	-0.471	0.638	(-0.170, 0.104)

Covariate Distributions after balancing



Highest Rank

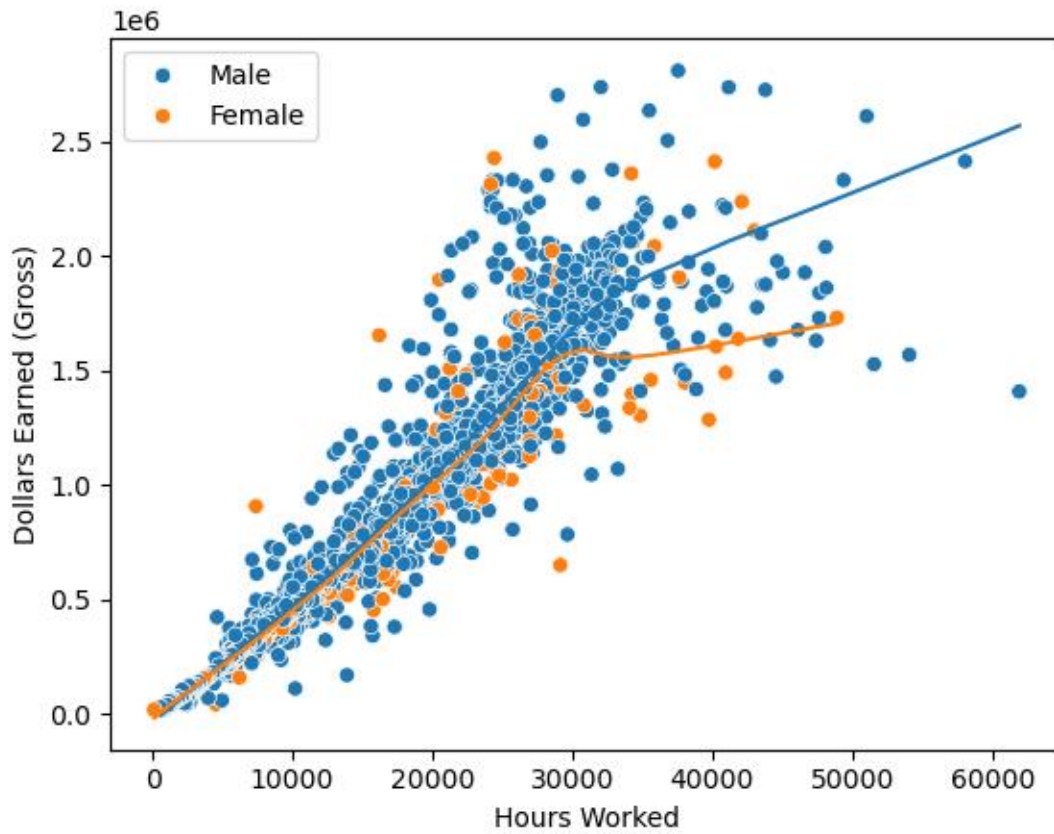
Distributions are the same as above, adding promotion count to covariates and removing highest rank:



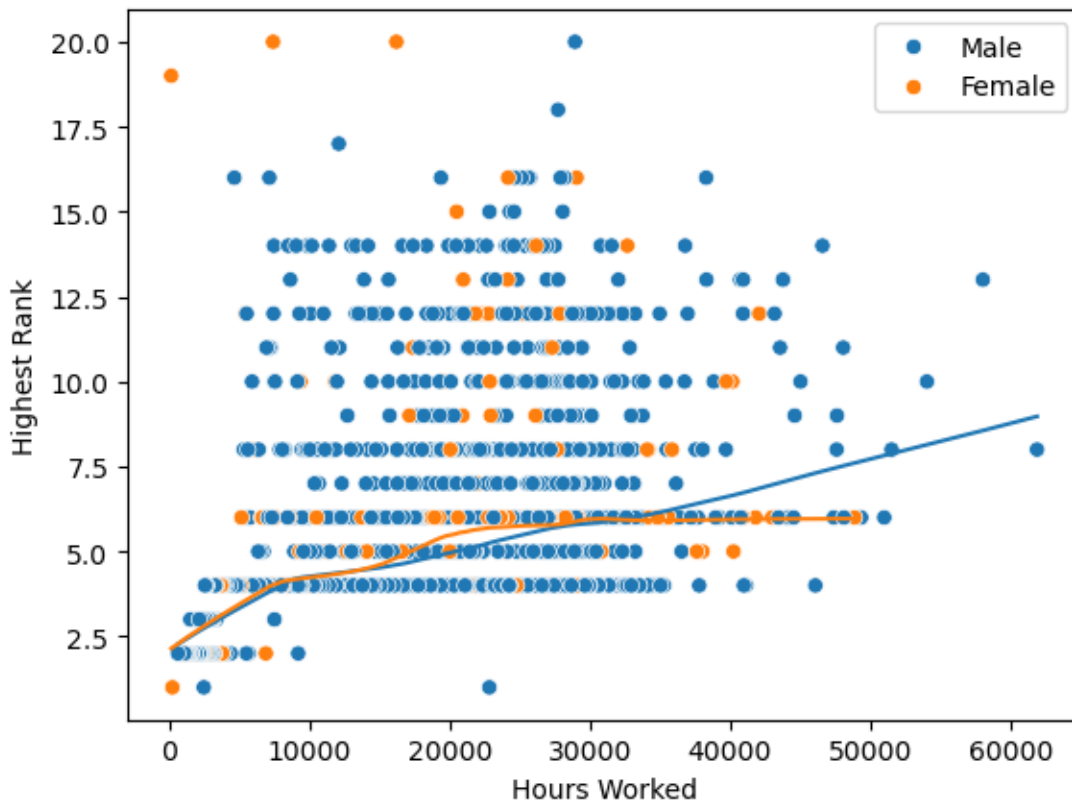
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Scatterplot of Hour Worked and Dollars Earned by Gender with LOWESS curve (Raw Data)



Scatterplot of Hours Worked and Highest Rank by Gender with LOWESS curve (Raw Data)



Average Max Compensation Rate by Highest Rank and Gender

	Males			Females		
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Police Officer (4)	839	74.2	15.8	126	69.3	15.2
Acting Police Officer Detective (5)	77	75.1	12.8	21	76.2	14.4
Police Officer Detective (6)	192	88.1	12.3	78	87.7	11.9
Acting Police Sergeant (7)	64	83.2	12.8	5	82.5	17.5
Police Sergeant (8)	148	93.1	12.7	17	94.3	14.3
Acting Police Sergeant Detective (9)	30	92.4	9.4	4	88.3	13.6
Police Sergeant Detective (10)	51	96.7	12.1	10	90.6	9.6
Acting Police Lieutenant (11)	32	99.0	13.0	2	110.9	4.2
Police Lieutenant (12)	73	102.7	12.0	14	99.2	8.0
Acting Police Captain (13)	16	110.1	8.2	2	98.3	13.0
Police Captain (14)	37	112.6	15.1	2	113.7	14.9
Acting Assistant Chief (15)	4	127.3	11.9	1	107.4	-
Assistant Chief of Police (16)	11	123.6	16.0	3	128.2	7.0
Interim Deputy Chief of Police (17)	1	105.6	-	0	-	-
Deputy Chief of Police (18)	1	141.3	-	0	-	-
Interim Chief of Police (19)	0	-	-	1	167.6	-
Chief of Police (20)	1	162.8	-	2	136.0	6.8

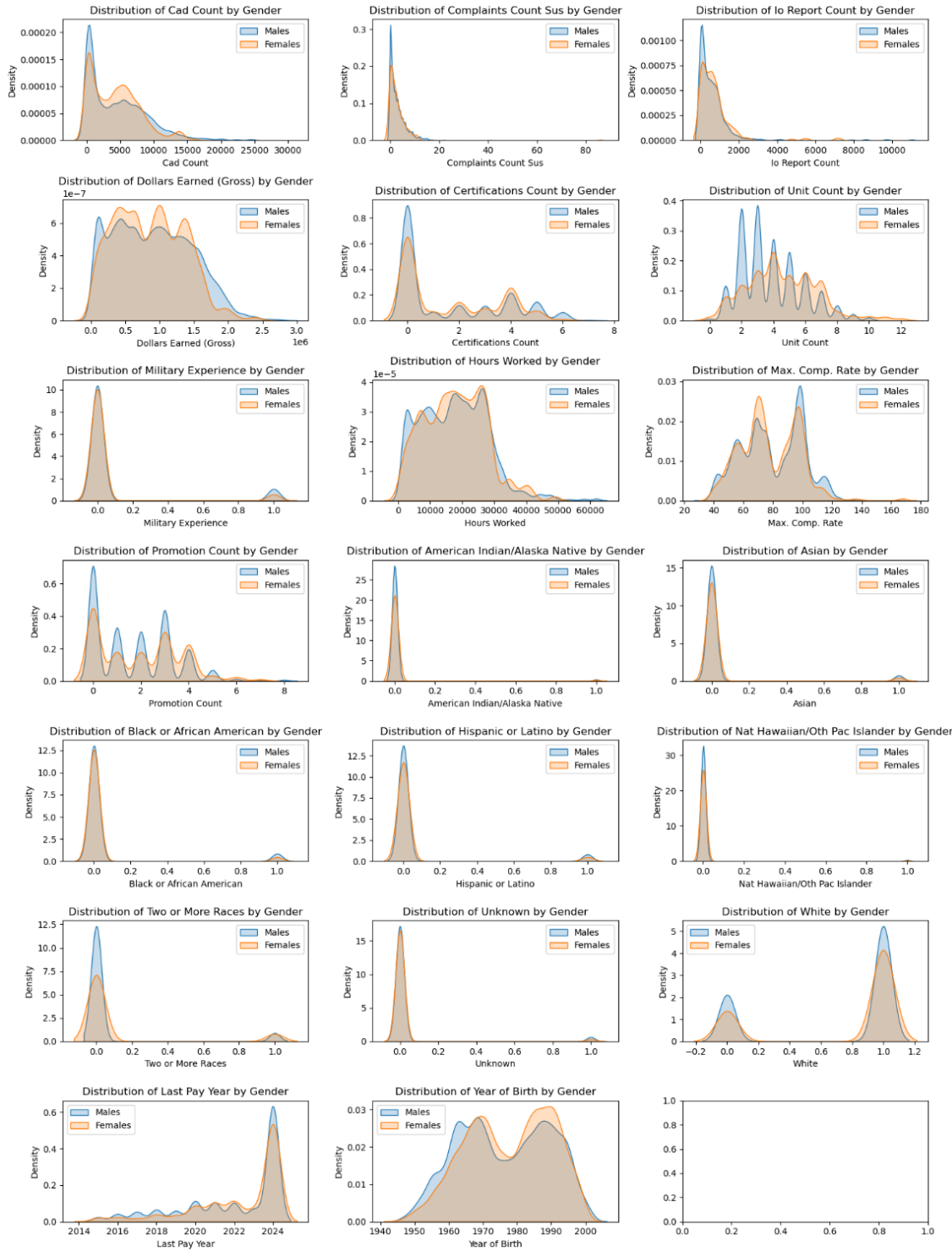
Difference in Outcome (from weighted least squares) – No trimming (i.e., entire sample)

	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	0.146	0.124	1.185	0.236	(-0.096, 0.389)

Difference in Outcome (from weighted least squares) – Trimmed Sample (1,405 Males and 293 Females)

	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	0.154	0.126	1.219	0.223	(-0.093, 0.401)

Covariate Distributions after balancing



Complaints Count

Standardized Mean Differences before balancing and raw difference in outcome

	Male (N=1708)		Female (N=307)		
Variable	Mean	S.d.	Mean	S.d.	Raw-diff
Complaints Count	6.228	7.086	4.762	6.798	-1.466
Variable	Mean	S.d.	Mean	S.d.	SMD
Cad Count	5711.241	5197.321	4508.176	3949.58	-0.261
Highest Rank	5.763	3.006	5.831	3.025	0.022
IO Report Count	653.06	774.331	642.134	744.662	-0.014
Dollars Earned (Gross)	984647	583608.4	893654.1	541859.8	-0.162
Certifications Count	1.852	2.125	1.619	1.91	-0.116
Unit Count	3.508	1.782	3.977	2.109	0.24
Military Experience	0.166	0.372	0.085	0.279	-0.246
Hours Worked	18535.94	9815.994	17750.4	9593.474	-0.081
Max. Comp. Rate	80.108	20.231	79.172	20.484	-0.046
Promotions Count	1.597	1.599	1.752	1.674	0.095
American Indian/Alaska Native	0.014	0.118	0.013	0.114	-0.009
Asian	0.077	0.267	0.042	0.202	-0.148
Black or African American	0.08	0.272	0.055	0.229	-0.099
Hispanic or Latino	0.068	0.252	0.052	0.223	-0.066
Nat Hawaiian/Oth Pac Islander	0.012	0.108	0.01	0.099	-0.019
Two or More Races	0.046	0.209	0.075	0.264	0.123
Unknown	0.046	0.21	0.033	0.178	-0.07
White	0.657	0.475	0.72	0.45	0.136
Last Pay Year	2022.004	2.644	2021.977	2.62	-0.01
Year of Birth	1975.94	12.812	1976.469	12.577	0.042

Difference in Outcome (from weighted least squares) – No trimming (i.e., entire sample)

	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	-0.530	0.575	-0.923	0.356	(-1.657, 0.596)

Difference in Outcome (from weighted least squares) – Trimmed Sample (1,404 Males and 294 Females)

	Est.	S.E.	z	P> z	[95% CI]
Avg. Difference (Female - Male)	-0.208	0.526	-0.396	0.692	(-1.238, 0.822)