UNIVERSITY of HOUSTON
COLLEGE OF MEDICINE

Salary and Rank Differences at Houston College of Medicine

Debunking False Claims Through Data Analytics

AN6003 – Analytics Strategy
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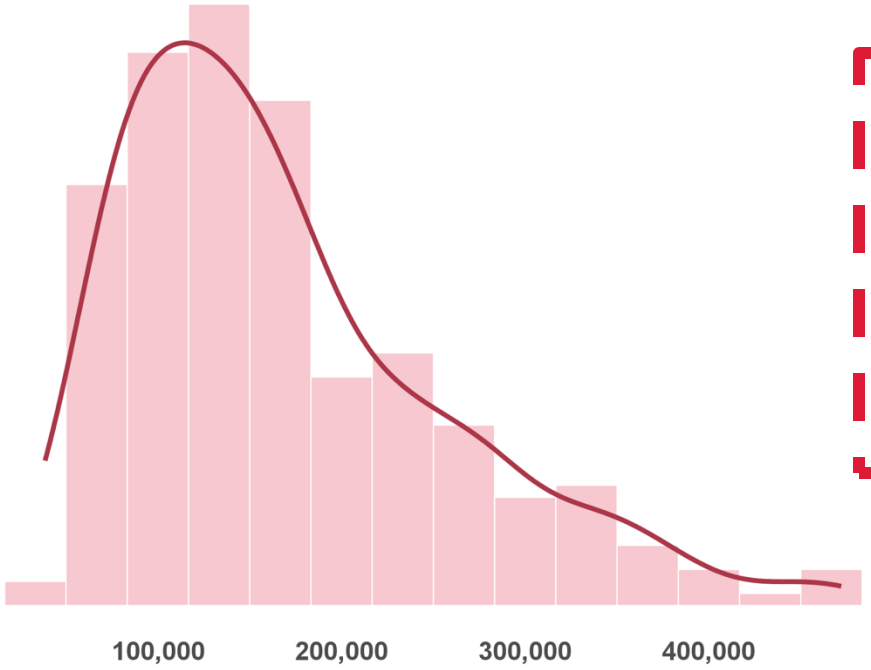
Staff Facts at Houston College of Medicine

Salary Distribution (1995)

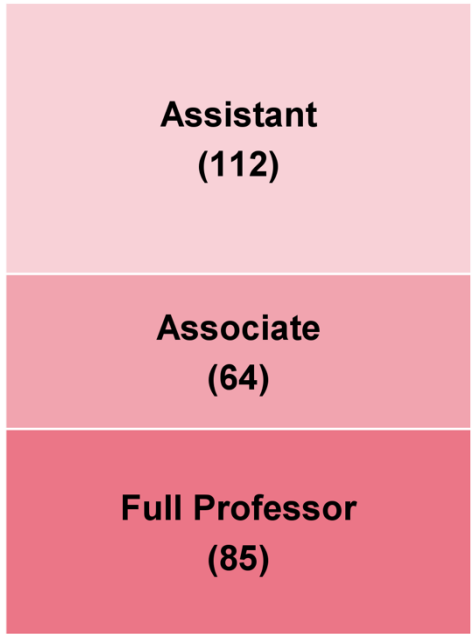


261

Total Employees

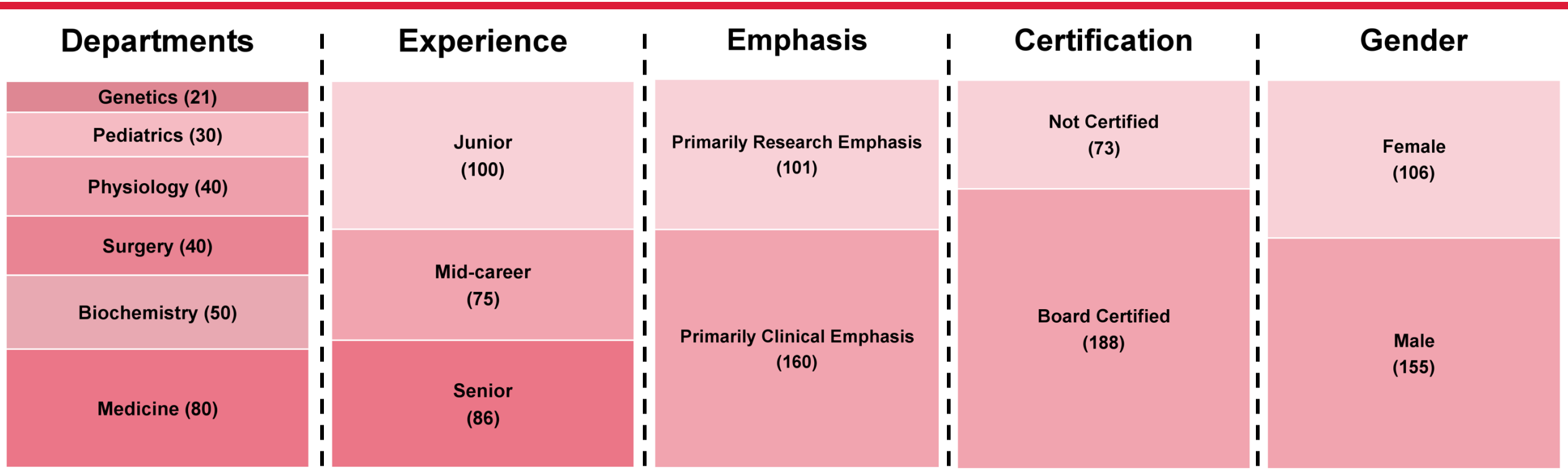
With visible differences in salary and rank

Ranks



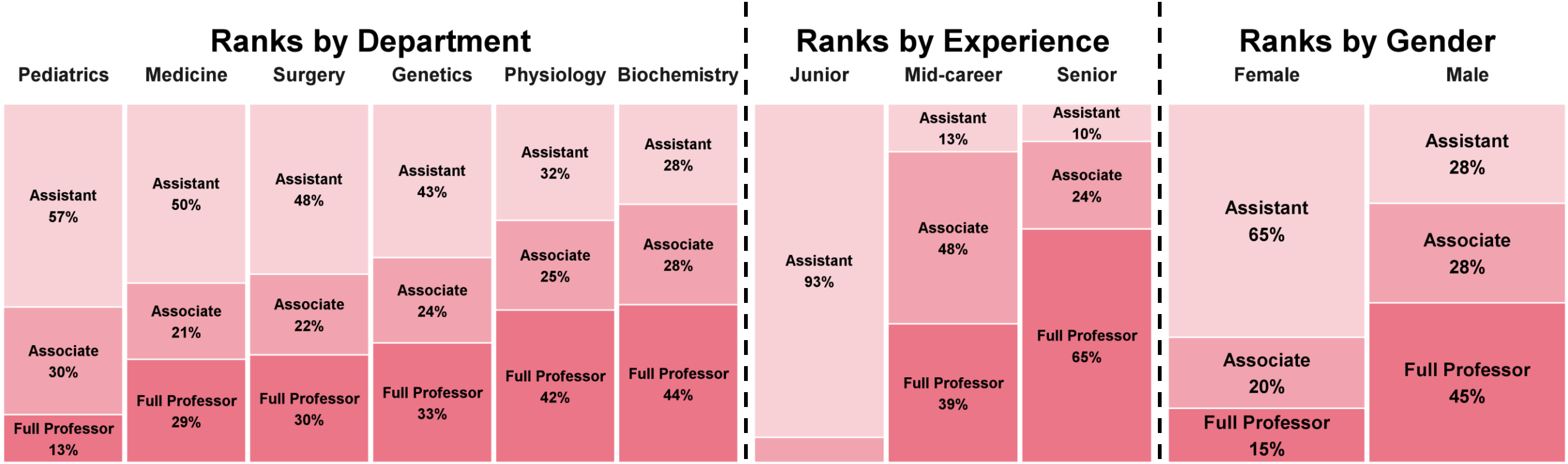
What causes these differences?

Five Ways to Categorise Our Staff



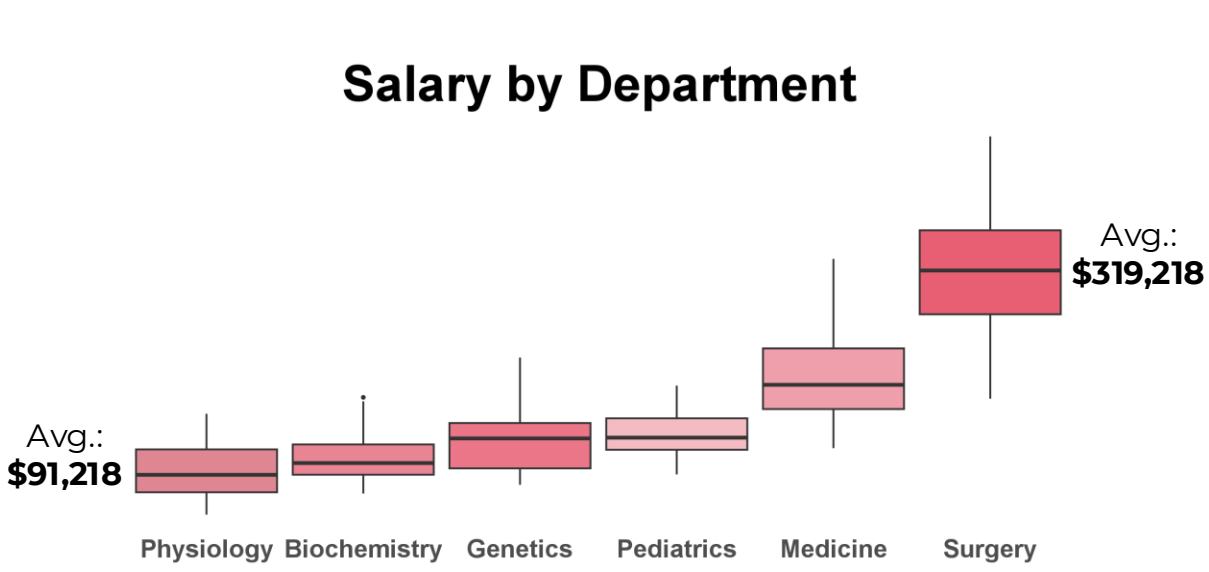
Which of these factors cause the salary and rank differences?

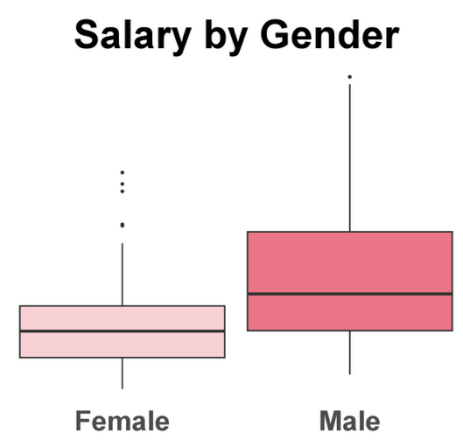
Three Main Factors Indicate Higher Ranks

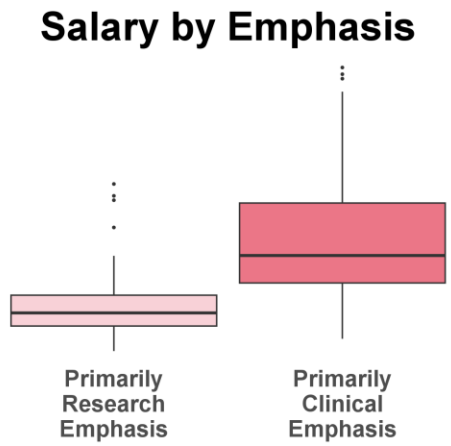


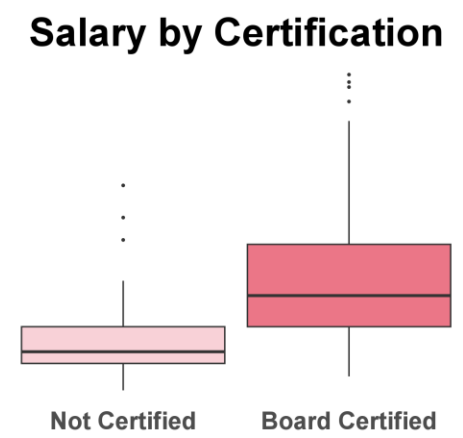
Which of these attributes is the significant and deciding factor?

Five Main Factors Indicate Higher Salaries





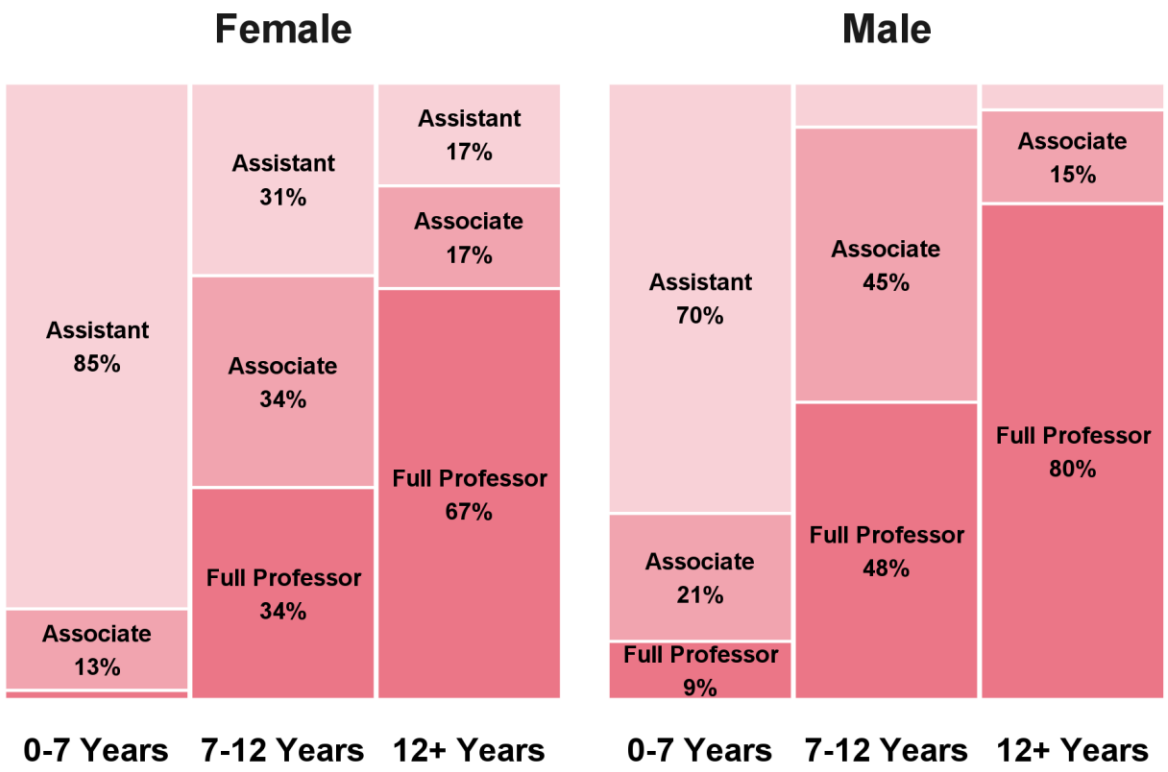




Which of these attributes is the significant and deciding factor?

Adjusting Work Experience for Working Hours

Ranks by Adjusted Experience



Experience ≠ Actual Working Hours

Research by Stanford University[1] from 1996 reveals that female doctor work 51 hours per week and 46 weeks each year, while male doctors work 62 hours per week and 47 weeks each year, on average.

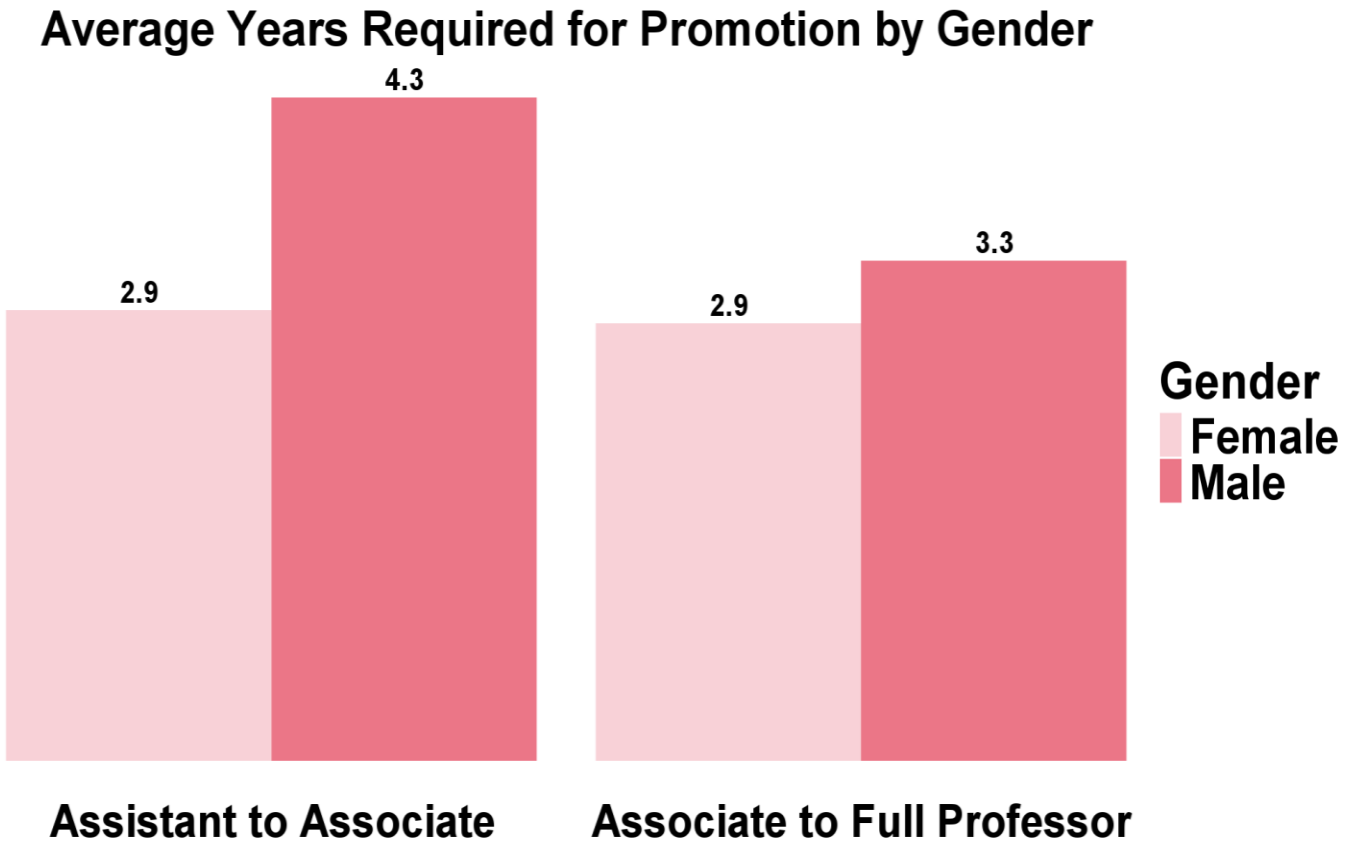
Female workload is ~80.5% of men's, so experience should be adjusted downward.

$$Exper_{Actual} = Exper_{Basic} * \frac{51}{62} * \frac{46}{47}$$

When effective working hours are considered, women's promotion patterns align broadly with men's

[1]Russel, S. (1996). Stanford Studies Gender Gap in Doctors' Pay / Longer hours, specialties make the difference. Sfgate. https://www.sfgate.com/news/article/Stanford-Studies-Gender-Gap-in-Doctors-Pay-2986283.php

Female Doctors Get Promoted Faster



No significant correlation between gender and promotion

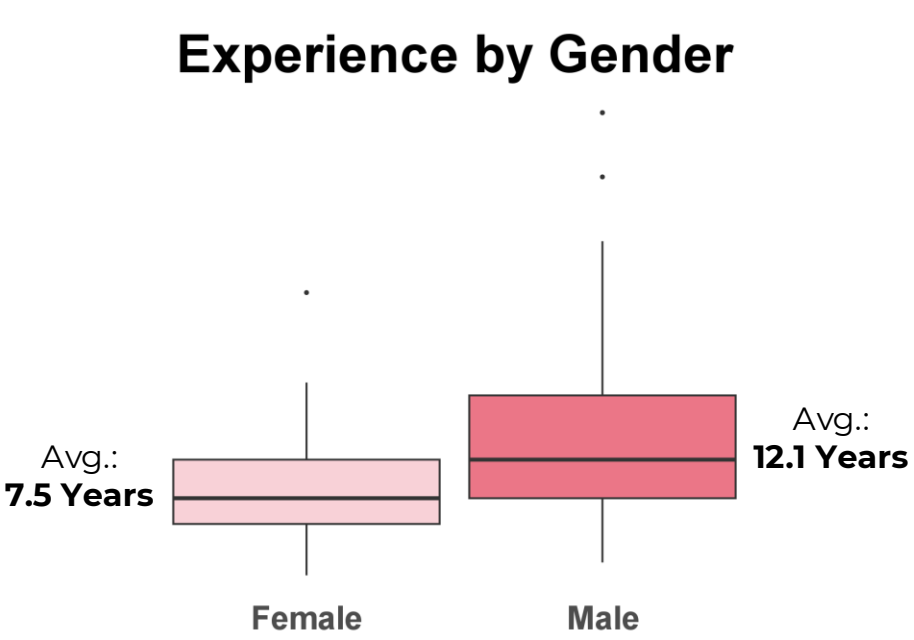
Rank within Each Actual Experience Group by Gender	
Category	Chi-Square P value
Less than 7 years	**0.057**
7 to 12 years	**0.012****
More than 12 years	**0.465**

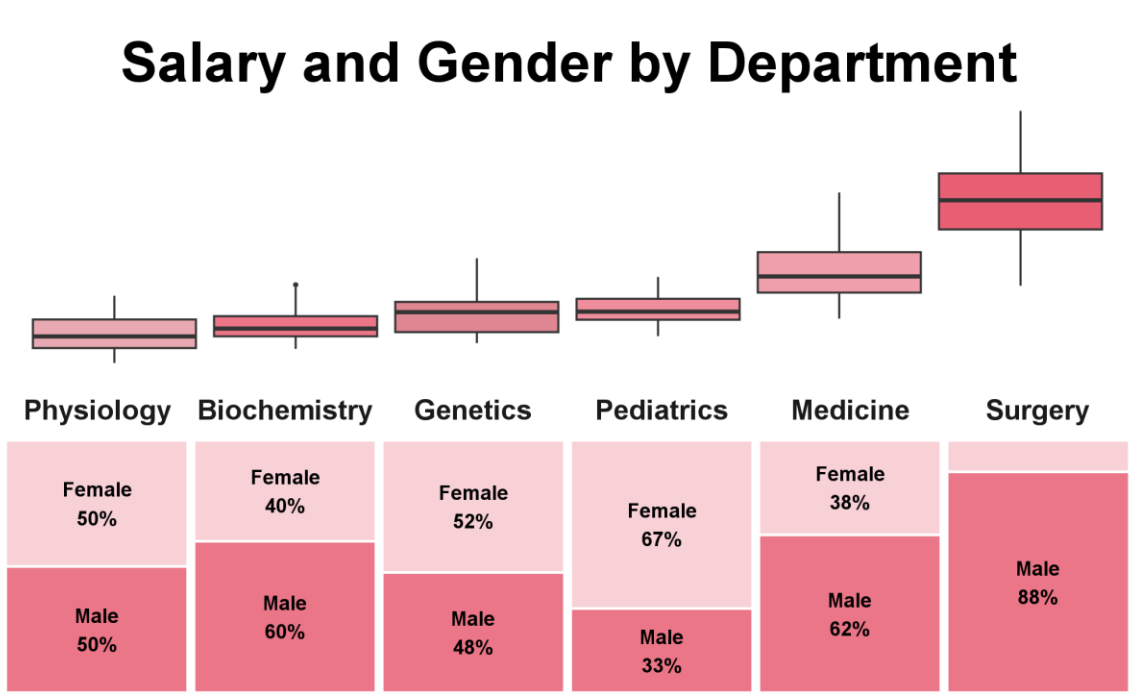
*P value: reflecting whether rank is influenced by gender

Salary Level within Gender (Experience Group 7-12)	
Category	Chi-Square P value
7 to 12 years	**0.595**

Within Experience Group 7-12, the significance of gender diminished when analyzed in conjunction with the more critical variable of salary

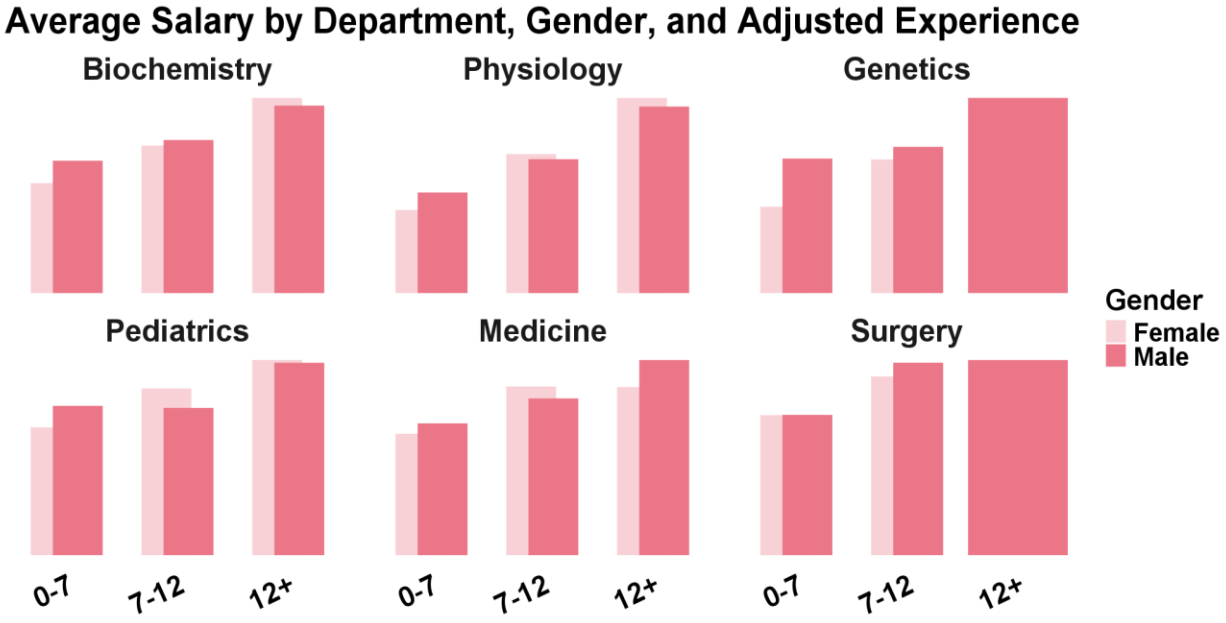
Strong Differences in Experience and Department



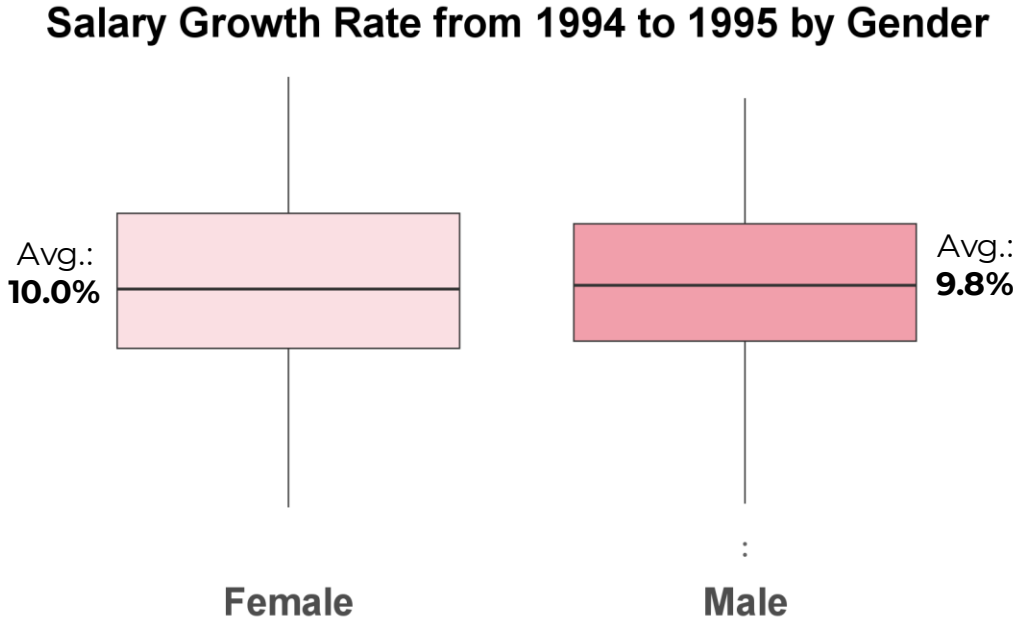


On average, female doctors have less experience and work in lower-paying departments

Experience and Department Explain Gender Pay Gap



There is no significant salary difference between male and female doctors with the same experience in the same department



Salaries are being increased similarly for female and male doctors, showing no signs of discrimination.

Experience and Gender Seem to Have a Significant Impact on Salary

$$\hat{S}al95 = \beta 0 + \cdot \beta 1\, Gender + \varepsilon$$

$$\hat{S}al95 = \beta 0 + \beta 1 \cdot Exper + \varepsilon$$

Independent variable	Residual: Min	Residual: 1Q	Residual: Median	Residual: 3Q	Residual: Max	Coefficient	P-value	Adj R-squared
Experience	-163639	-70263	-13423	44777	285387	4546.9	1.39e^(-7) ***	0.09825
Gender	-135991	-60711	-17327	44700	277675	64037	3.64e^(-9) ***	0.1226

- *$\hat{S}al95$: Predicted salary in 1995 (dependent variable, continuous numerical value)*
- *$\beta 0$ is the intercept (the value of Y when X=0, i.e., the average salary of females)*
- *$\beta 1$ is the slope (the average change in Y when X changes from 0 to 1, i.e., the salary difference between males and females)*
- ** represents the significant level*

"Significance" ≠ "Large effect",
Doubt on whether gender's impact on salary is genuinely statistically significant

Regression Model: Experience is the only Deciding Factor for Salary

Multivariable Linear Regression

$$\hat{Sal95} = \beta_0 + \beta_1 \cdot Gender + \beta_2 \cdot Dept + \beta_3 \cdot Rank + \beta_4 \cdot Exper + \beta_5 \cdot Prate + \beta_6 \cdot Cert + \beta_7 \cdot Clin + \varepsilon$$

Variable	Gender	Physiology	Genetics	Pediatrics	Medicine	Surgery	Rank-L	Rank-Q	Exper	Prate	Cert	Clin
P-value	0.42304	0.03305 *	0.00297 **	0.03740 *	2.91e^(-15) ***	2e^(-16) ***	1.28e^(-10) ***	0.93576	4.81e^(-16) ***	0.37355	4.09e^(-6) ***	0.02942 *

Consider Top 25% earners as high_salary Group

Logistic Regression

$$\ln[P(high\_salary)/(1 - P(high\_salary))] = \beta_0 + \beta_1 \cdot Gender + \beta_2 \cdot Dept + \beta_3 \cdot Rank + \beta_4 \cdot Exper + \beta_5 \cdot Prate + \beta_6 \cdot Cert + \beta_7 \cdot Clin$$

Variable	Gender	Physiology	Genetics	Pediatrics	Medicine	Surgery	Rank-L	Rank-Q	Exper	Prate	Cert	Clin
P-value	0.60159	0.99994	0.99984	0.99982	0.99392	0.99240	0.12463	0.84144	0.00564 **	0.64241	0.10298	0.39513

Experience is the Only Deciding Factor for Salary

Regression Evidence

Model A (Salary ~ Gender):

- Gender appears significant in raw data, but explains only **12.6%** of salary variation.
- Effect size small → not sufficient to explain overall salary differences.

Model B (Salary ~ Gender + Dept + Rank + Experience + Clin + Cert + Prate):

- **$R^2 = 0.90$** → captures nearly all salary variation.
- Gender effect = **not significant** ($p = 0.423$).
- **Key drivers:** Rank, Department, Clinical orientation, Certification, and **Experience**.

Model C (Logistic Regression within High Salary Group):

- Only **Experience** predicts entry into top 25% earners (OR ≈ 1.38, $p < 0.01$).
- Gender, Dept, Cert, Clin → not statistically significant.

Conclusion:

- Gender does **not** independently affect salary once career structure is controlled.
- **Experience is the decisive factor** determining salary outcomes.

Summary of Findings

Promotion and salary are determined by experience and department, with experience being the sole decisive factor for doctors in the high salary group.

Women have fewer effective working hours than men and are more often found in lower-paying departments.

According to the Multivariable Linear Regression and Chi-square Test, gender is not a significant predictor of either salary or promotion.

Men and women progress at the same pace in both promotion and salary growth.

There is no evidence of systemic gender discrimination in promotion or salary at Houston College of Medicine.