CURRENT STATE OF PHYSICIAN REVIEWS ON HEALTHGRADES.COM

Webscraping project presentation

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Background

What is Healthgrades.com?

- It is a website listing comprehensive physician and hospital profiles to facilitate connection between patients and providers

- Yelp for doctors?! Patients can search for physicians based on specialty, location, and read the detailed doctors profile in order to choose a provider

- Each doctor's page includes reviews from patients in the form of star ratings and qualitative comments

- Physician profiles also include demographic information, practice location, areas of expertise, medical training history, etc.

Project Objective

- Analyze physician performance by looking at patient reviews
- Understand what physician characteristics impact rating
- Assess data quality and caveats from this website and implications

Outline

- Introduction to the dataset
- Distribution of overall rating
- What drives / influences overall rating?
    - Number of reviews
    - Age
    - Gender
    - Doctor's performance vs. office staff performance
- Conclusions
- Future work

Pilot analysis includes ~950 gastroenterologists in New York City metro area

Ratings and doctor demographic information were scraped for analysis

Ratings through patient survey (1-5 stars rounded to 0.5 star precision)	
Overall Rating	*Likelihood to recommend doctor to friends and family*
Doctor Score	*Level of trust in provider's decisions*
	How well provider explains medical condition(s)
	How well provider listens and answers questions
	Spends appropriate amount of time with patients
Staff Score	*Ease of scheduling urgent appointments*
	Office environment, cleanliness, comfort, etc.
	Staff friendliness and courteousness

Doctor characteristics

Used in analysis
- ***Age***
- ***Gender***
- ***Number of reviews***

Scraped, not used
- *Main practice name*
- *Main practice address*
- *Educational history (medical school, residency, fellowship hospitals)*
- *Number of insurance plans accepted*

Not scraped
- *Qualitative comments from patient reviews*
- *Top conditions and procedures*
- *Legal action background check*
- *Languages spoken*

Healthgrades has collected > 5 million patient reviews nationally

The NY Metro GI doctor data contained a number of missing values for the different variables

Variable	% of Missing Value	N available for analysis
Age	22%	737
Gender	7%	884
Overall Rating / Doctor Score / Staff Score	28%	681
Practice Name	12%	681
Fellowship Hospital	41%	
Residency Hospital	33%	
Medical School	25%	
Number of Insurance Accepted	94%	

Total Number of Doctors in initial scraped dataset: 947

On first glance, it would appear that more than a third of doctors are getting perfect 5 stars …

Distribution of Overall Rating

Number of doctors

Average Number of Stars
(likelihood to recommend the doctor)
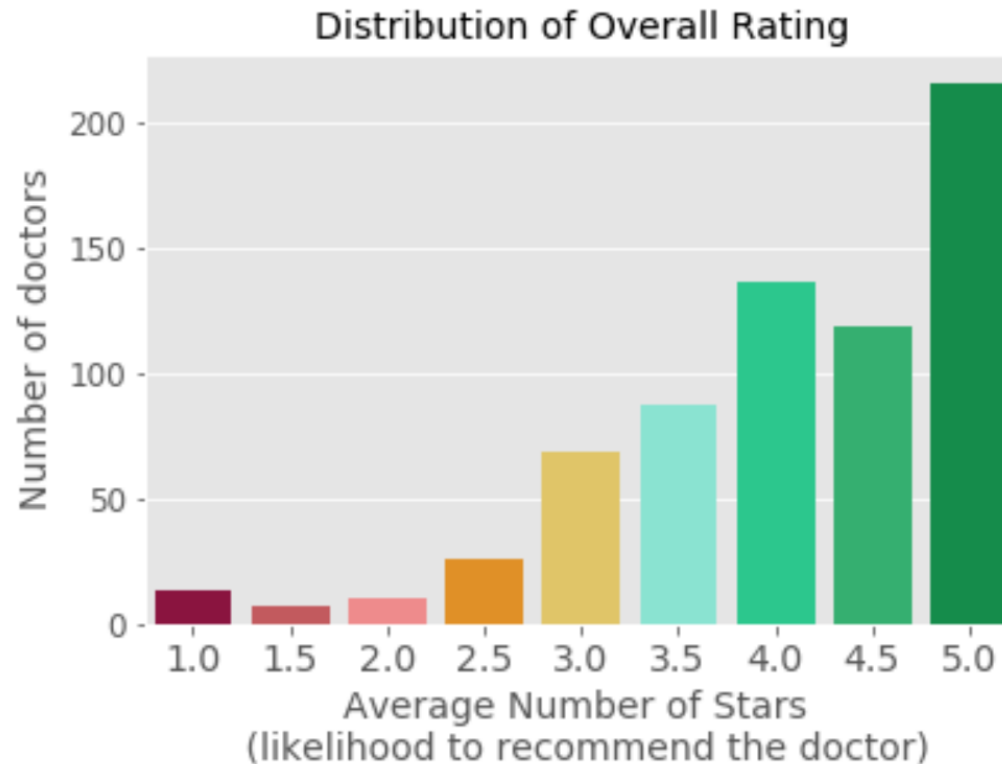
N = 681
Including all doctors with at least 1 review

But, a 5 star rating based on 1 review ≠ a 5 star rating based on 10 reviews!

The number of reviews follows an extremely skewed distribution with 36% doctors each having < 5 reviews

Histogram of Number of Reviews for Gastroenterologists in New York Metro Area

Number of Reviews	% of Doctors
1 – 4	36%
5 – 9	25%
10 or more	39%
30 or more	4%
50 or more	< 2%

N = 681
Including all doctors with at least 1 review

Max = 158 (not shown)

Frequency (Number of Doctors)

Number of reviews received by each physician
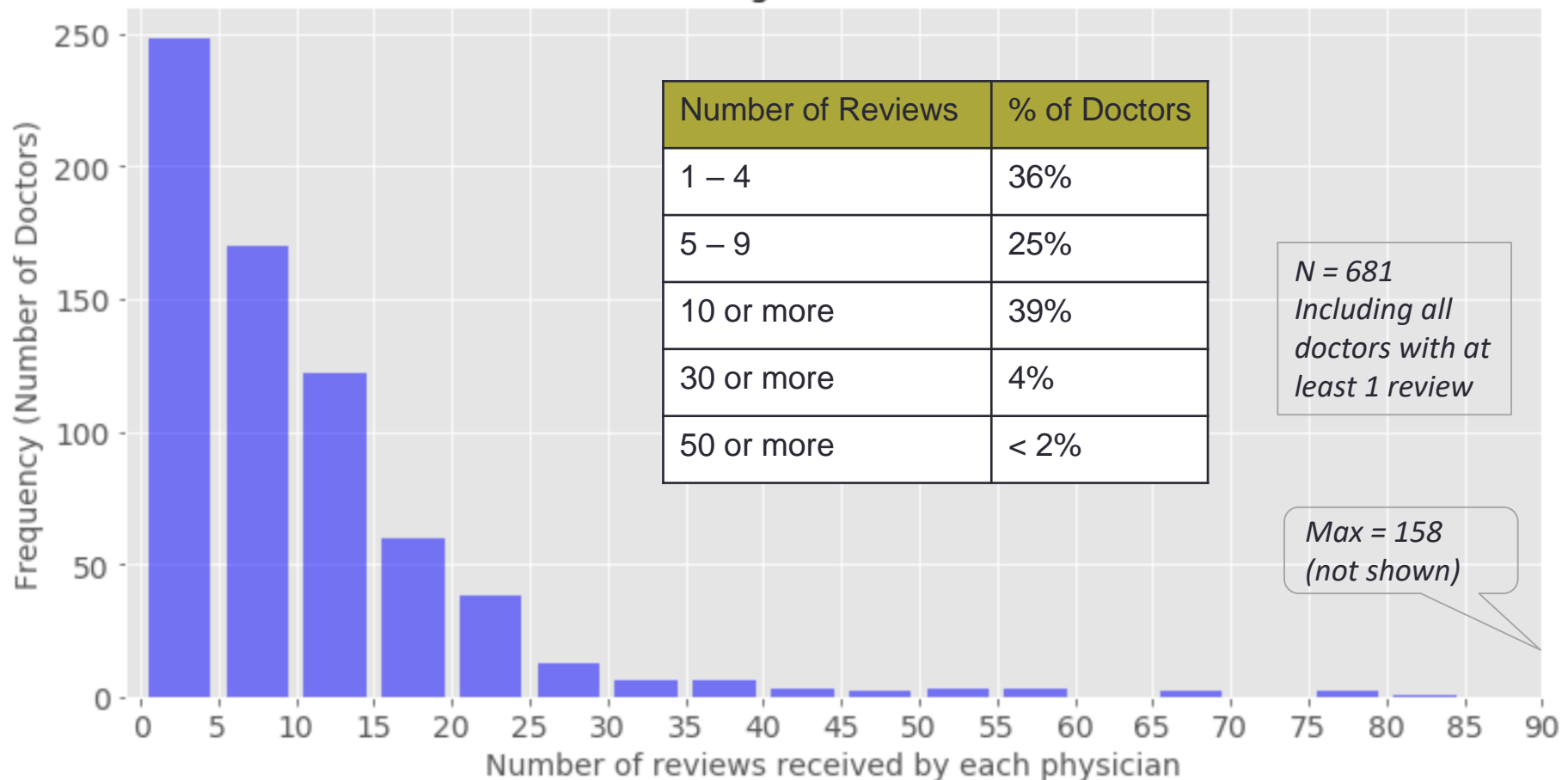
Examining rating in conjunction with the number of substantiating reviews help consumer pick providers in a more reliable way
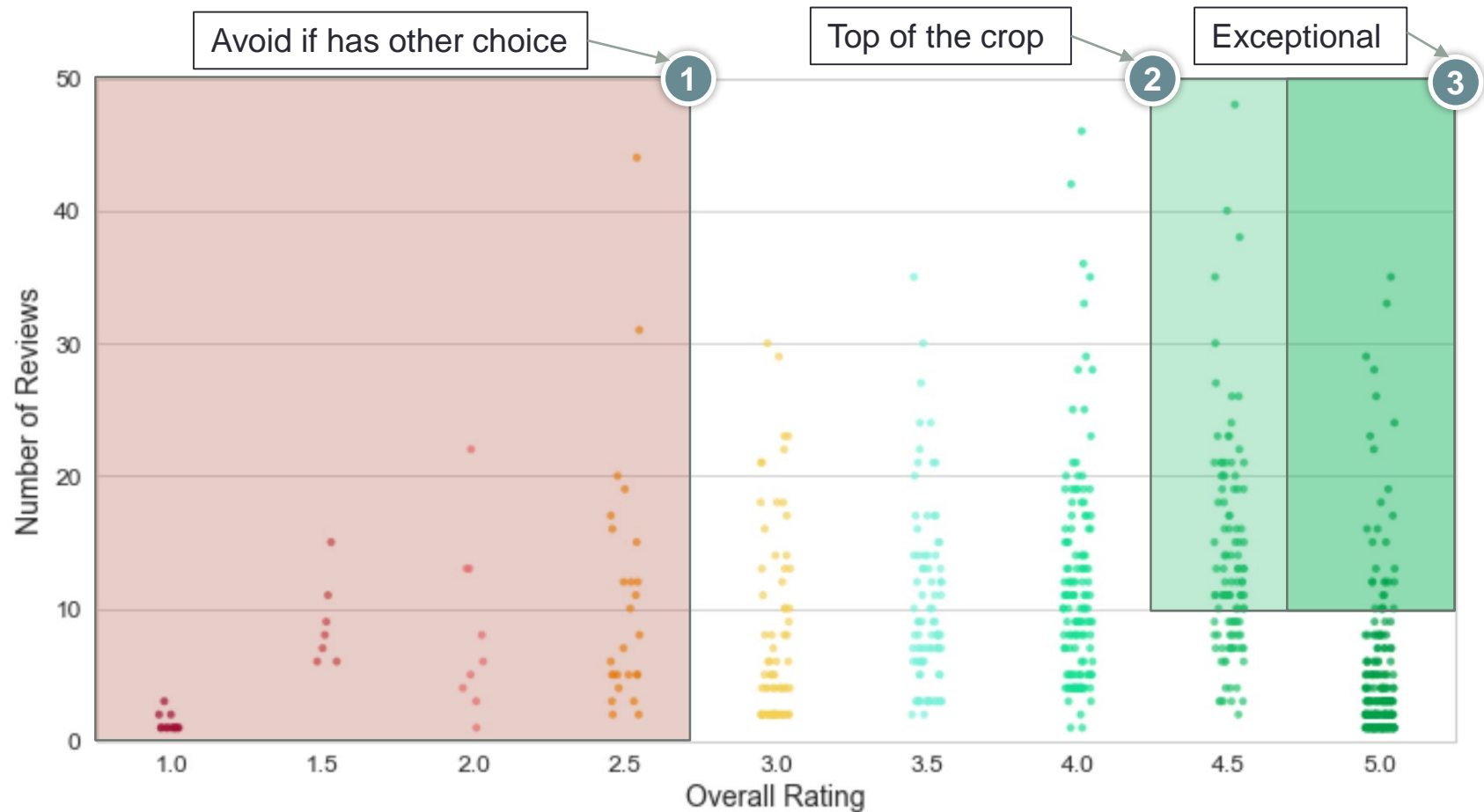
- Doctors with low rating in generally much less likely to get a large number of reviews
- Among patients submitting a review, more are motivated by positive than negative experiences

Only including ratings based on 5 or more reviews, the distribution still looks very favorable toward high scores

*N = 433
Including all doctors with at least 5 reviews*

2% 2% 5% 8% 16% 25% 25% 17%

Number of doctors (y-axis)

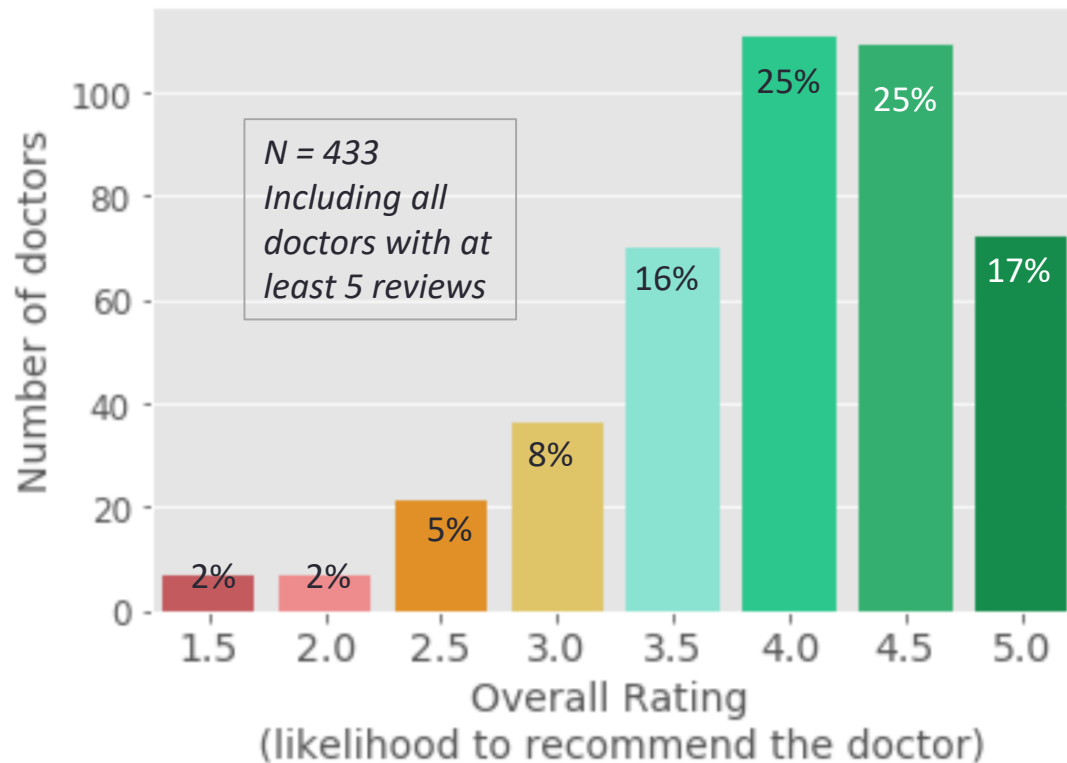**Overall Rating** (likelihood to recommend the doctor) (x-axis)

Hypotheses

- The average quality of gastroenterologists in NY metro area is very high and patients are truly highly satisfied
- Selection bias in those who are willing to submit a survey vs. those who are not

What factors influence the overall rating?

We will explore the relationship between rating and doctor age, gender, and doctor's own vs. office staff's performance

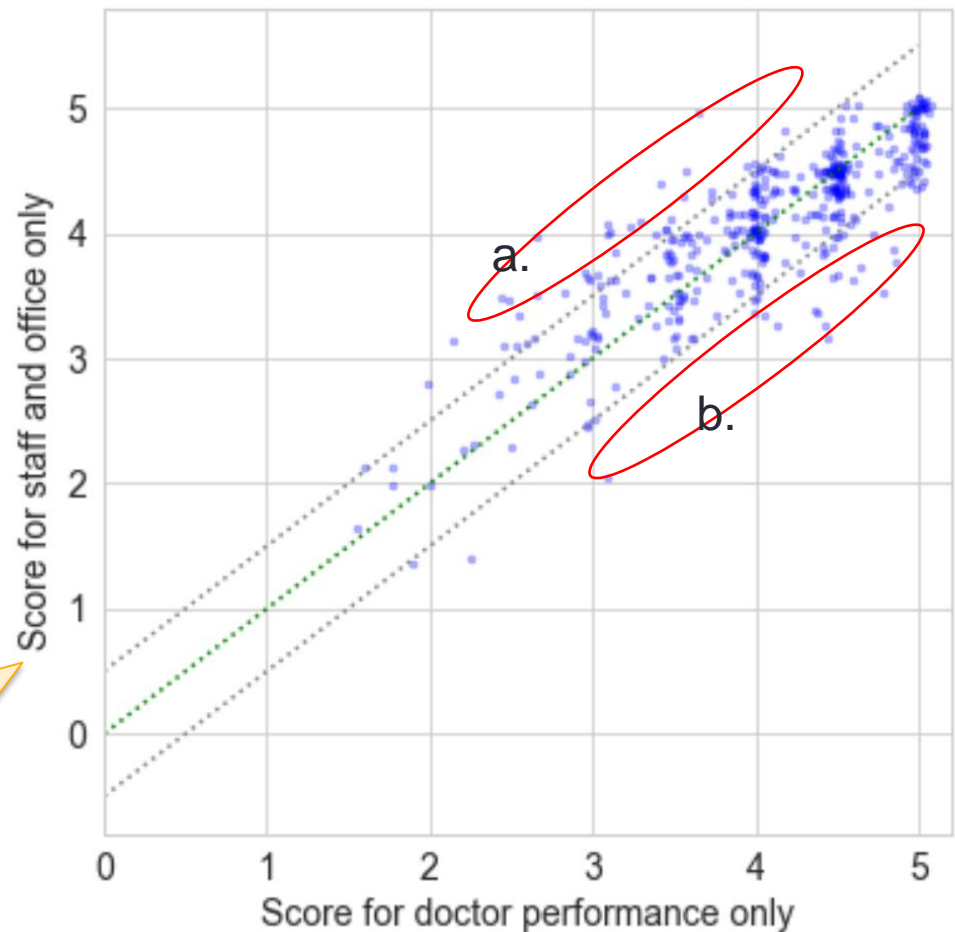| Factor	Question
Doctor's own performance vs. Staff Performance	• *How well do doc score and staff score correlate with overall rating?* • *How well does doctor score correlate with staff score?* • *What kind of impact does office staff's performance have on the doctor's overall rating?*
Age	*Do experienced doctors get better reviews?*
Gender	*Is there any difference between the ratings received by female vs. male GI specialists?*

Staff scores and doctor scores are generally very concordant, but it is not uncommon for the two to differ by > 0.5 stars

Pearson Correlation

	doc score	staff score	rating
doc score		0.84	0.96
staff score			0.86
rating			

What happens to the overall rating when the staff's score is

a. Higher than doctor's score?

b. Lower than doctor's score?

Score for staff and office only (y-axis), Score for doctor performance only (x-axis)

Overall likelihood to recommend a physician is primarily driven by physician factors, but can be dragged down by poor office and staff performance

Overall rating – Doctor score (y-axis)

Doctor score – Staff score (x-axis)
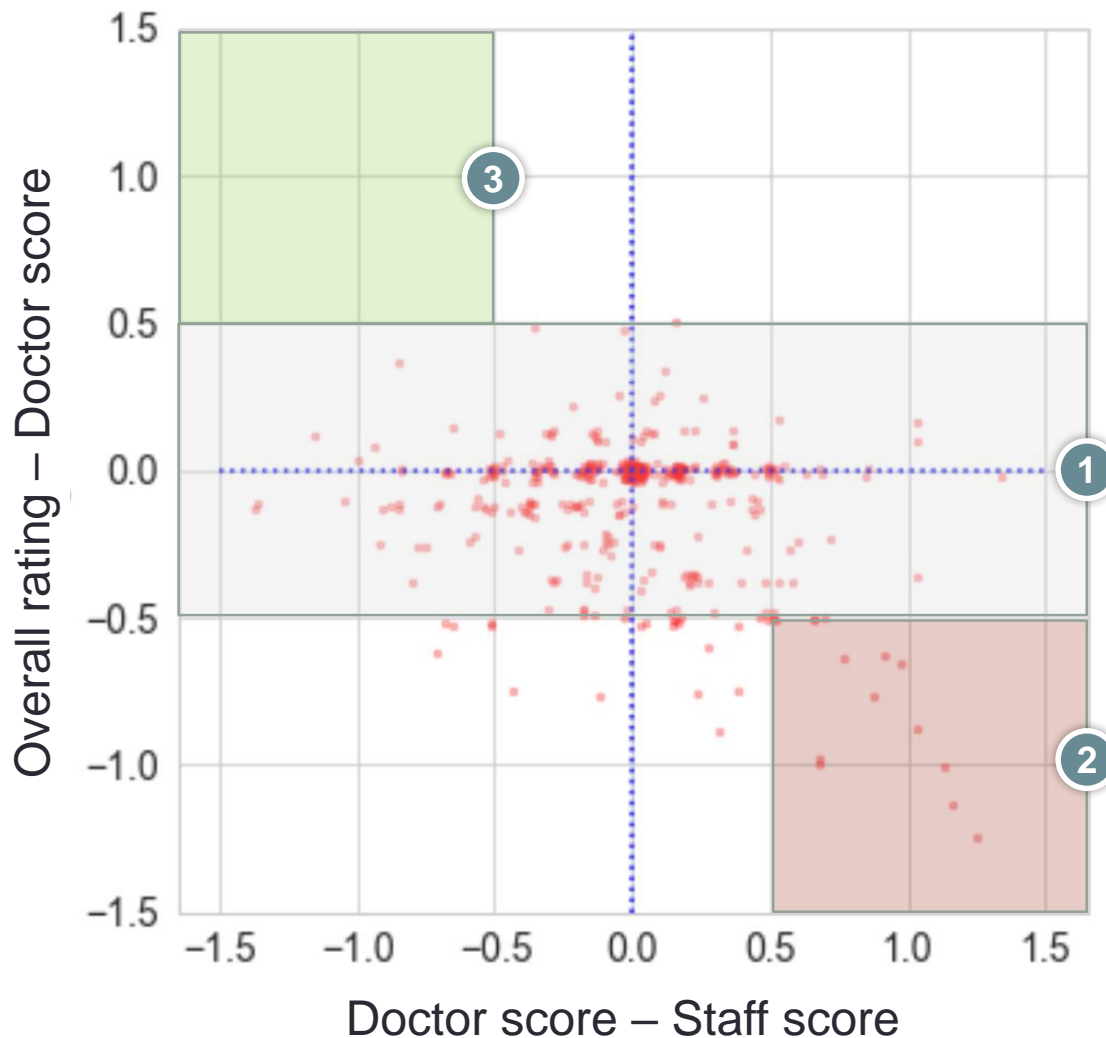
3. When office and staff score is better than the doctor's, it rarely lifts the overall rating

1. Most of the time, overall rating closely mimics the score for doctor's performance

2. When office and staff quality is significantly below that of the doctor, overall rating suffers

Surprisingly, more experienced doctors do not have a higher average rating than younger ones
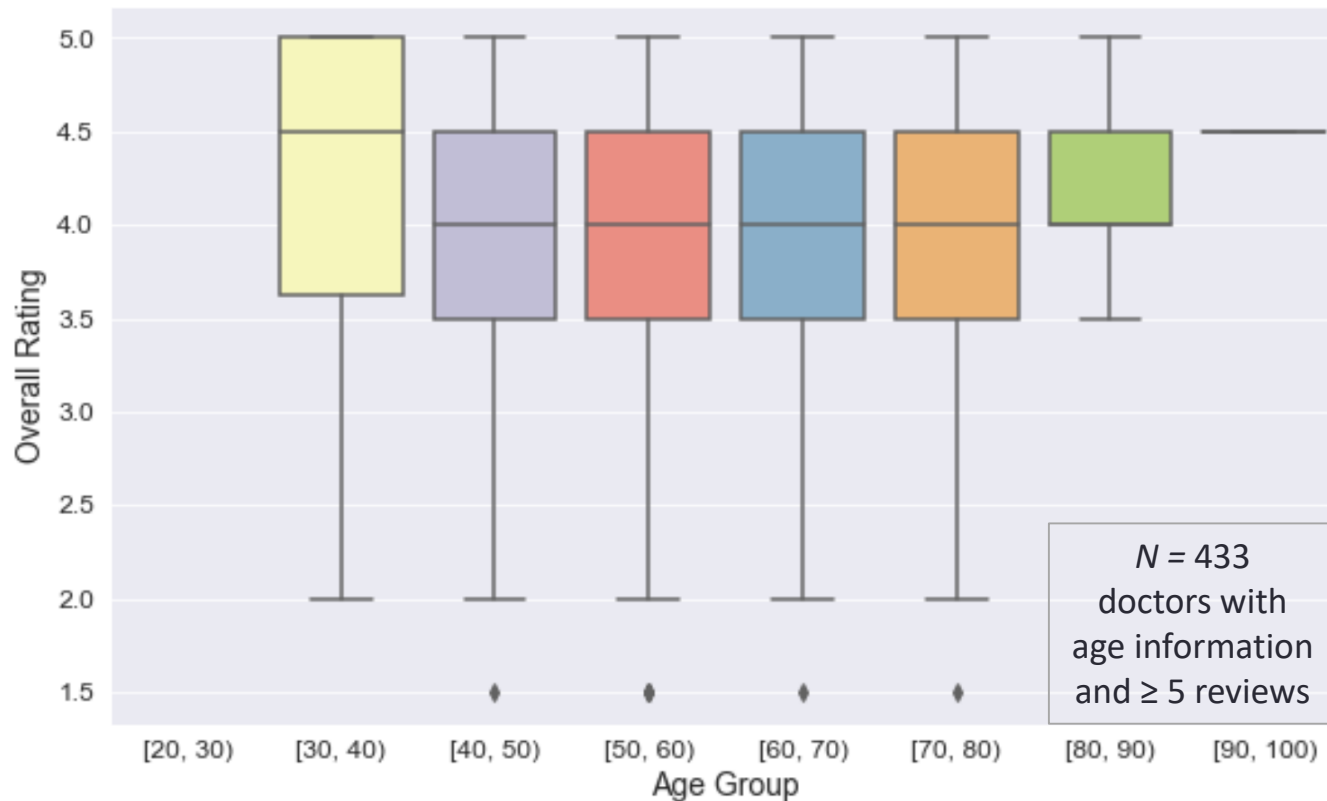
One way anova test shows there is no statistically significant difference between the group means

Number of reviews is biased by gender, but rating distribution is not

N = 947 (all doctors)

N = 404
(has gender
info, and ≥ 5
reviews)
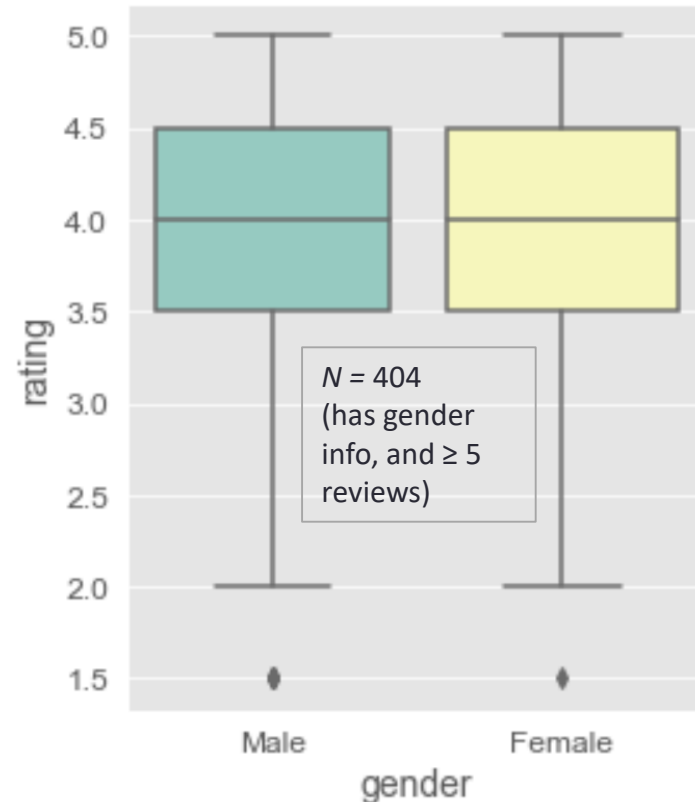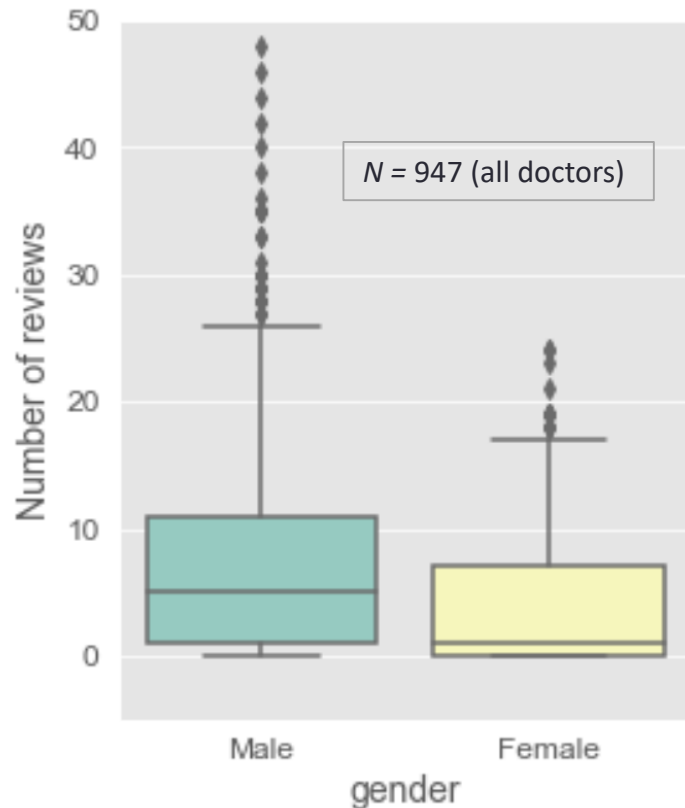
- Female doctors tend to have fewer reviews than male doctors (p-val = 0.0002)
- The doctors with > 25 reviews are almost all male

Conclusions

- What healthgrades has done is a great effort, but the current data collected have a number of potential caveats, such as
  - Ratings heavily tilted toward the higher end and lack dynamic range
  - The way search result is ordered by "best match" may promote rich-gets-richer does not help generate reviews more evenly across the physician universe

- GI doctors in NYC metro with different length of time in practice are perceived similarly by patients in terms of bedside matter and quality of interaction

- Female GI specialists have much lower visibility on healthgrades as reflected by the smaller number of reviews, but their ratings do not differ from the male doctors

- Overall rating is primarily driven by doctor's own performance. Negative experience with the office staff can bring down the overall rating while positive experience generally does not lift the overall rating

Future work

Questions	Analysis
What are the doctor or staff qualities that patients appreciate the most?	Word cloud analysis of qualitative patient comments (associated with 5 stars) for top rated doctors
What are the doctor or staff qualities lend to very negative patient experience?	Word cloud analysis of qualitative patient comments (associated with low stars) for doctors with poorest ratings
Do the same trends hold in geographies other than NY metro?	Similar to this analysis and compare geographies
How do the rating trends differ by specialty?	Similar to this analysis and compare specialties

Trends from analysis of cardiologists in NYC metro very similar to those from the GI doctor analysis

APPENDIX

Healthgrades has a good coverage of physicians from a variety of specialties, including gastroenterologists

Number of Doctors by Specialty in the US
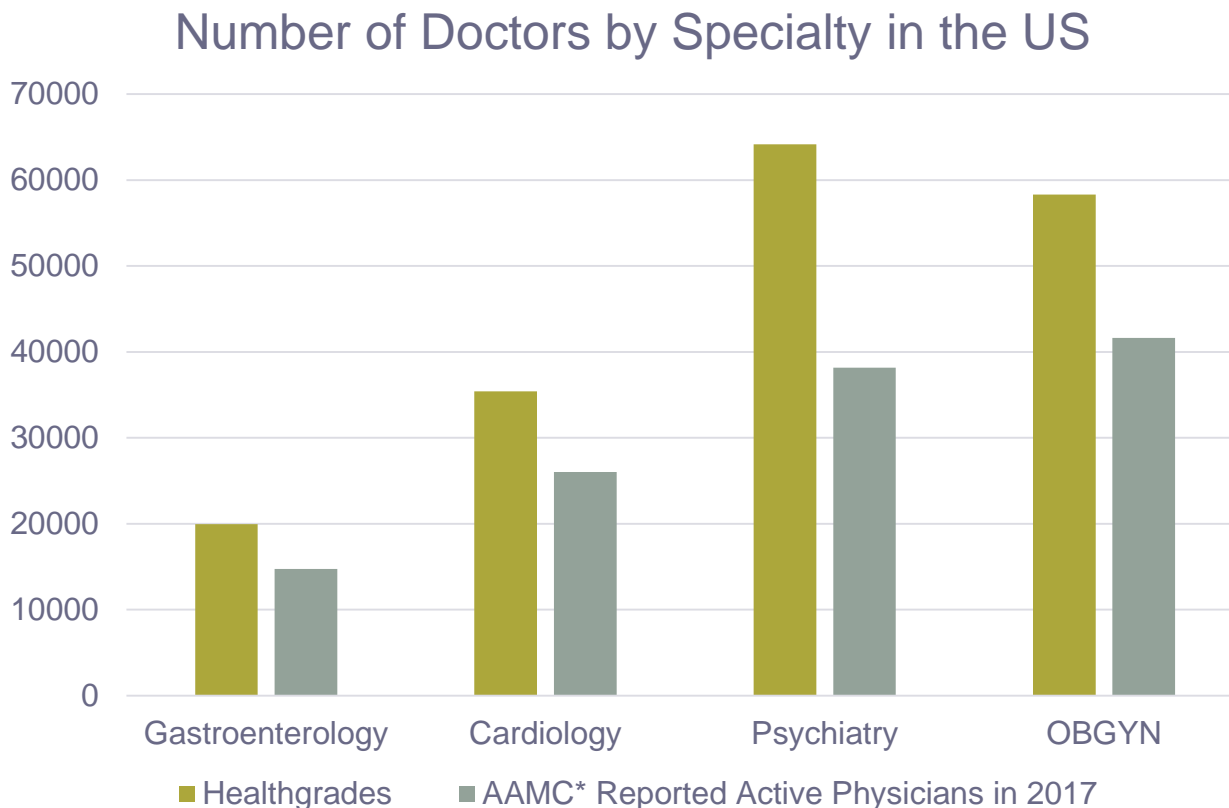
- Healthgrades reports a larger number of doctors than AAMC
- Healthgrades physician universe likely includes both active and inactive physicians

Legend: ■ Healthgrades ■ AAMC* Reported Active Physicians in 2017

The ~950 gastroenterologists in New York metro area represent ~5% of all GI doctors in the nation

Quick look at the exceptional doctors shows that some are from large group practices and most completed fellowship in local hospitals

## Top 2 practices based on number of exceptional doctors

Practice name	# of exceptional doctors
GOTHAM MEDICAL ASSOCIATES	3 (10%)
Concorde Medical Group	2 (7%)

Top 6 practices based on total # of GI doctors

Practice name	#	%
Mount Sinai Gastroenterology	31	3.7%
Concorde Medical Group	14	1.7%
Advantage Care Physicians	11	1.3%
NYU LANGONE HOSPITAL CENTER	10	1.2%
MOUNT SINAI HOSPITAL	10	1.2%
GOTHAM MEDICAL ASSOCIATES	9	1.1%

Gastroenterologists 50 to 70 years old account for 52% of the pool and tend to receive more patient reviews than other groups

N = 737 doctors with age information
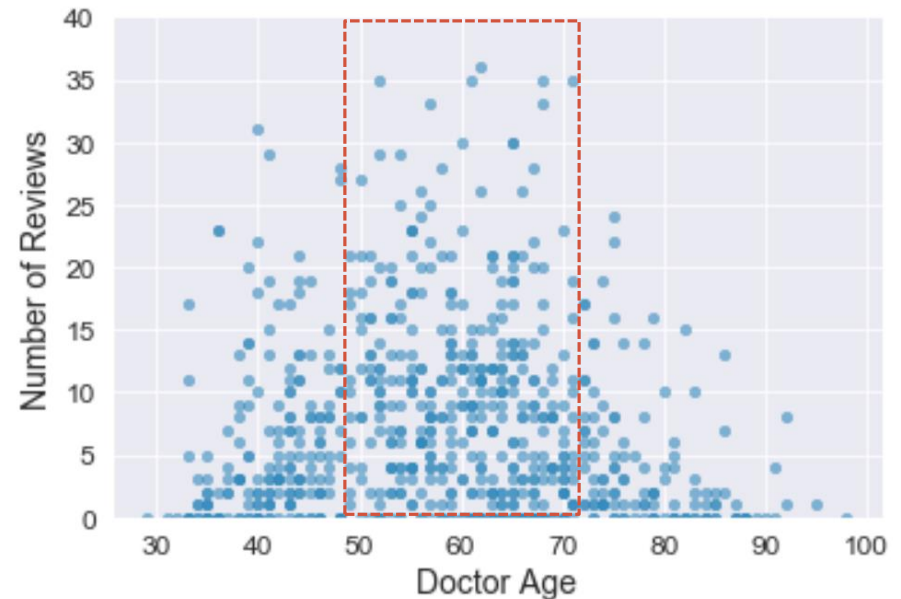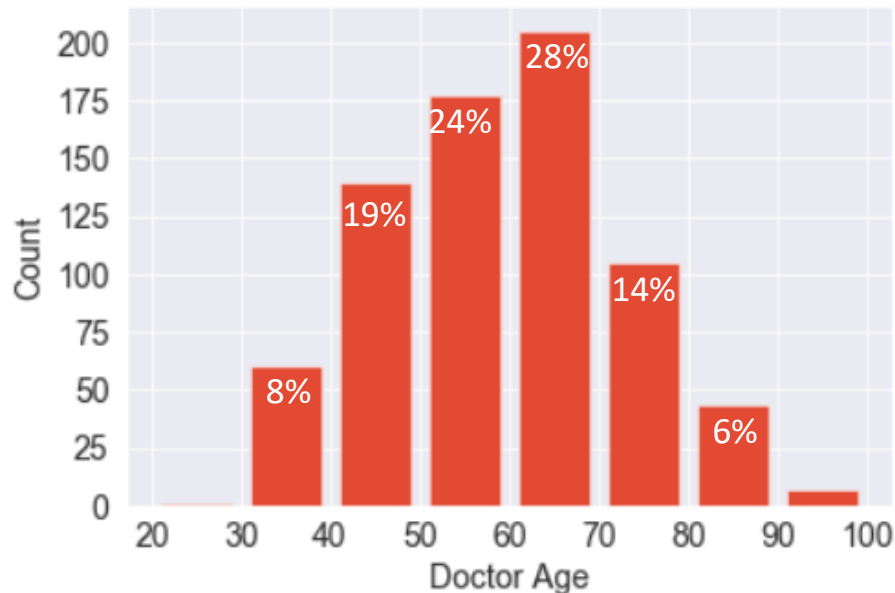
The higher number of reviews per physician in the 50-70 age range could be due to:
- More accumulated patients over time due to longer time in practice
- Higher patient volume due to patient preference for physicians in this group

Doctor's score is usually higher than the staff score and the overall rating is either same as doctor's score or lower
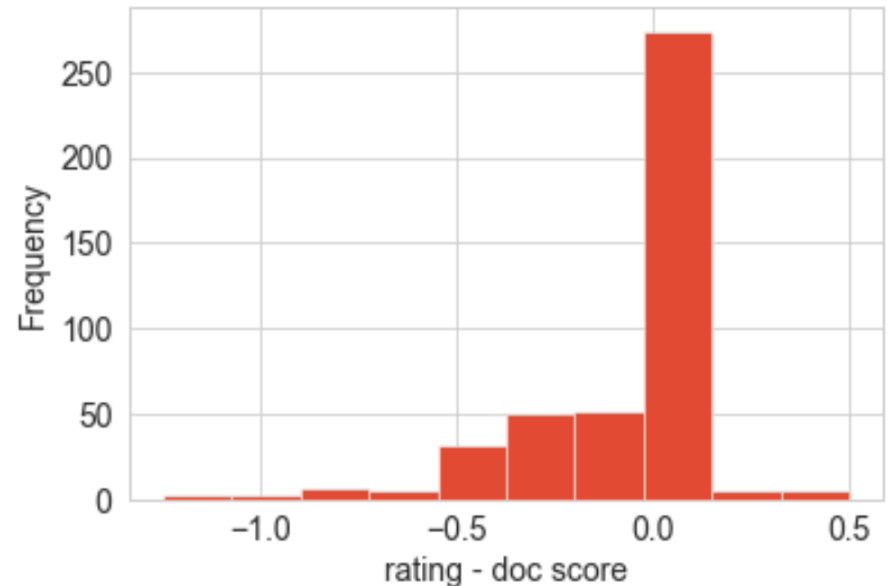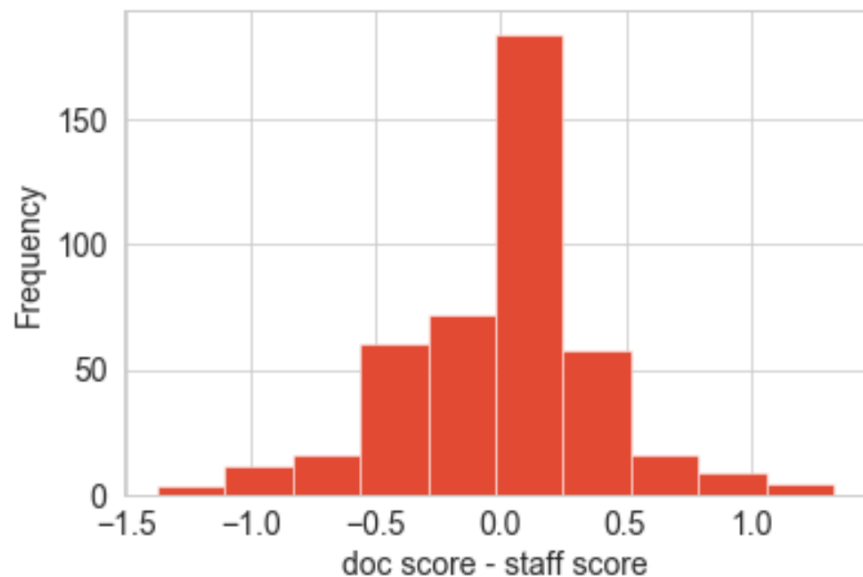
Patients are most satisfied with cardiologists in NYC metro area aged between 40 to 60 years old