



Project I: Vertical Integration with Hospitals  
Project II: Payments to Physicians That May Pose  
Conflicts of Interest

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$$(\pi_1 + wt)k + (\pi_2 + ws)(m + m') + (\pi_3 + wv)x \leq Y = y + wT. \quad \dots(4)$$

Maximizing the utility function (3) subject to (2) and (4) is equivalent to maximizing the Lagrangian expression

$$L = U(x, k, m') + [(y + wT) - (\pi_1 + wt)k - (\pi_2 + ws) [g(x, k) + m'] - (\pi_3 + wv)x]. \quad \dots(5)$$

The first-order conditions for a maximum are:

$$\frac{U_x}{(\pi_3 + wv) + (\pi_2 + ws)g_x} = \frac{U_k}{(\pi_1 + wt) + (\pi_2 + ws)g_k} = \frac{U_{m'}}{\pi_2 + ws} = \lambda. \quad \dots(6)$$

These suggest the nature of the interaction between  $k$  and  $x$  and necessary curative consumption,  $m$ . Since consumption of  $k$  or  $x$  reduces the rate of illness and thus the need for  $m$ , the net price of consuming  $k$  or  $x$  is the own cash and time price less the induced savings in expenditure on  $m$ , e.g.

$$(\pi_3 + wv) + (\pi_2 + ws)g_x < (\pi_3 + wv),$$

since  $g_x < 0$ . It is possible that these net prices may be negative for the initial increments of consumption of  $k$  and  $x$ . However, in equilibrium one must assume that the marginal effect of  $k$  and  $x$  on  $m$ ,  $g_k$  and  $g_x$  are sufficiently small that

$$\begin{aligned} (\pi_3 + wv) + (\pi_2 + ws)g_x &> 0 \text{ and} \\ (\pi_1 + wt) + (\pi_2 + ws)g_k &> 0. \end{aligned} \quad \dots(7)$$

# Outline

## Project Overviews and Aims

1) Background/Motivation

2) My role in the project

3) Findings

4) Q&A

## Lessons Learned


# Project Overviews

Two projects:

- I. Vertical integration of physician practices with hospitals and the effects on costs
  - A. To document the instances of vertical integration by hospitals
  - B. To determine whether or not vertical integration will lead to a change in costs of standard items ordered by doctors and hospitals (like cardiac stents) and also what is used
- II. Payments to physicians by large pharmaceutical companies and potential conflicts of interest
  - A. To understand the types of payments physicians receive
  - B. To see the effects these payments have on a doctor's prescribing domain

# Definition

**Table 1: Physician-Hospital Integration Explanatory Variable Definitions**

Independent Practice Association: loose contractual networks to boost managed care contracts	<p><b>Least Integrated</b></p>  <p><b>Most Integrated</b></p>
Open Physician-Hospital Organization: adds admin services, can manage ambulatory facilities for docs	
Closed Physician-Hospital Organization: selectively contracts w/ physicians based on costs and/or quality	
Fully Integrated Organization: hire physicians as salaried employees	

(Short, Ho, & McCracken 2017)

# Background



Dr. House owns a practice called Nihilist Physicians, Inc.

Dr. Cuddy owns a hospital and wants Nihilist Physicians to integrate with her hospital.



**Dr. House decides to integrate with Cuddy's hospital. But what happens next?**

# Background

Potential answers:

- See Season 7 of House to see what happens when Cuddy and House are together.
- There is a lot of tension between House and Cuddy in terms of types of procedures they want done and their personalities, although House's practice delivers quality care.
- House prefers to use Braun's coronary stents but Cuddy's hospital uses Boston Scientific's coronary stents because they are cheaper for the hospital.

# My role in the project

Create a dataset that provides information on acquired physician practices and the hospitals that acquired them

Find ways in which to organize data so that analysis is easy



# Project I: Vertical integration of physician practices and the effects on cost



...and this was my enemy

These were my weapons...

# The Data (enemy)



Levin

- Contains data on acquisitions for medical devices, pharmaceuticals, physician practices, etc.
- Includes target names and acquirer name
- Only looked at physician practices acquired by hospitals or hospital systems

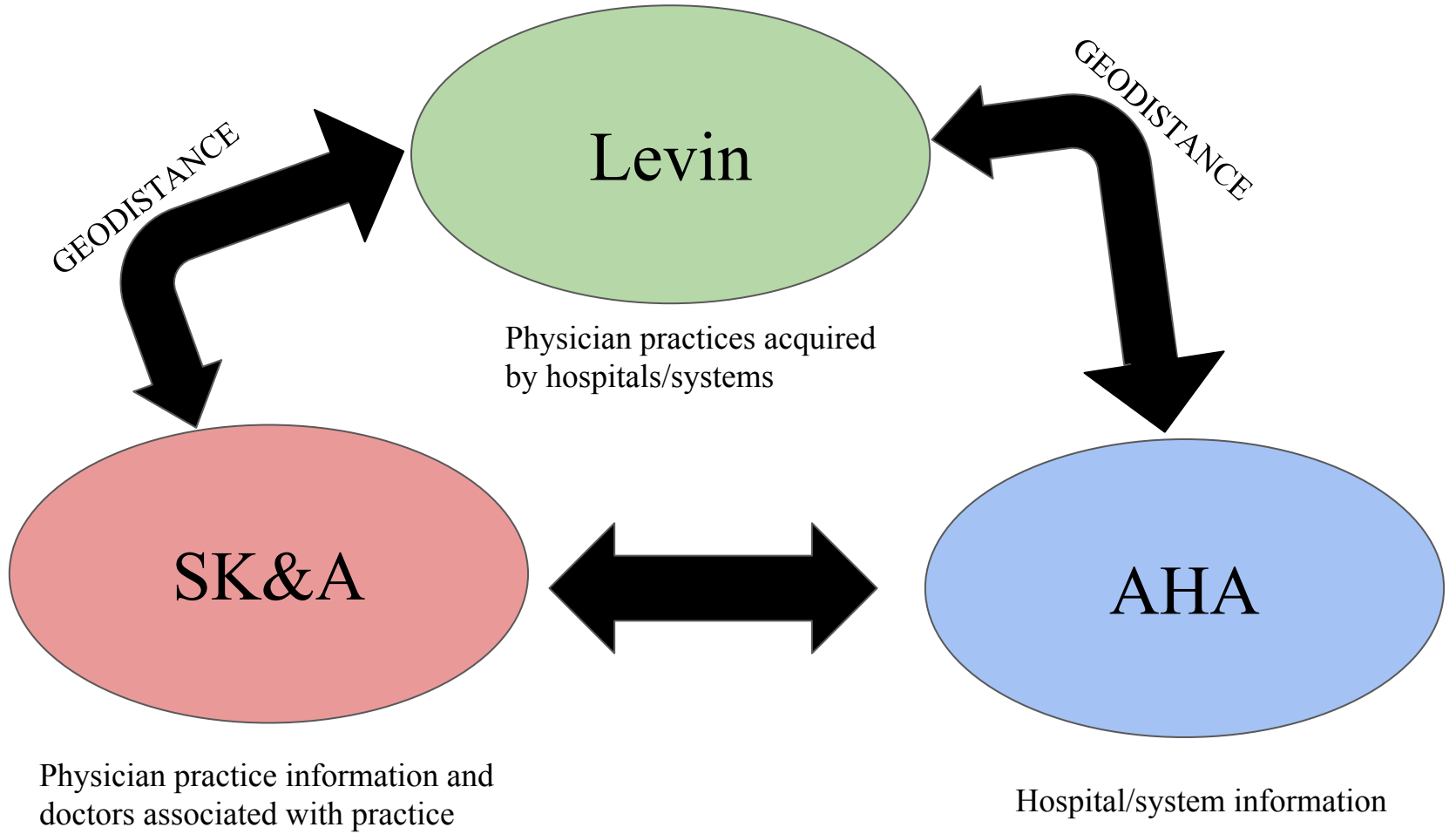
AHA

- Contains data on universe of hospitals and hospital systems
- Data ranges from 2000-2014

SK&A

- Contains data on 75% of physicians and practices they belong to
- Includes practice specialties and NPIs

Project I: Vertical integration of physician practices and the effects on cost



# Preliminary findings

88 total observations

46% of practices were acquired by hospitals

54% of practices were acquired by systems

Of the 88 observations, 42% of the acquired practices were multi-speciality, 16% were cardiology, and 14% were family practice

## Next steps

Find the set of doctors that existed pre and post integration across all 88 observations

Merge with data that details purchasing of medical devices by physicians

Look at changes in costs of items purchased, and also changes in types of items bought

Q&A

# Aims

To understand the types of payments physicians receive from pharmaceutical companies

To see the effects these payments have on a doctor's prescribing domain

# Background



Lead defense attorney Benjamin Brafman walks with former pharmaceutical executive Martin Shkreli after the jury issued a verdict at the U.S. District Court for the Eastern District of New York, August 4, 2017 in the Brooklyn borough of New York City. Drew Angerer/Getty Images



# Background

- Negative perceptions formed as a result of what we see in the media
- Physician Payments Sunshine Act (2010)
- **Almost all** doctors have had some sort of financial interaction with pharmaceutical companies
- Researchers like to talk about the correlations that exist, but don't tease apart the factors that influence a physician's' behavior

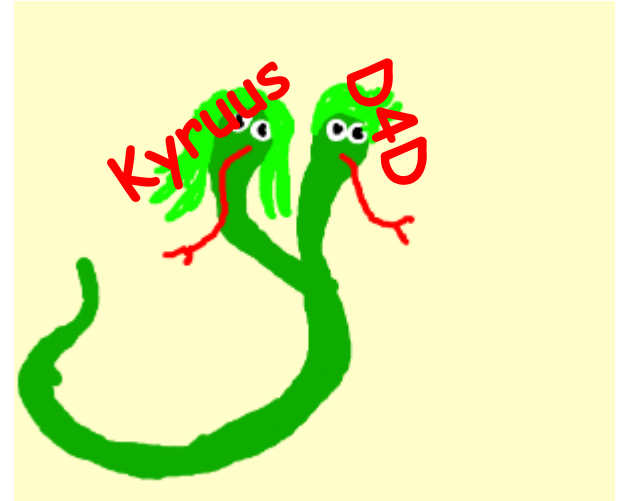
## My role in the project

Construct a dataset that includes ProPublica Open Payments/D4D data and Kyruus payments data

## Project II: Payments to physicians by large pharmaceutical companies and potential conflicts of interest



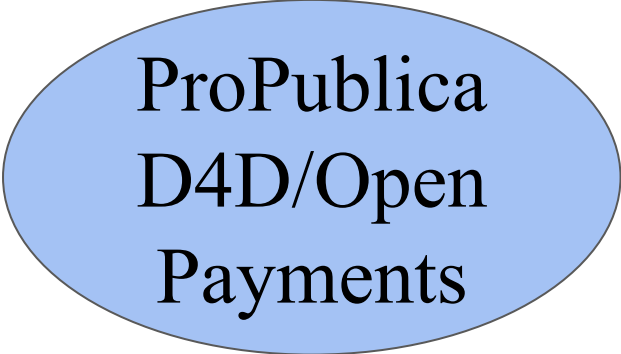
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. help_me  
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...and this was my new enemy

Again, these were my weapons...

## The Data (enemy)



ProPublica  
D4D/Open  
Payments

- Contains payments data from pharmaceutical and medical device companies
- Years: 2013-2015



Kyruus  
Payments  
Data

- Contains payments data from 12 major pharmaceutical companies
- Years: 2010-2013\*

# The Data

1. AstraZeneca
2. Cephalon\*
3. EMD Serono, Inc.
4. Forest Laboratories\*
5. GlaxoSmithKline
6. Johnson & Johnson
7. Eli Lilly & Company
8. Merck & Co.
9. Novartis
10. Pfizer
11. Valeant
12. ViiV Healthcare

**Combined estimated annual revenue:**

**~\$316 billion  
(USD)**

\*No longer around (as of 2014)

# The Data

## **paygen\_food**

“Food and Beverage”  
“Entertainment”

## **paygen\_trav**

“Travel and Lodging”

## **paygen\_conspk**

“Promotional Speaking”  
“Education”  
“Gift”  
“Consulting”  
“Honoraria”  
“Nonaccredited Training”  
“Accredited Training”  
“Charitable Contribution”

## **payres**

“Grant”

# Findings

From 2010-2015, these 12 firms spent \$925 million on physicians

In addition, \$812 million was spent funding research

96% of physicians paid during this time received payment for food and travel

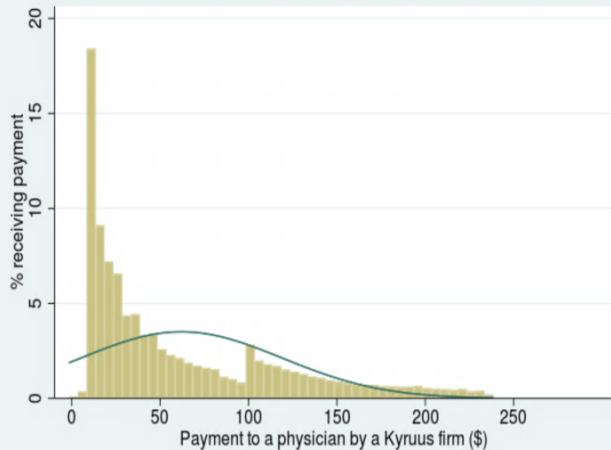
7% of physicians received a consulting and speaking payment

Maximum payment received by a physician: ~\$2million (for consulting and speaking)

That same physician received \$4 million for research

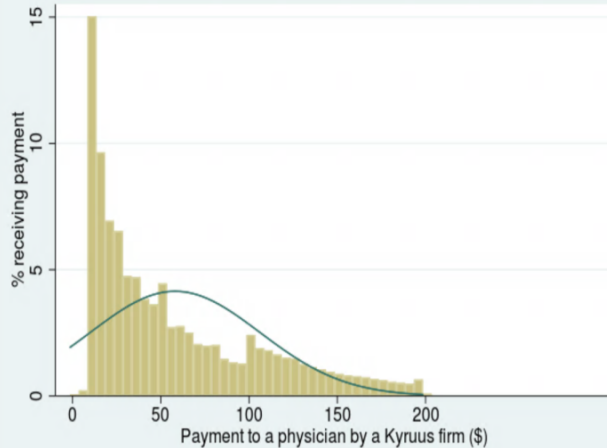
Payments to Physicians in 2010 by Kyruus Firms

# of transactions = 128437



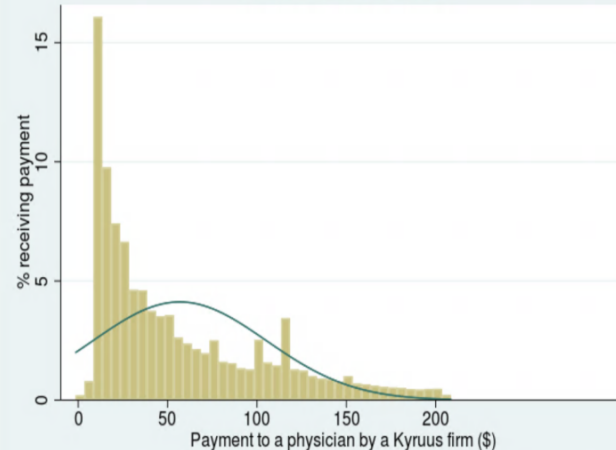
Payments to Physicians in 2011 by Kyruus Firms

# of transactions = 259651



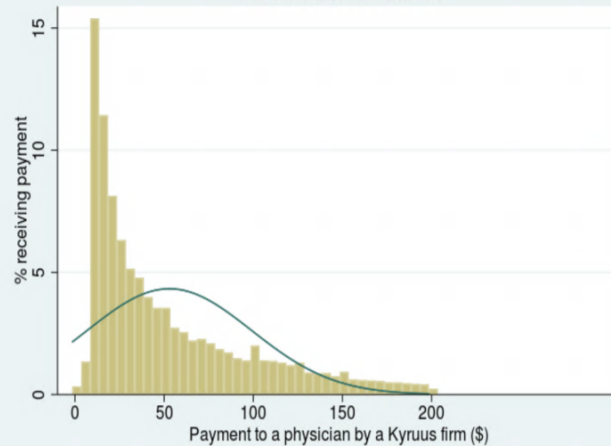
Payments to Physicians in 2012 by Kyruus Firms

# of transactions = 470155



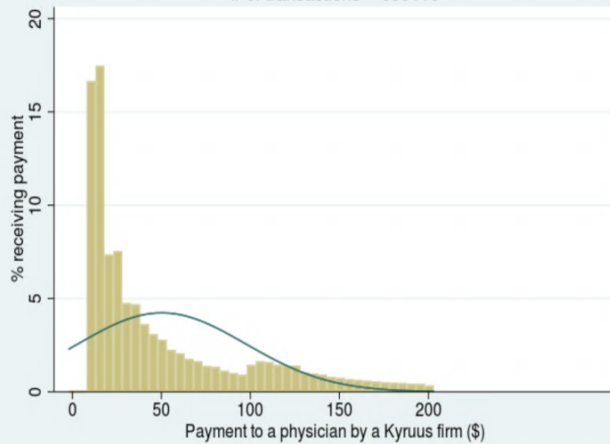
Payments to Physicians in 2013 by Kyruus Firms

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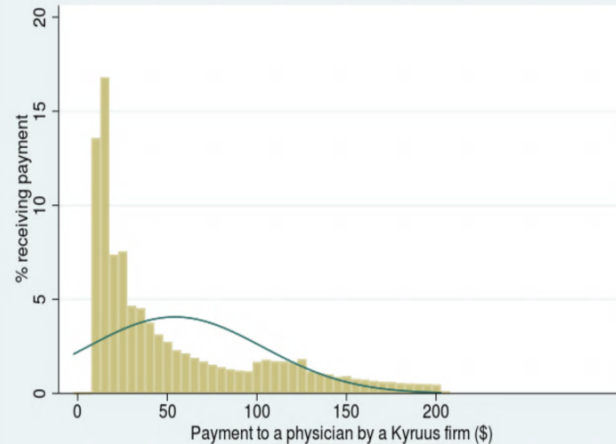
Payments to Physicians in 2014 by Kyruus Firms

# of transactions = 633110



Payments to Physicians in 2015 by Kyruus Firms

# of transactions = 604500





## Next steps

Question to consider: A physician makes roughly \$175,000, why would a \$75 dinner make a difference?

Brainstorm potential variables that could affect physician prescribing behavior

Currently looking at pre- and post-patent expiration

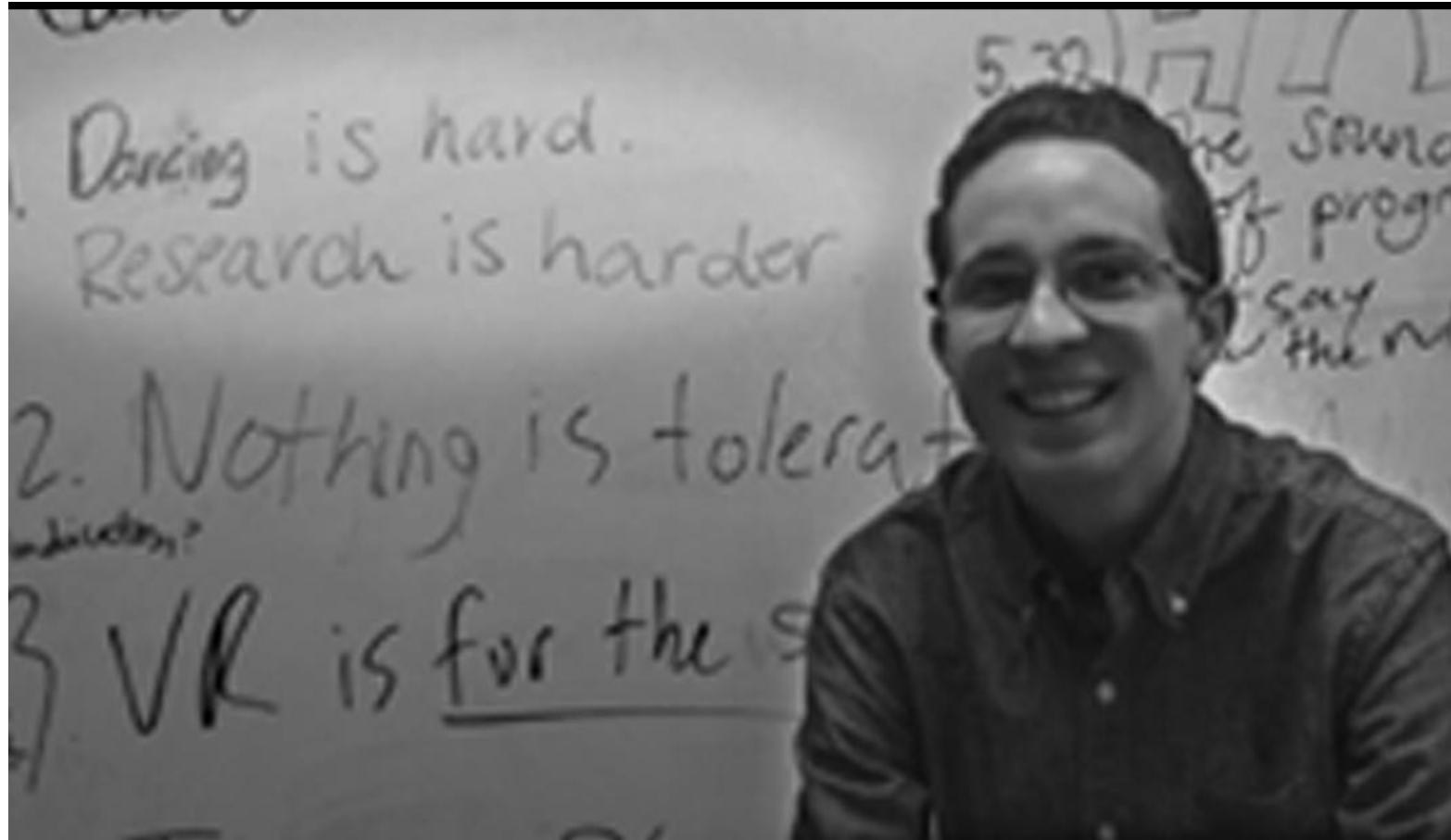
Merge with data on doctors' prescribing information

# Lessons Learned

The answer to “how do we fix the healthcare system?” is “yes.”

No real way to answer this question, and in research we have to break this problem into smaller pieces

# Lessons Learned



# Acknowledgements

- My mentors, Ashley and Matt
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- Joanne and Safa
- Hoag
- My girlfriend, Hannah



Q&A