

# Can Employee Engagement Predict Turnover?

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# Data Science Problem

- Which federal agency has the most engaged employees?
  - **Can employee engagement predict an employee's intent to leave within the next year?**

# Why is this important?

- Happy employees = better individual performance = better organizational performance = happy organization
- Turnover is expensive!!!
  - 30% of an employee's annual salary on average

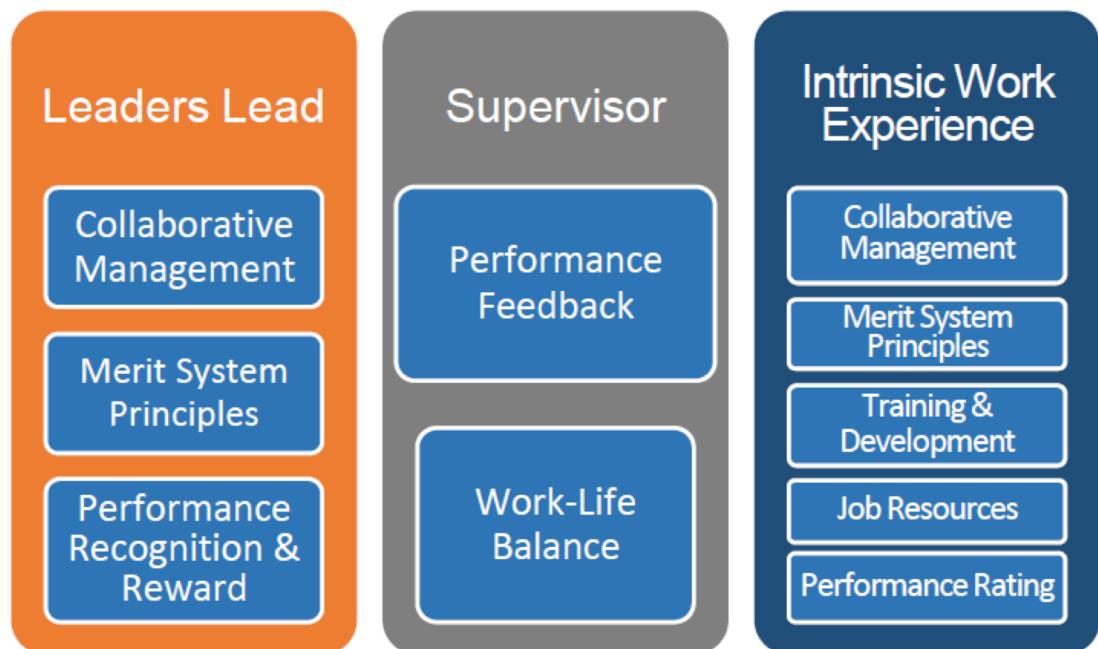


# Data: Federal Employee Viewpoint Survey (FEVS)

- 60% response rate
- 486,105 observations
- Two datasets from OPM:
  - Agency-level summary data (2013-2017)
  - Employee-level survey data (2017)

# Employee Engagement Index (EEI)

- 15 FEVS questions grouped into three categories:
  - **Leaders Lead:** employee perceptions of the integrity of leadership and leadership behaviors
  - **Supervisor:** interpersonal relationship between employee and supervisor
  - **Intrinsic Work Experience:** employee feelings of motivation and competency relating to their role in the workplace

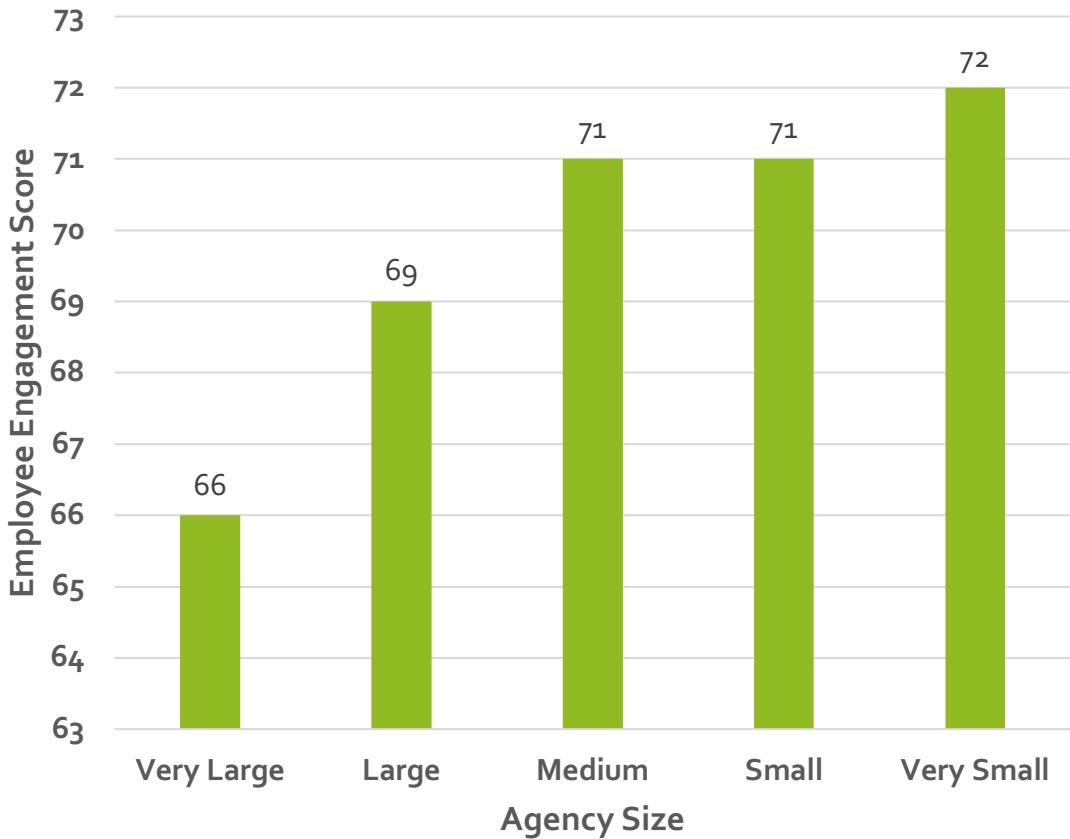




# Exploratory Data Analysis

## Agency-Level Findings

- Governmentwide employee engagement has slightly increased from 64 in 2013 to 67 in 2017
- Employee engagement decreases as agency size increases



# Which federal agency has the most engaged employees?

- Agencies with most engaged employees by agency size
  - **Very Small:** Marine Mammal Commission (96)
  - **Small:** Federal Mediation and Conciliation Service (85)
  - **Medium:** Federal Trade Commission (83)
  - **Large:** National Aeronautics and Space Administration (82)
  - **Very Large:** Department of Health and Human Services (72)

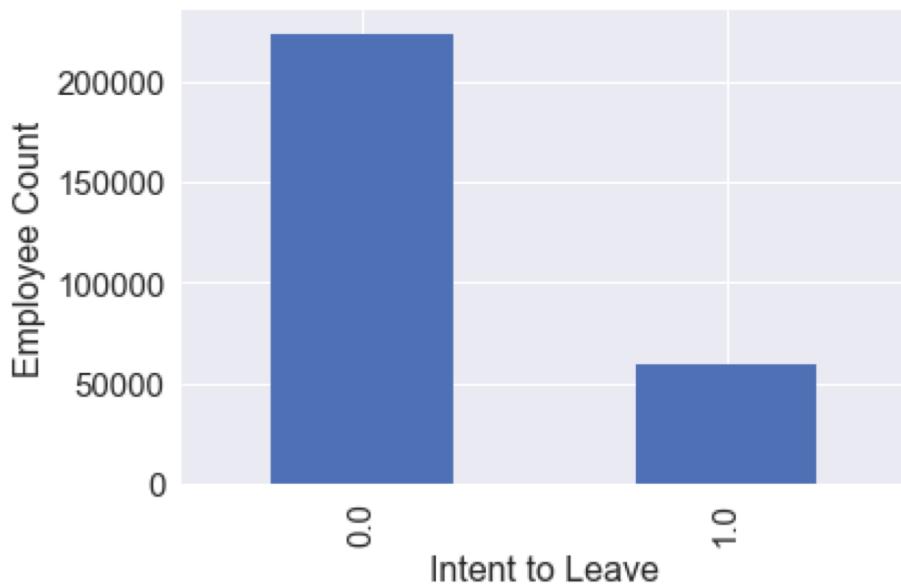
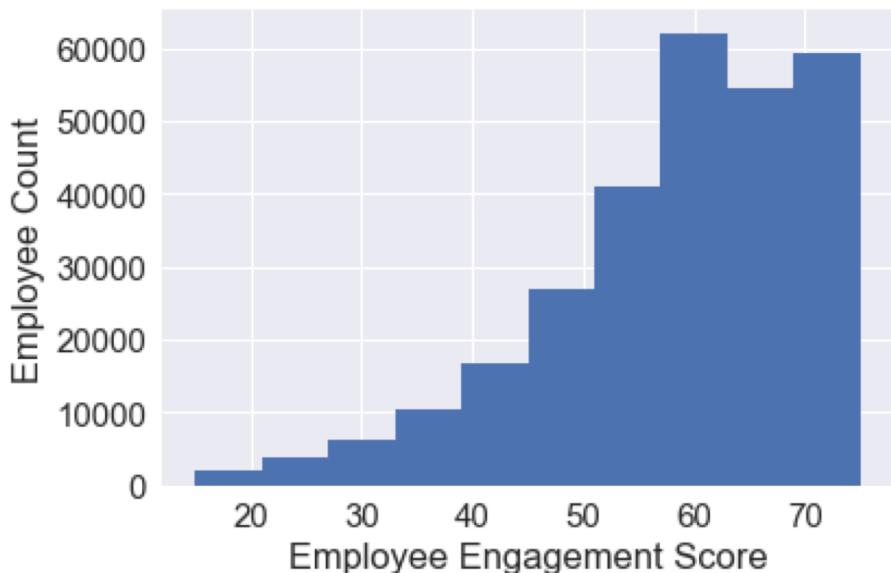
# Employee- Level Data: Cleaning the Data

1. Dropped employees with no identified agency
2. Dropped all unnecessary columns
3. Dropped rows with any null values

**End result: 283,247 observations (employees)**

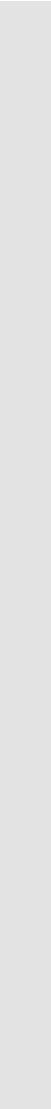
# Employee- Level Data: Findings

- **Skewed data:**
  - Most employees report being fairly engaged
  - 79% of employees reported intent to stay, 21% reported intent to leave
  - 22.4% of men intend to leave vs. 19.4% of women
  - 23.5% of minorities intend to leave vs. 19.9% of non-minorities
  - 12.6 % of employees working for 20+ years intend to leave vs. 24% of employees working for 20 or less years



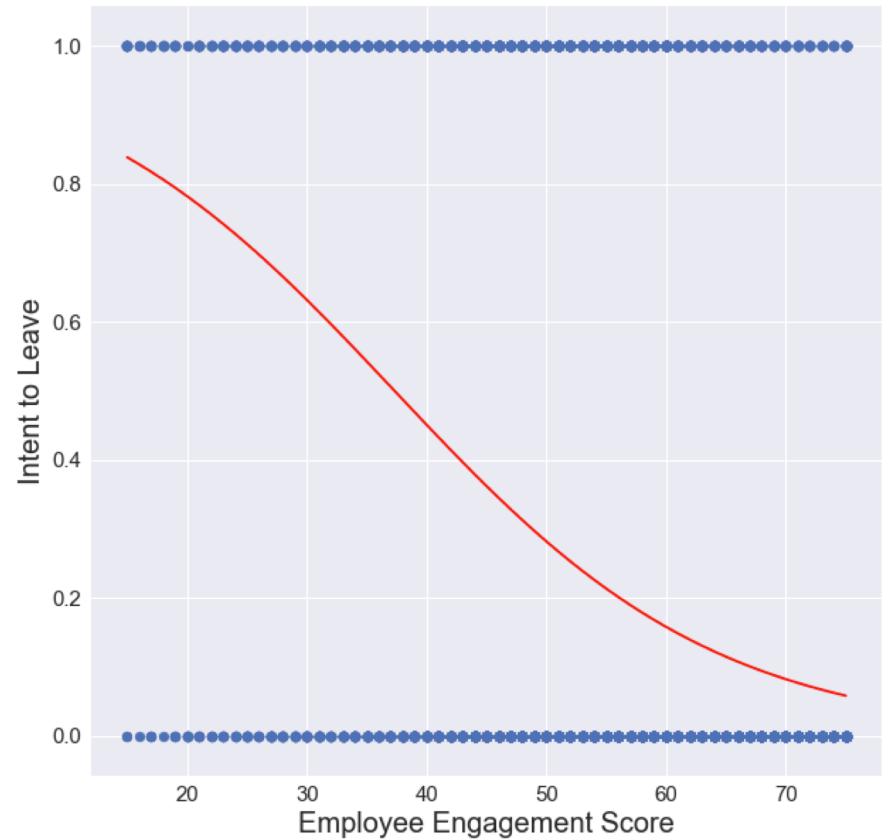


Modeling



# Logistic Regression

- Accuracy of 80.2%
- 1-unit increase in Employee Engagement Score is associated w/ 0.07-unit decrease in log odds of Intent to Leave
- Approx. 1% improvement in accuracy compared to null accuracy



# Random Forest

- **Features included:**
  - Agency
  - Sex
  - Education level
  - Tenure
  - Supervisory status
  - Minority status
  - Employee engagement score
- **Most important features:**
  - Employee engagement score (0.57)
  - Agency (0.32)
  - Tenure (0.05)
- Accuracy of 78.0% compared to 78.9% null accuracy

# Conclusions and Next Steps

# Conclusions

- Neither model performed well compared to null accuracy
  - **Null:** 78.9%
  - **Logistic regression:** 80.2%
  - **Random forest:** 78.0%
- Need to manage the skew
- The data may be more telling at the agency- or component office-level

## Next Steps

- Use data that distinguishes between types of turnover (retirement vs. quitting is a critical distinction!)
- Analyze specific subsets of the EEI and specific questions
- Analyze at the agency-level and component-level
- Use actual turnover data instead of self-reported intent to leave



Questions?

