

STA 199

# **Who Is Most at Risk? How Smoking, Exercise, and Family History Shape Heart Disease Outcomes**

Group Staddies-4-Life

# Topic and Motivation

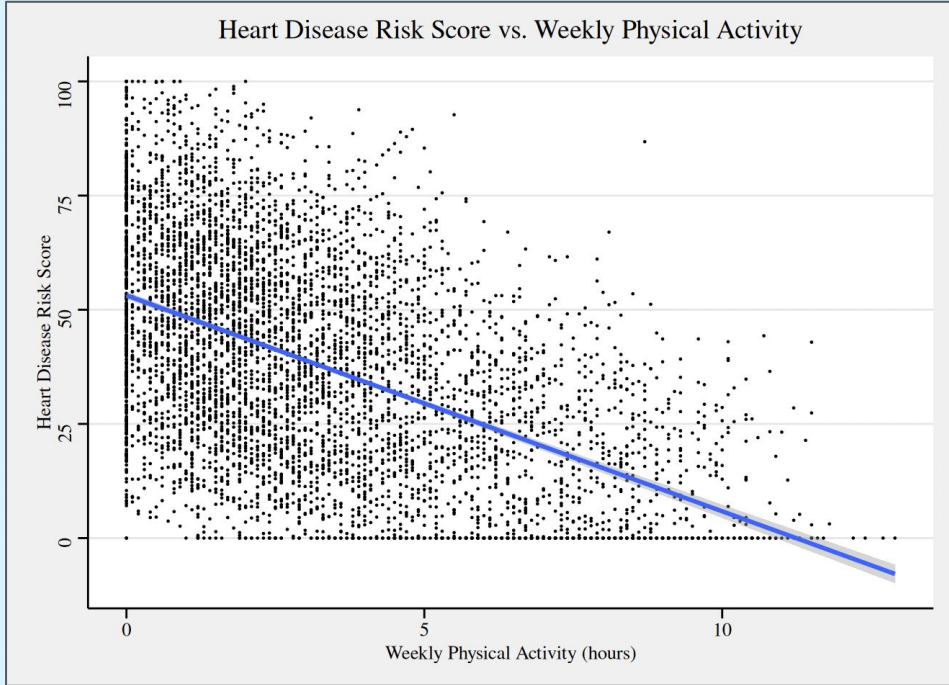
How does smoking status and hours of weekly physical activity relate to a patient's heart disease risk score, and does this relationship vary depending on whether the patient has a family history of heart disease?

- ❖ Heart disease is one of the leading causes of death worldwide
- ❖ Risk is influenced by many behavioral and genetic factors
- ❖ Understanding how certain factors interact can help identify which combinations are most important for preventing heart disease

# Cardiovascular Risk Dataset

- ❖ Sourced from Kaggle, created by data curator Vishard Mehta
- ❖ Synthetic and created for educational purposes so no ethical concerns (no real patient data)
- ❖ 5500 observations, each represents a unique patient
- ❖ 16 variables known to influence cardiovascular health
- ❖ We focused on smoking status, weekly physical activity, family history of heart disease, and their combined effects on heart disease risk score

# Physical Activity and Heart Disease Risk



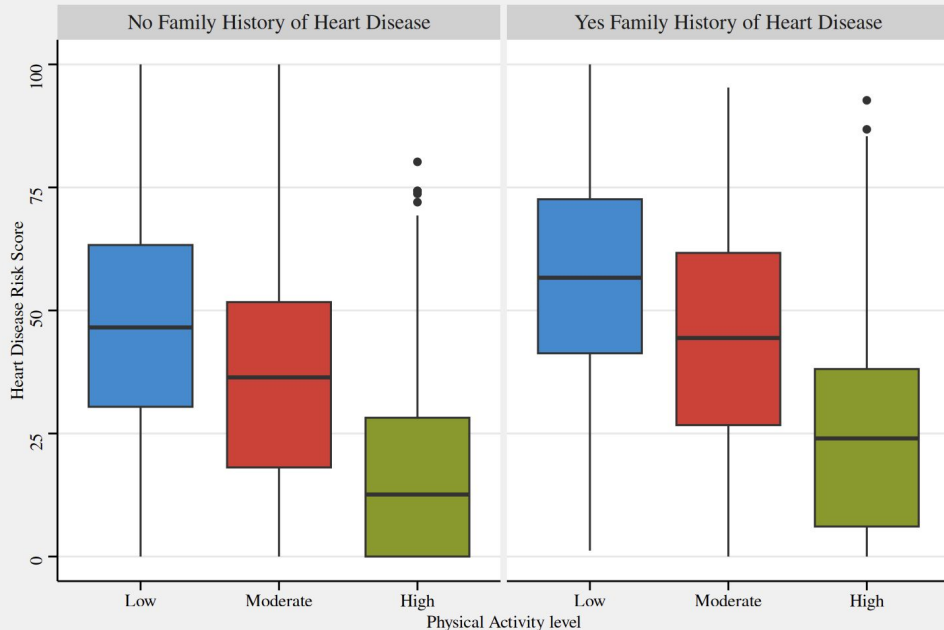
- ❖ Overall negative relationship; higher weekly physical activity associated with lower heart disease risk score
- ❖ High variability
  - Activity ALONE does not fully explain risk
  - Likely due to confounding factors
- ❖ Indicates the need to examine interactions rather than simple relationships

# Physical Activity and Heart Disease Risk

## by Family History

- ❖ Risk decreases with higher activity levels in both groups
- ❖ Family history increases risk at every activity level
- ❖ Physical activity still lowers risk even with family history (protective effect remains)
- ❖ Both lifestyle and genetics may jointly influence risk

Heart Disease Risk Score by Physical Activity and Family History



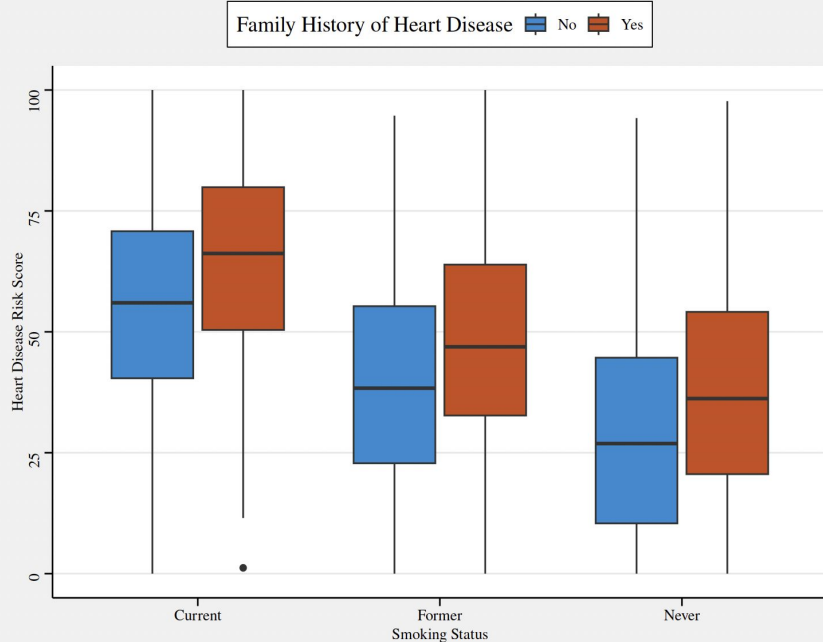
Mean Heart Disease Risk Score by Physical Activity and Family History

Activity Level	Family History of Heart Disease	Mean Risk Score
Low	No	46.859
Low	Yes	56.708
Moderate	No	35.684
Moderate	Yes	44.415
High	No	16.411
High	Yes	24.733

# Smoking Status and Heart Disease Risk

## by Family History

Heart Disease Risk Score by Smoking Status and Family History



- ❖ Risk highest for current smokers, lower for former, lowest for never
  - Quitting may reduce risk, but former still higher than never
- ❖ Family history increases risk across all smoking status
  - Genetic risk may add on top of smoking effects
- ❖ Overall higher risk scores compared to physical activity
  - Smoking may be more important than no physical activity in increasing risk
  - Higher physical activity may be more important in lowering risk

Mean Heart Disease Risk Score by Smoking Status and Family History

Smoking Status	Family History of Heart Disease	Mean Risk Score
Current	No	55.734
Current	Yes	64.857
Former	No	38.770
Former	Yes	47.125
Never	No	28.932
Never	Yes	37.792

## Conclusions and Critique

Though more commonly associated with lung diseases, smoking may also be related to poorer cardiovascular health, especially if the person has a family history of heart disease

Physical activity can also affect cardiovascular health where higher weekly activity may decrease risk, with no family history decreasing it further, but there is a lot of variation

Potential confounding variables in the associations, especially for physical activity. Ex. People who have higher activity may also tend to eat healthier, decreasing risk.