

Mental Health and Adverse Childhood Experiences: A Relational Investigation

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Group 14

DS 6021: Introduction to Predictive Modeling
Professor Afriyie
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Research Questions

Adverse Childhood Experiences

- Adverse Childhood Experiences (ACEs) are traumatic events that occur when an individual is aged 0-17 years old

Research Questions:

- How do distinct clusters or patterns of ACEs predict mental health outcomes?
- Which specific ACEs are the strongest predictors of adult depressive disorders?
- To what extent can mental health disorders be accurately predicted from ACEs?

Data

Data Overview

- Data originates from the CDC Behavioral Risk Factor Surveillance System survey
- Administered via telephone interview
- Combined data from the years 2019, 2021, and 2023

Data Cleaning

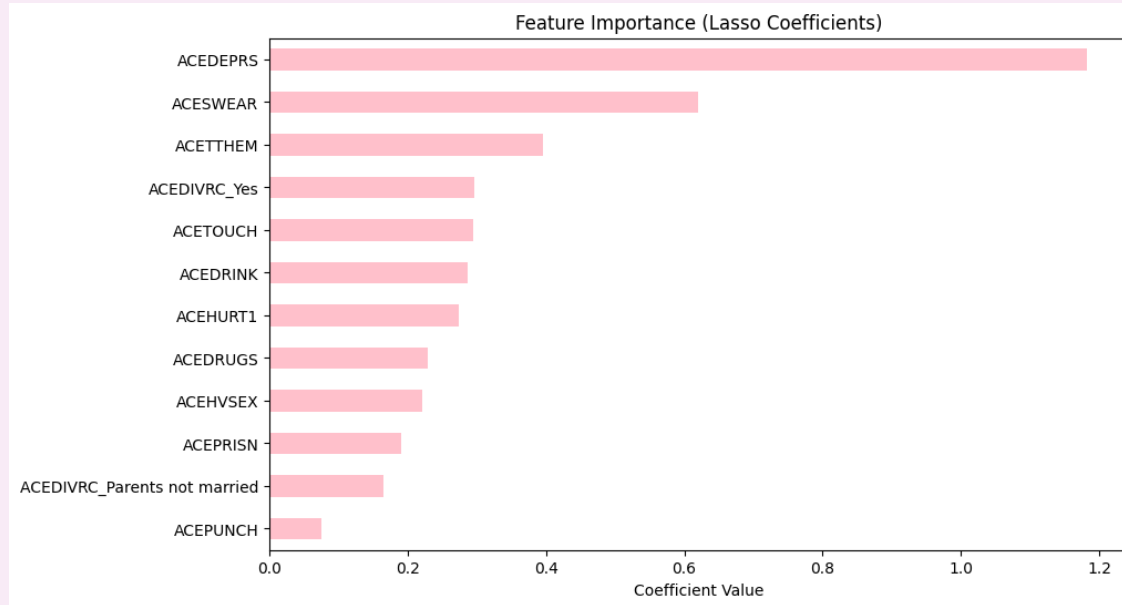
- Narrowed data down to 1,264,973 rows and 18 Columns
- Used replace map to convert numeric to a more informative numeric type
- Converted 'Yes' and 'No' to 0 and 1
- Dropped rows with missing values

Lasso Regression

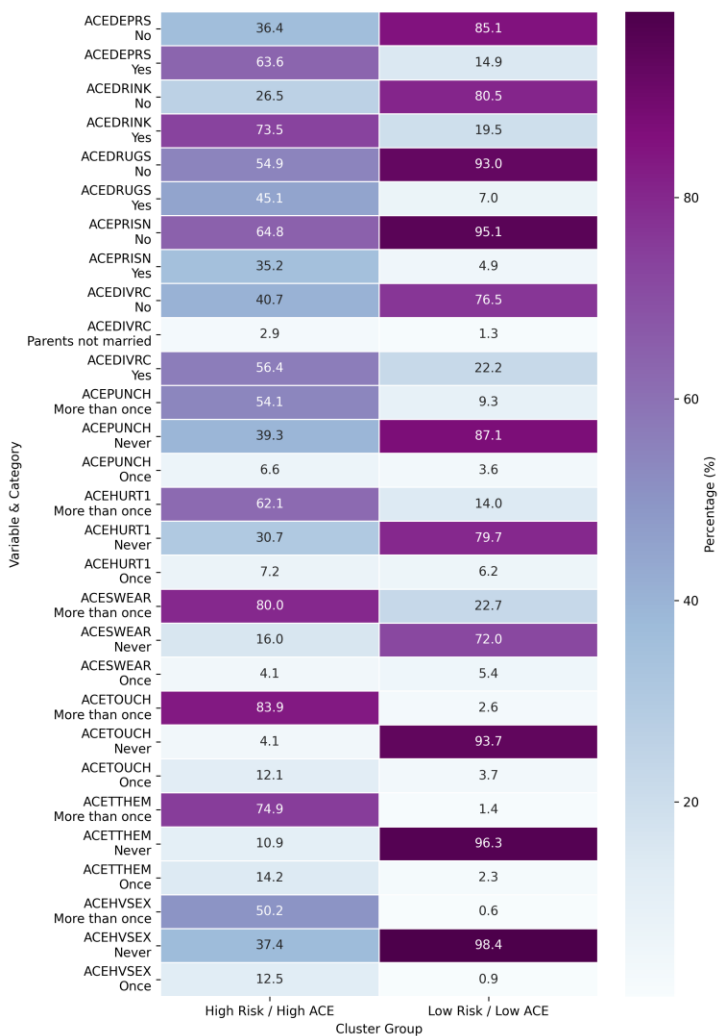
Question: Which specific ACEs are the strongest predictors of adult depressive disorders?

Objective: Find most influential predictors for the number of days someone was depressed

Target Variable: MENTHLTH – how many days in the past 30 days was your mental health not good?



Proportion of ACE Categories by Cluster



Hierarchical Cluster Analysis

Question: How do distinct clusters or patterns of ACEs predict mental health outcomes?

Method: Gower Distance with Average Linkage

Sample: N: 10,000

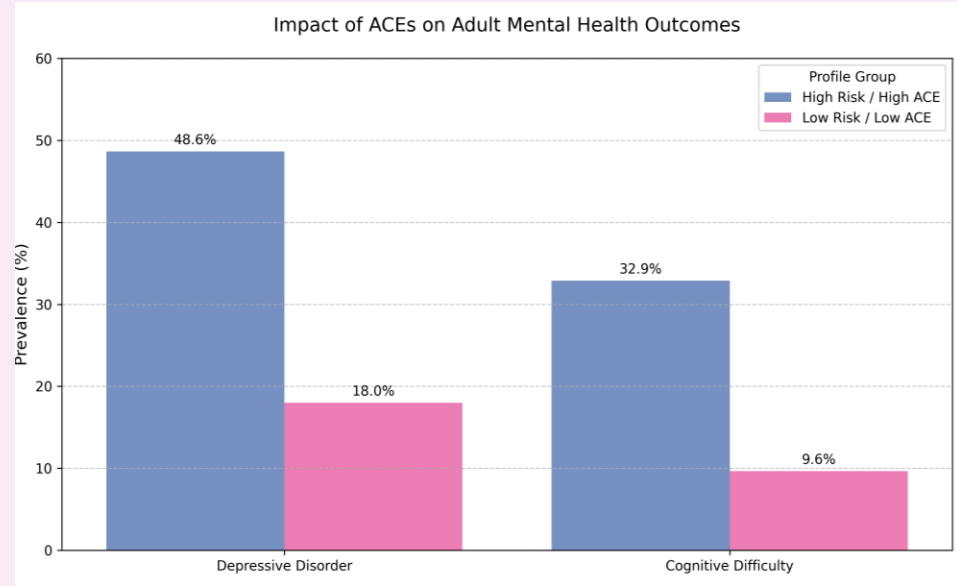
Result: Two distinct profiles identified.

- **Cluster 1 (5%):** High/Multi-Type Exposure
- **Cluster 0 (95%):** Low/Baseline Exposure.



Hierarchical Cluster Analysis

Key Metric	High ACE	Low ACE	Relative Impact
Sexual Abuse Prevalence	84%	3%	28x
Witnessed Domestic Violence more than once	54%	9%	6x
Depression Diagnosis	49%	18%	2.7x
Activity Limitation days/month	10.8	3.5	3.1x
Poor Mental Health days/month	9.3	4.9	1.9x

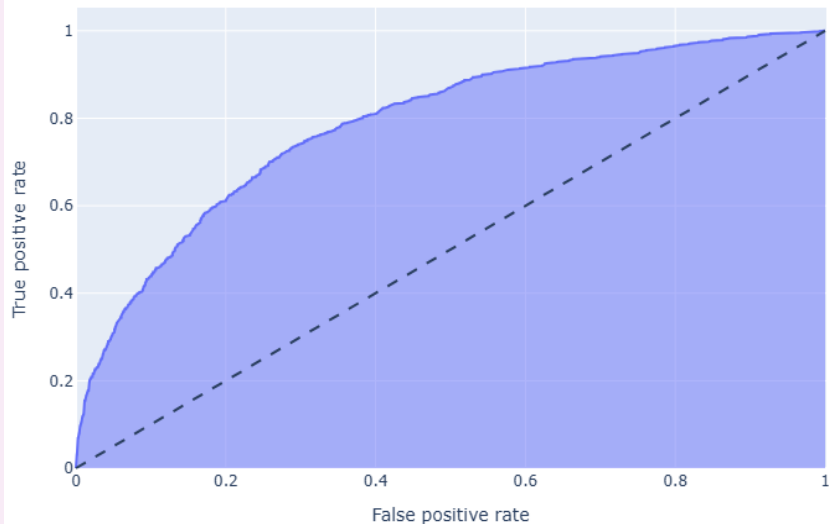


Logistic Regression

Question: To what extent can mental health disorders be accurately predicted from ACEs?

Target Variable: ADDEPEV3 - Have you ever been told you have a depressive disorder?

ROC Curve (AUC = 0.788)



Threshold: 0.70
Accuracy: 0.788
Log Loss: 0.491

Actual label

Actual: No depression

3267

97

Actual: Yes depression

1056

317

Predicted: No depression

Predicted: Yes depression

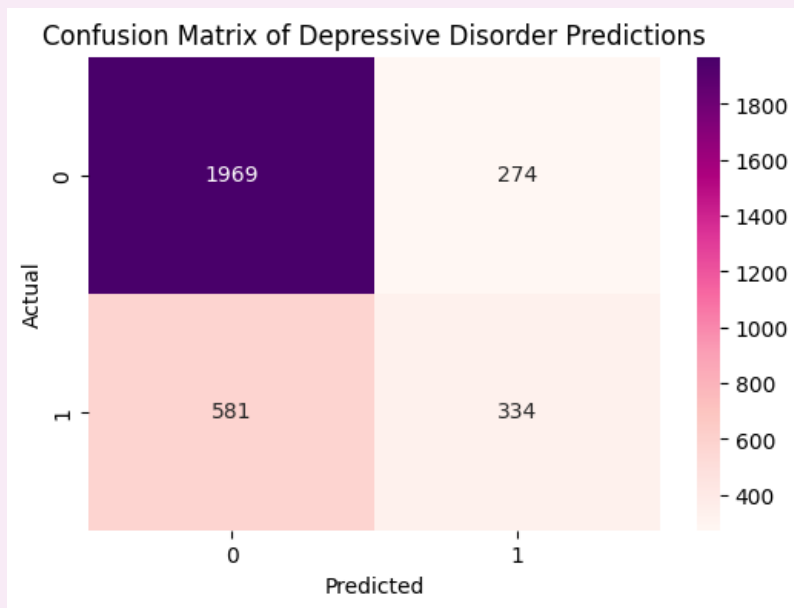
Predicted label

K-Nearest Neighbor

Question: To what extent can mental health disorders be accurately predicted from ACEs?

Objective: Classify individuals into having had or not had a depressive disorder

Target Variable: ADDEPEV3 - Have you ever been told you have a depressive disorder?



K = 11

Outcome: 0 = No diagnosis ,
1 = Has been diagnosed

Accuracy: 0.729

Balanced Accuracy: 0.621

AUC: 0.708

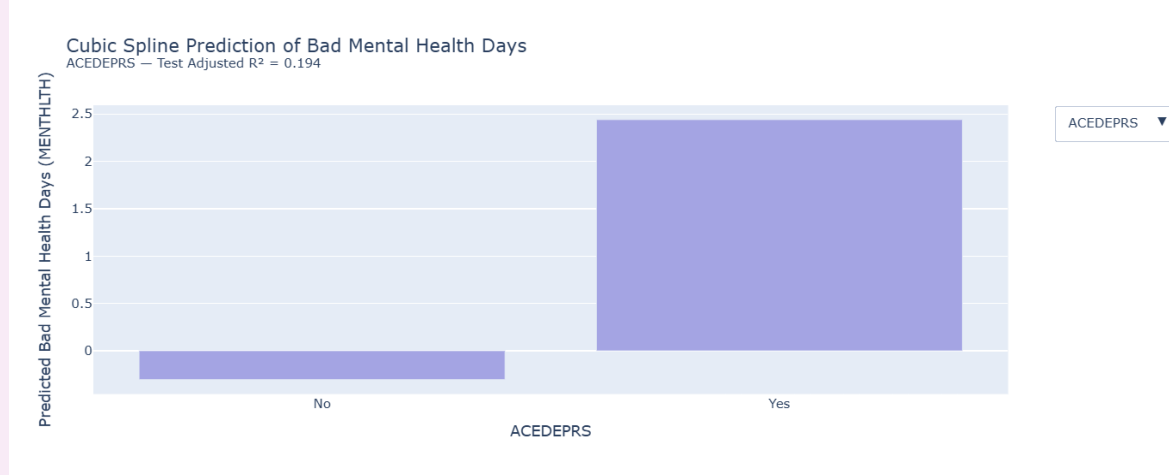
Multiple Linear Regression

Question: To what extent can mental health disorders be accurately predicted from ACEs?

Objective: Predict the number of days an individual has depression in the past 30 days

Target Variable: MENTHLTH – how many days in the past 30 days was your mental health not good?

➤ Only data from 2019 & 2023



ACEDEPRS

Predicted Values:

No = -0.0304 (0 days)

Yes = 2.4398 (~2.4 days)

Conclusion

Main Takeaways

- Able to predict mental health with ~72% accuracy
- Strongest Predictors:
 - Living with someone depressed
 - Living with someone who swore at you
 - Divorced Parents

Next Steps

- Explore different K clusters for HAC to explore combination clusters within ACEs
- Incorporate more lifestyle variables into the models
 - Chronic Health Conditions
 - Age Groupings
 - Physical Activity

Thank you!

Any Questions?

We want to specifically thank Professor Johnson and Professor Afriyie!

