Medha Pappula

Socioeconomic Factors and Mental Health Outcomes

Analyzing What Factors May Result In Increased Adverse Effects

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01

Introduction

My Topic And Research

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Mental Health

Has been steadily **rising in popularity for research** in it's diagnosis, prevention, and treatment. One important factor to consider is what demographics and socioeconomic **factors might contribute to increased mental health severity**.

Literature review

- **HUDSON (2005).** ***Socioeconomic status and mental illness.*** **The American Journal of Orthopsychiatry.**
  - The study found evidence supporting the relationship between socioeconomic status and mental illness.
- **LEE, DEMARIS, BAVIN, & SULLIVAN (2001).** ***Gender differences in the depressive effect of widowhood in later life.*** **OUP Academic.**
  - The research revealed gender differences in the impact of widowhood on depression among older adults.
- **MACINTYRE, FERRIS, GONÇALVES, & QUINN (2018).** ***What has economics got to do with it? The impact of socioeconomic factors on mental health and the case for collective action.*** **Nature News.**
  - The article highlighted the influence of socioeconomic factors on mental health outcomes and emphasized the need for collective action.
- **NAGASU, KOGI, & YAMAMOTO (2019).** ***Association of socioeconomic and lifestyle-related risk factors with mental health conditions.*** **BMC Public Health.**
  - The study demonstrated an association between socioeconomic and lifestyle-related risk factors and mental health conditions.
- **ROY-BYRNE, KESSLER, WANG, & JOESCH (2009).** ***Low socioeconomic status and mental health care use among respondents with anxiety and depression in the NCS-R.*** **Psychiatric Services.**
  - The research indicated a link between low socioeconomic status and reduced utilization of mental health care among individuals with anxiety and depression.
- **VAALAVUO, NIEMI, & SUVISAARI (2022).** ***Growing up unequal? Socioeconomic disparities in mental disorders throughout childhood in Finland.*** **SSM - Population Health.**
  - The study revealed socioeconomic disparities in mental disorders throughout childhood in Finland.
- **ZHANG, SU, CHEN, TAN, & CHEN (2022).** ***Effect of socioeconomic status on the physical and mental health of the elderly: The mediating effect of Social Participation.*** **BMC Public Health.**
  - The findings highlighted the impact of socioeconomic status on the physical and mental health of the elderly, with social participation playing a mediating role.

Area Of Study

Literature Review

- Socioeconomic status (SES) is a **strong predictor of mental health**. Individuals with lower SES are more likely to experience mental disorders.
- There are **several factors that contribute** to the association between SES and mental health, including income level and educational attainment
- The relationship between SES and mental health is **complex and not fully understood.**

Current Gaps

- The **role of social support** in the relationship between SES and mental health.
- The specific differences in impact **between children and adults** outside of education.
- Possible **location based relationships** between SES and mental health outcomes in individuals.

Research Questions

Question 1

What are some specific socioeconomic factors that affect mental health in adults?

Question 2

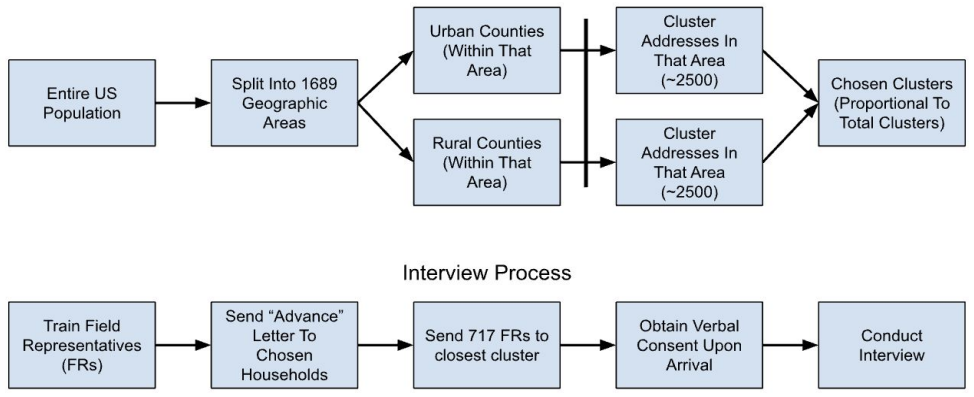
Do these factors affect adults and children in the same way?

02

Data And Methods

What Data I Used To Analyze
This Problem

Sample Selection



- Geographic cluster sampling
- Excluded those without a fixed household address, within the military, in long-term care/correctional facilities, and those living in foreign countries.

This means that any conclusions can be applied to the **entirety of the United States,** but can not be interpreted as cause and effect

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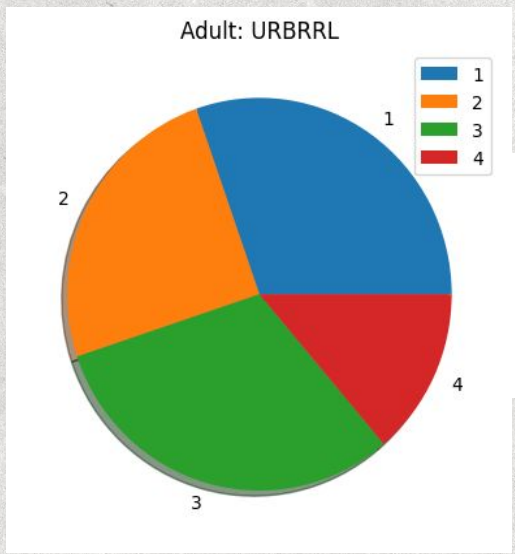
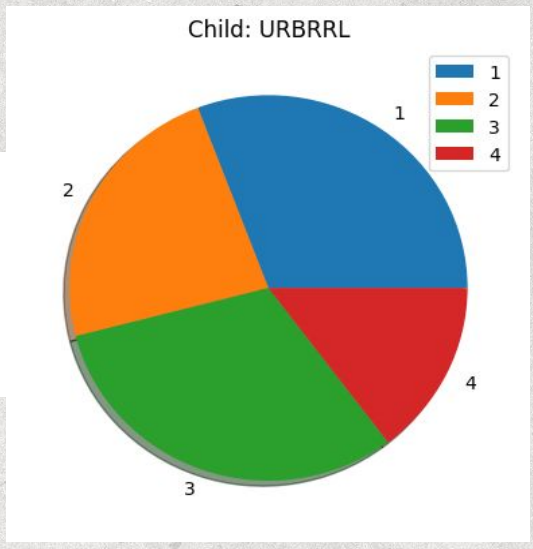


Adult: Urban-Rural Classification Scheme

Mode: 3 → 9315

Key:
1 - Large Central Metro
2 - Large Fringe Metro
3 - Medium and Small Metro
4 - Nonmetropolitan



Child: Urban-Rural Classification Scheme

Mode: 3 → 2529

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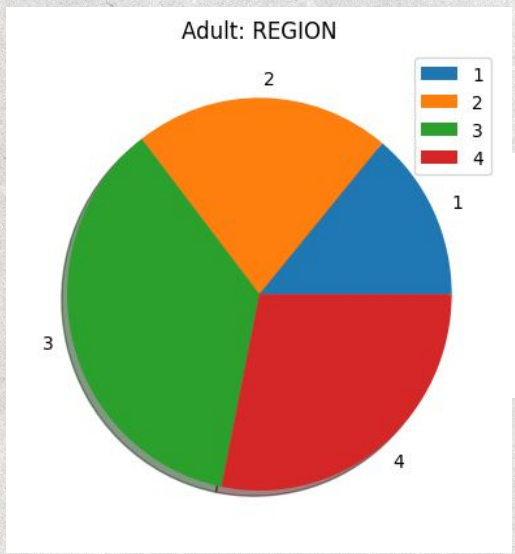
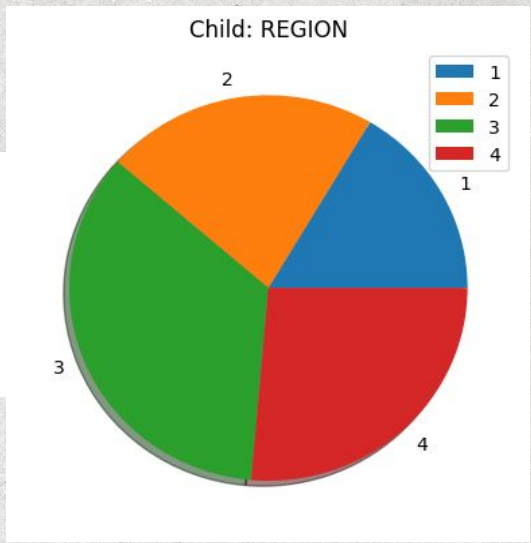


Adult: Region Of United States

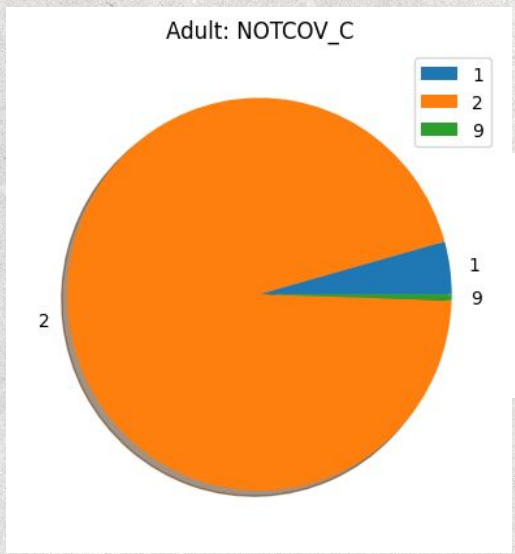
Mode: 3 → 10731

Key:
1 - Northeast
2 - Midwest
3 - South
4 - West



Child: Region Of United States

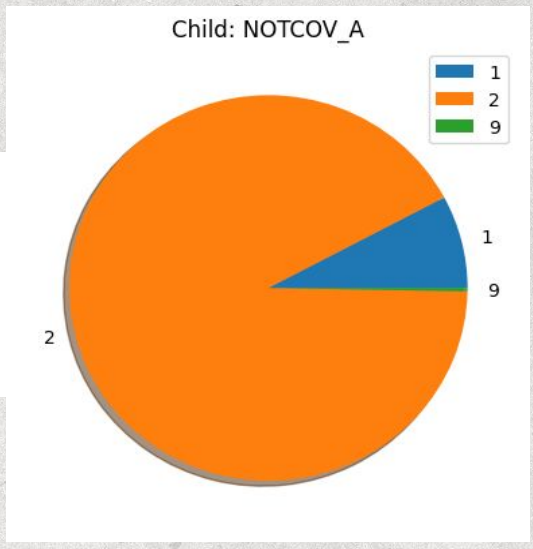
Mode: 3 → 2995



Adult: Coverage Status

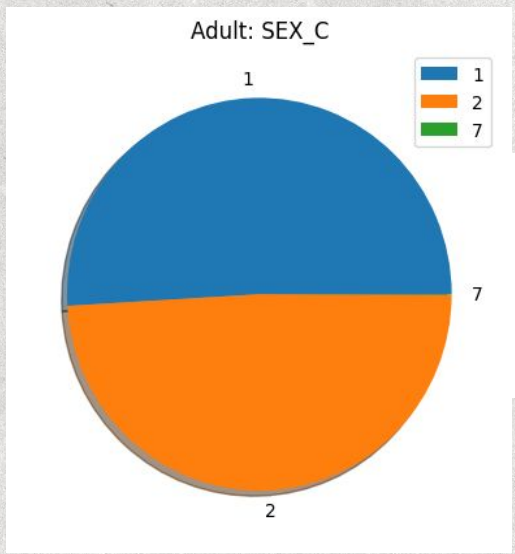
Mode: 2 → 27072

Key:
1 - Not covered
2 - Covered



Child: Coverage Status

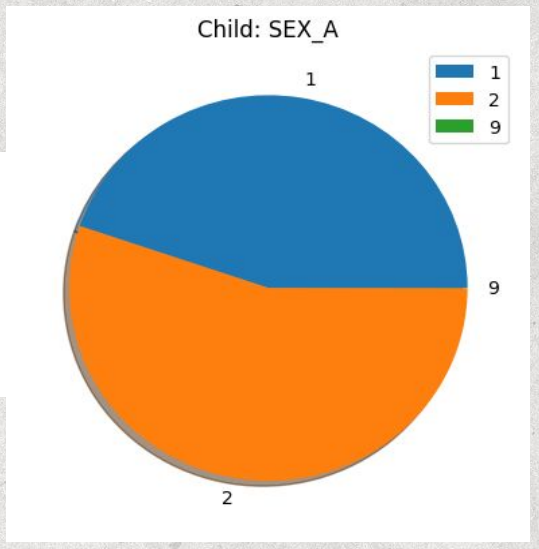
Mode: 2 → 7889



Adult: Gender

Mode: 2 → 16102

Key:
1 - Male
2 - Female



Child: Gender

Mode: 1 → 4257

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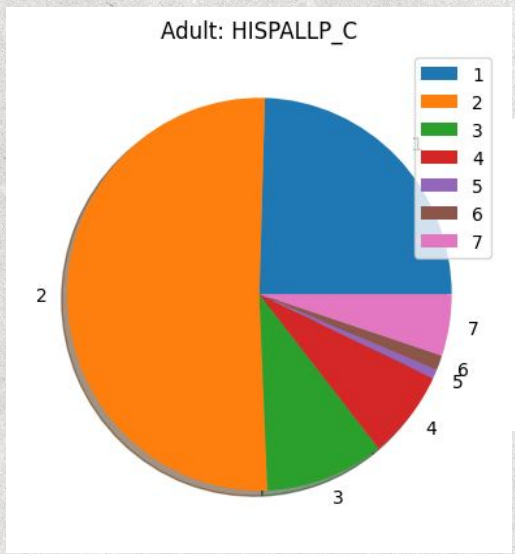
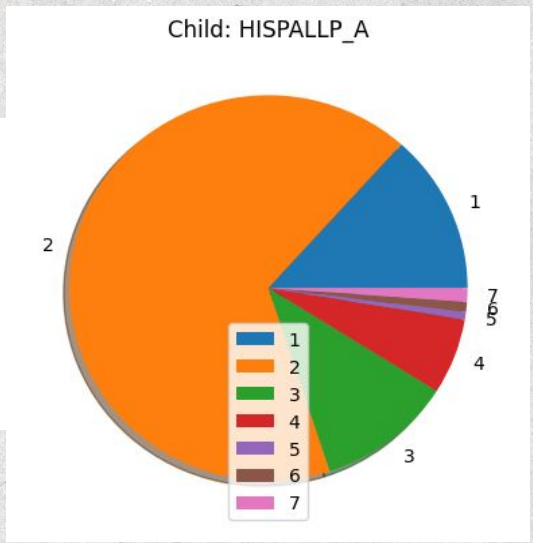


Key:
1 - Hispanic
2 - Non-Hispanic White only
3 - Non-Hispanic Black/African American only
4 - Non-Hispanic Asian only
5 - Non-Hispanic AIAN only
6 - Non-Hispanic AIAN and any other group
7 - Other single and multiple races



Adult: General Race

Mode: 2 → 19658

Child: General Race

Mode: 2 → 4204

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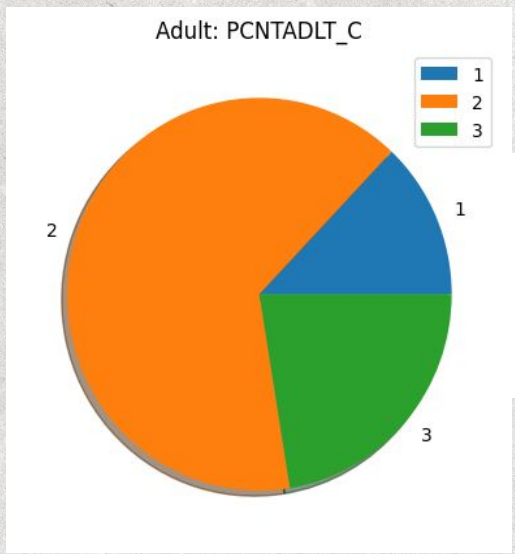
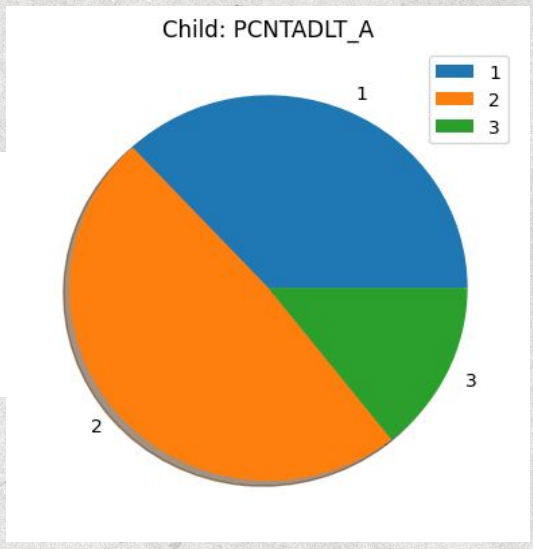


Adult: Number Of Adults In Family

Mode: 2 → 14401

Key:
1 - 1 adult
2 - 2 adults
3 - 3+ adults



Child: Number Of Adults In Family

Mode: 2 → 5264

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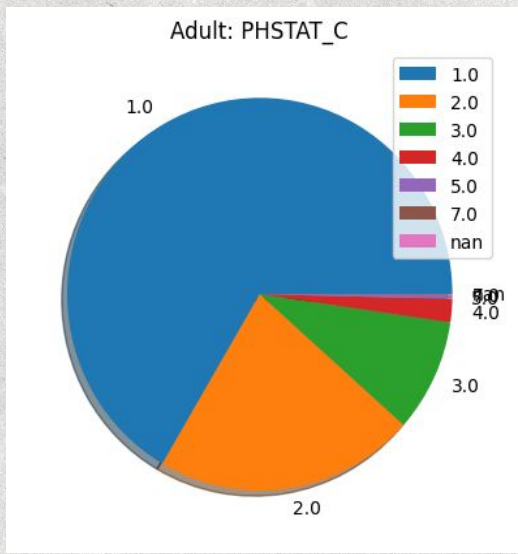
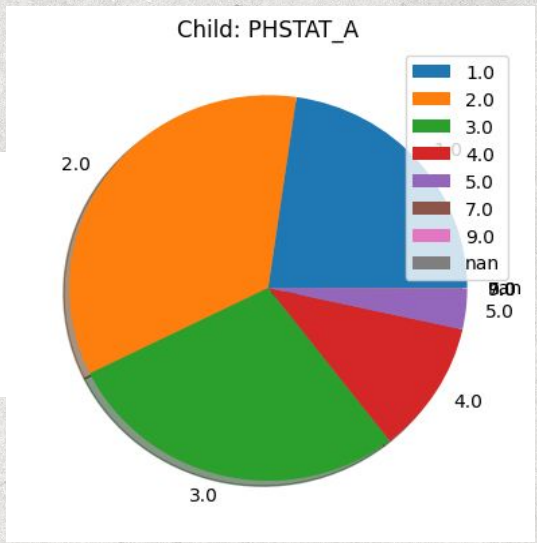


Adult: General Health Status

Mode: 2 → 10105

Key:
1 - Excellent
2 - Very Good
3 - Good
4 - Fair
5 - Poor



Child: General Health Status

Mode: 1 → 5511

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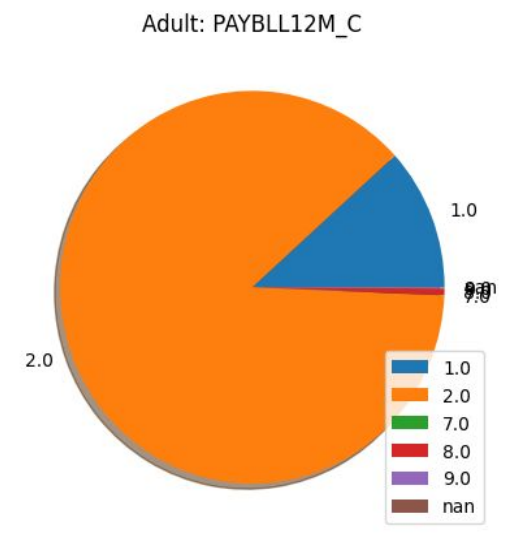
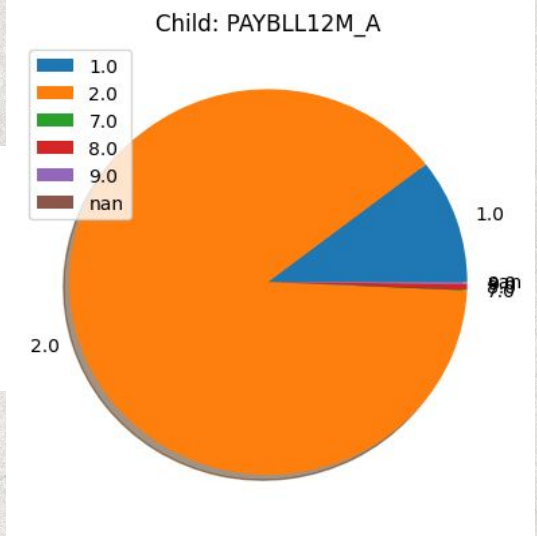


Adult: Difficulty In Paying For Healthcare

Mode: 2 → 26450

Key:
1 - Yes
2 - No



Child: Difficulty In Paying For Healthcare

Mode: 2 → 7285

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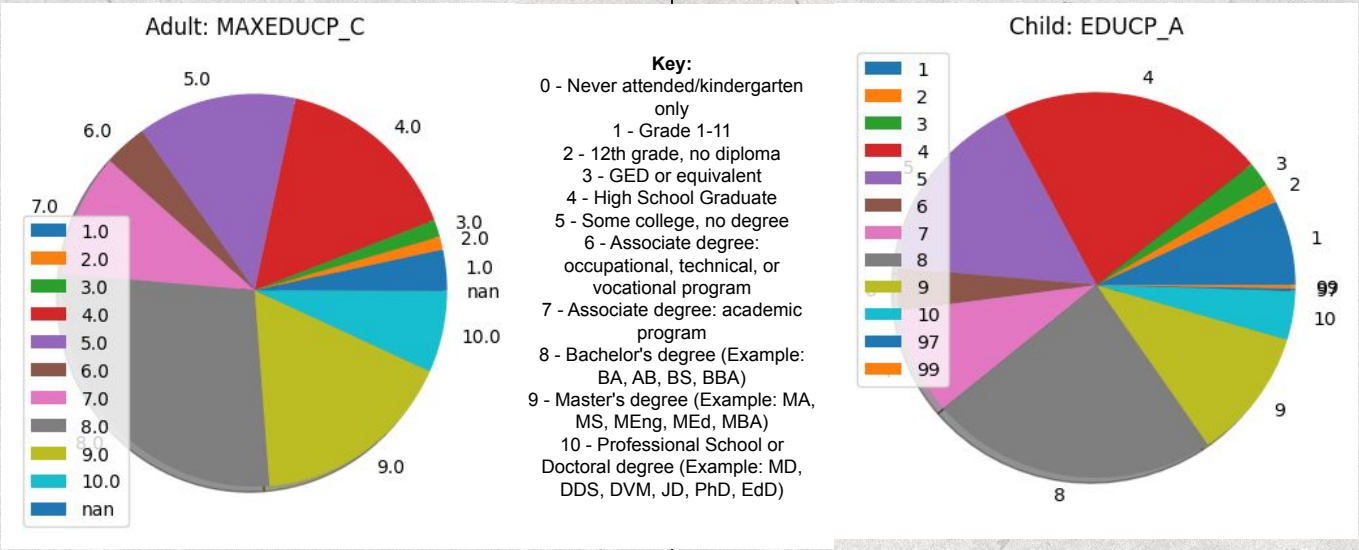
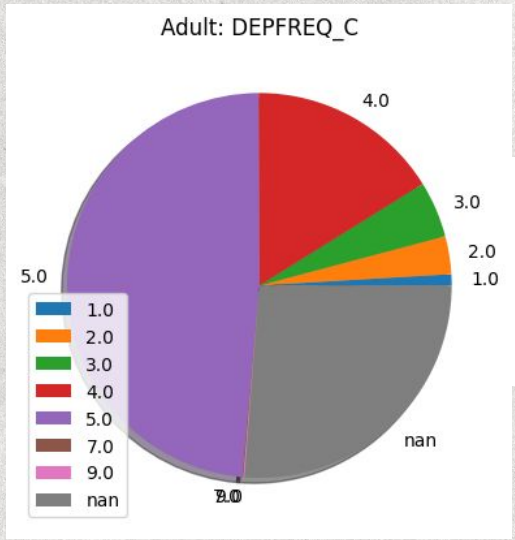


Adult: Highest Education Level Received

Mode: 8 → 6968

Child: Highest Education Level In Family

Mode: 8 → 2210

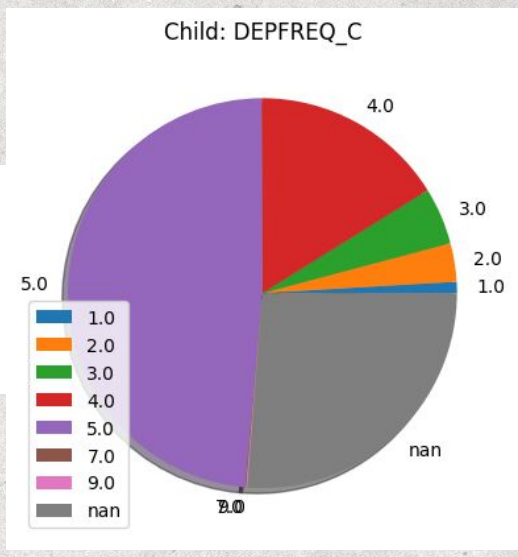


Adult: Depression Frequency

Mode: 5 → 15182

DEPENDANT VARIABLE

Key:
1 - Daily
2 - Weekly
3 - Monthly
4 - A few times a year
5 - Never.



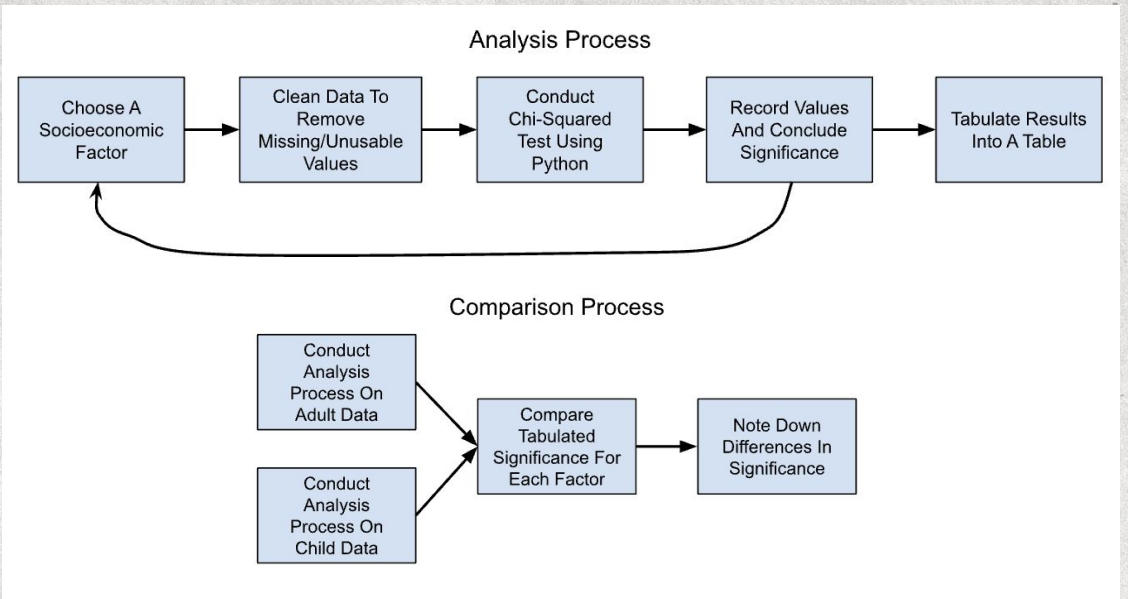
Child: Depression Frequency

Mode: 5 → 4007

Analysis

- Collected data from adults and children were **cleaned and organized** for analysis.
- Conducted **separate chi-squared tests** on adult responses to identify influential socioeconomic factors on mental health outcomes.
- Excluded child responses to avoid introducing external variables.
- Checked **if the p-value was less than 5% (alpha = 95%)** to determine the significance of the relationship between independent factors and depression levels.
- **Conducted similar tests on children's data** to compare factors between age groups.
- **Used Python and libraries** (Pandas, Numpy, Stats from Scipy) for statistical analyses and data handling.
- Calculated expected values, degrees of freedom, chi-squared statistics, and p-values via Python Scipy Stats function, used that to make conclusions.
- Detailed analysis code can be found in Appendix B of the research paper.

Analysis Diagram



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03

Analysis

Finding Patterns and Trends

Chi-Squared Tests

- Significance test performed on **every socioeconomic factor** to assess its relationship with depression frequency.
- Significant factors determined based on **p-value < 0.05 (α).**
- **Hypotheses formulated for each target variable**:
  - H0: The <TARGET VARIABLE> and depression outcomes for <ADULTS/CHILDREN> are independent from each other.
  - Ha: The <TARGET VARIABLE> and depression outcomes for <ADULTS/CHILDREN> are not independent from each other.
- **Conditions required for the tests:**
  - Random: Data collected through randomized geographic sampling of the US.
  - Large Counts: All expected values > 10.
  - Independence: Each individual falls into only one category for each variable.
- Chi-squared test **not performed if any conditions were not met** (not applicable in this study as all conditions were met during all tests).

Table 1. *Chi-squared independence test results across all socioeconomic factors in adults.* This table shows that for adults, all the following variables have some sort of correlation with depression frequency.

Variable	*Degrees Of Freedom*	*Chi-square statistic*	*P-value*	*Significant?*
URBRRL	12	52.962	4.184 * 10^(-7)	Yes
REGION	12	57.943	5.337 * 10^(-8)	Yes
NOTCOV	4	12.009	0.0173	Yes
SEX	4	346.537	9.811 * 10^(-74)	Yes
HISPALLP	24	290.875	1.147 * 10^(-47)	Yes
PCNTADLT	8	342.520	3.573 * 10^(-69)	Yes
PHSTAT	16	2808.269	~0	Yes
PAYBLL12M	4	814.895	4.560 * 10^(-175)	Yes
EDUCP	36	395.611	4.147 * 10^(-62)	Yes

Table 2. *Chi-squared independence test results across all socioeconomic factors in children. This table shows that for children, all except urban-rural classification (URBRRL), coverage (NOTCOV), and number of adults in the family (PCNTADLT) have some correlation with depression frequency.*

Variable	*Degrees Of Freedom*	*Chi-square statistic*	*P-value*	*Significant?*
URBRRL	12	13.389	0.341	No
REGION	12	29.366	0.003	Yes
NOTCOV	4	8.515	0.074	No
SEX	4	49.739	4.093 * 10^(-10)	Yes
HISPALLP	24	104.244	5.625 * 10^(-12)	Yes
PCNTADLT	8	12.769	0.120	No
PHSTAT	16	415.798	1.769 * 10^(-78)	Yes
PAYBLL12M	4	78.592	3.460 * 10^(-16)	Yes
EDUCP	36	63.898	0.003	Yes

04

Discussion

What Can We Learn From The Results?

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Question 1

- **All examined factors were found to have a significant impact**, indicating that various seemingly unimportant factors influence mental health outcomes in adults.
- **Lower socioeconomic status (SES) correlated with higher risk of mental disorders,** limited access to mental health services, and increased psychological distress.
- **Findings align with existing literature on the relationship between socioeconomic factors and mental health outcomes,** including higher risk among lower SES individuals and positive associations between education and mental well-being.
- Study **uncovered previously unexplored areas** of socioeconomic prediction, such as **URBRRL and REGION,** which also demonstrated significant relationships with depression outcomes.
- **Urban rural classification and region may impact** mental health outcomes through their **association with income levels** in the population of the area.

Question 2

- **Urban-rural classification (URBRRL)** did not show significant impact for children. Children **may have parental support** that contribute to better mental health outcomes in high-risk areas.
- **Health insurance coverage (NOTCOV)** was not significant for children. Children may have **access to free school counselors and better social conditions,** resulting in less detrimental mental health outcomes
- **Number of adults in the family (PCNTADLT)** was not significant for children. Perhaps because, **children receive constant support from teachers and friends**, whereas adults are more likely to rely on their own support system.
- Supports existing literature on the impact of education, including parental education on children's mental health outcomes.

05

Future Work + Impact

How can this study be used in practice?

Further Research

- Explore the **introduction of urban-rural classification and US region** as additional socioeconomic factors.
- Investigate **specific combinations of these variables** that pose a higher risk for mental health issues.
- **Examine external (possibly confounding) factors** (consistent schooling, regional funding, extracurricular activities, sports, etc.) contributing to the differential impact of socioeconomic factors on mental health outcomes between children and adults.
- Gain insights into **what adults may be missing from their childhood** in their lives and how incorporating these factors can mitigate mental health outcomes within specific socioeconomic situations.

Implementation

- Tailor interventions to **address the specific needs of individuals** from diverse socioeconomic backgrounds.
- **Redirect resources and efforts towards socioeconomic factors that have shown significant associations** with mental health outcomes in both children and adults (income level, educational opportunities, access to mental health resources).
- There are **limitations and challenges** in implementing recommendations, requiring comprehensive and collaborative approaches involving various stakeholders.
- Make strides in improving mental health outcomes and promoting overall well-being for **individuals of all ages**.

Reflections

- Acquired skills in **conducting comprehensive literature reviews**, navigating vast amounts of information, critically assessing content, and distilling significant insights.
- **Proficiency in data analysis,** including statistical techniques and software applications, enabling the ability to dissect complex datasets, uncover trends and patterns, and draw meaningful conclusions applicable to various professional settings.
- Emphasized the importance of **time management and organization** in research, developing skills in effective prioritization, resource allocation, balancing multiple tasks, meeting deadlines, and collaborating with team members.
- Transformed as a researcher, with honed critical thinking, problem-solving abilities, and strengthened time management and organizational skills.

06

Citations + Appendix

Wrapping Things Up.

Code

Code used to compute chi-squared statistics.

```
import math

from scipy import stats

import pandas as pd

import matplotlib.pyplot as plt

import numpy as np


#import data

child = pd.read_csv("child21.csv")

adult = pd.read_csv("adult21.csv")
```

```
#where total counts were stored
table = [
    [0, 0, 0, 0, 0],
    [0, 0, 0, 0, 0]
]

array =  #child or adult
val1 = "" #target factor
val2 = "DEPFREQ_C"
```

```
for i in range(len(array[val1])):
  if(not (math.isnan(array[val2][i]) or
array[val2][i] == 7 or array[val2][i] == 8 or
array[val2][i] == 9) #checking if 7, 8, or 9
  and not (math.isnan(array[val1][i]) or
array[val1][i] == 7 or array[val1][i] == 8 or
array[val1][i] == 9)): #checking if 7, 8, or 9

table[int(array[val1][i])-1][int(array[val2][i])-1]
+= 1 #adding value to table based on result

print(np.array(table)) #printing counts
```

```
#  Example data (2D array)
observed_values = np.array(table)

#  Perform chi-squared test
chi2, p_value, dof, expected_values =
chi2_contingency(observed_values)

#  Print the results
print("Chi-square statistic:", chi2)
print("P-value:", p_value)
print("Degrees of freedom:", dof)
print("Expected values:")
print(expected_values)
```

Citations

- Hudson, C. G. (2005, January). *Socioeconomic status and mental illness: Tests of the social causation and selection hypotheses*. The American journal of orthopsychiatry. https://pubmed.ncbi.nlm.nih.gov/15709846/
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- Zhang Y;Su D;Chen Y;Tan M;Chen X; (2022, March 29). *Effect of socioeconomic status on the physical and mental health of the elderly: The mediating effect of Social Participation*. BMC public health. https://pubmed.ncbi.nlm.nih.gov/35351078/

Thanks

Any Questions?