Analyzing Susceptibility to Mental Health Issues

DS4A Team #2 | Data Divas

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Meet the Team

Data Divas

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Problem Overview

The goal of this our project and analysis is to **identify factors that make individuals more susceptible to mental health issues.**

Content Outline

Datasets

National Survey on Drug Use and Health (NSDUH)

Survey level data on drug use and health (2015 - 2019)

Dataset shape: (214505, 95)

Health Professional Shortage Area (HPSA)

Clinic level data (inclusive of HPSA ID and Date of Designation/Withdrawal)

Health Resources and Services Administration (HRSA)

Grants awarded to qualified non-federal entities

National Survey of Drug Use and Health (NSDUH)

- Race/ethnicity
- Health insurance status and type
- Adult age groups
- Susceptibility to mental illness by demographic subset

Health Professional Shortage Area (HPSA)

- Metropolitan indicator by state
- The average number of withdrawn days by state
- HPSA status by county

ANALYZING SUSCEPTIBILITY TO MENTAL HEALTH ISSUES

In 2019, national spending on mental health services totaled $225.1 billion and accounted for 5.5% of all health spending. (1) Furthermore, approximately 40% of Americans live in a designated mental health provider shortage area, which exacerbates the problem. Across the US, each state has discretionary funding allocated specifically for mental health. Sufficient funds and effective resource allocation are necessary for the diagnosis and treatment of mental health issues. Mental health issues are pervasive and, now more than ever, need to be better understood to address their causes and impacts in a meaningful way.

The goal of this project was to identify factors that make individuals more susceptible to mental health issues, based on self-administered substance use, demographics, and geographic information from the National Survey on Drug Use and Health (NSDUH).

 # Survey Participants

194,552

Male

47%

Female

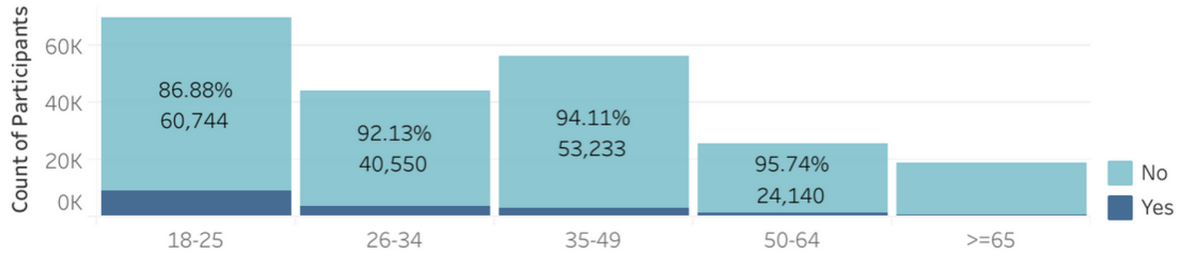
53%

Population Density Type

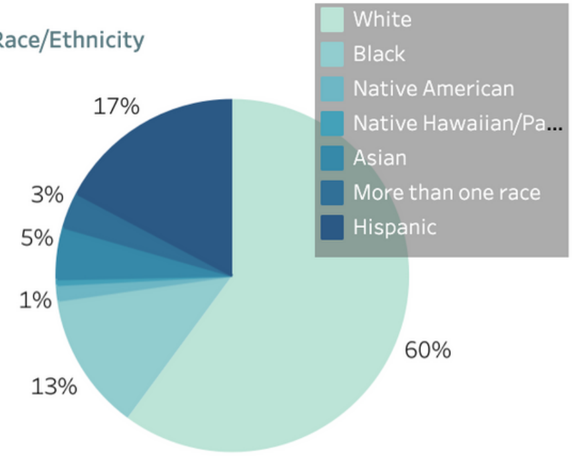
54%
<1 Million Persons

46%
>=1 Million Persons

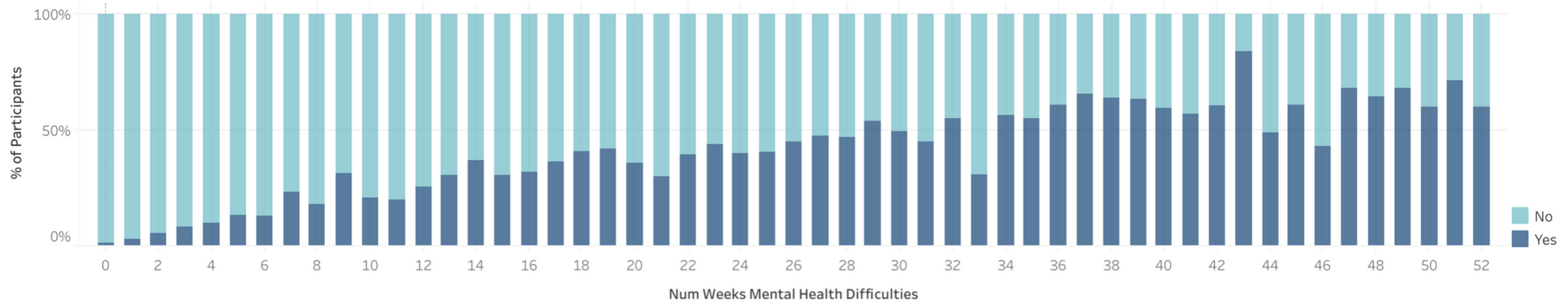
Distribution of Age Group



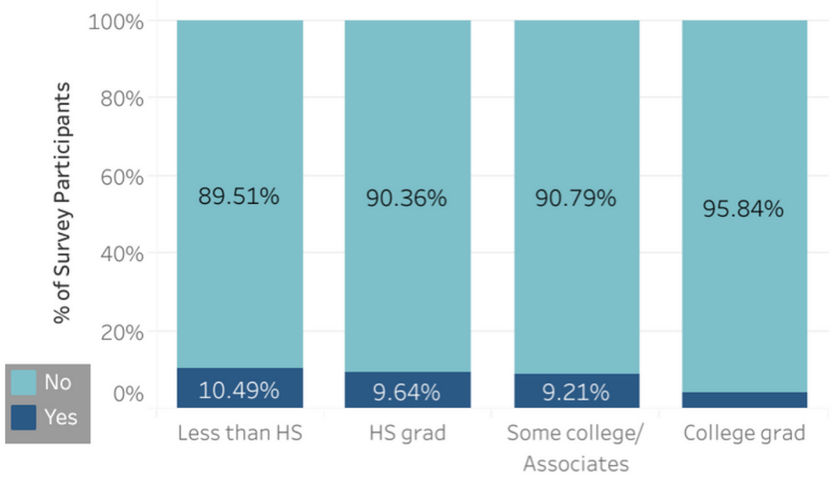
Race/Ethnicity



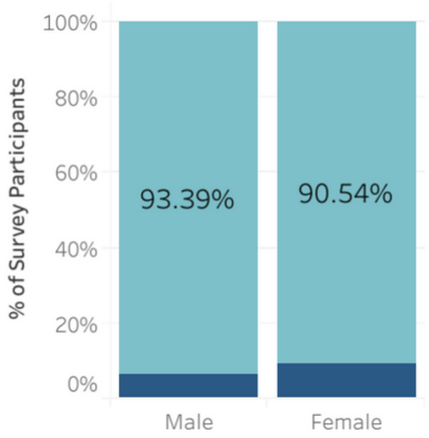
Trend of Number of Weeks with Mental Health Difficulties by Susceptibility to Mental Health Issues



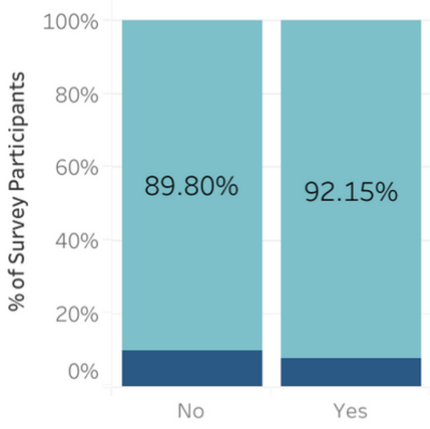
Susceptibility to Mental Health Issues by Education Level



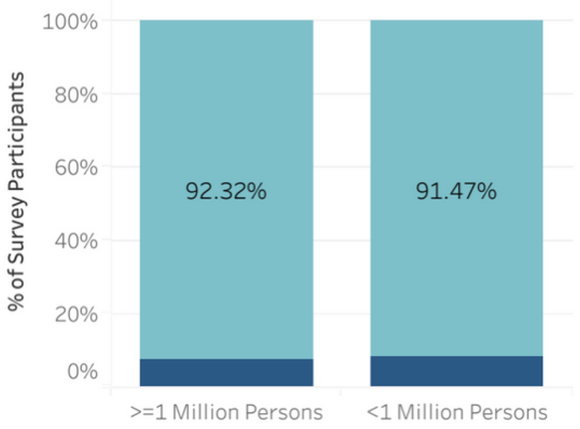
Susceptibility to Mental Health Issues by Gender



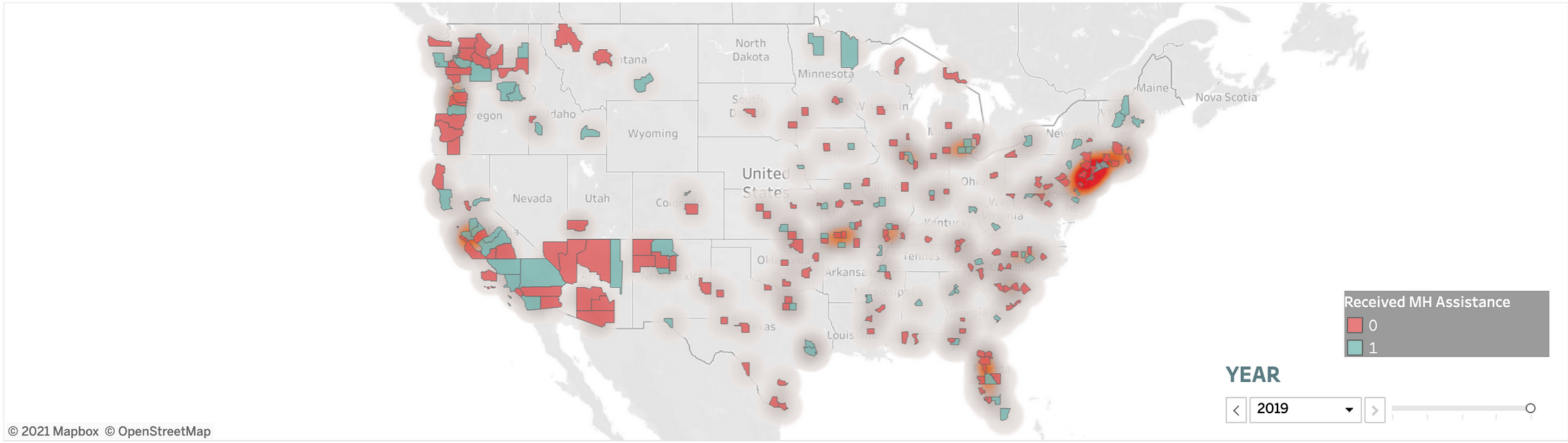
Susceptibility to Mental Health Issues by Insurance Status



Susceptibility to Mental Health Issues by Population Density Type



High HPSA Scored Areas The Brighter It Is The Higher the HPSA score) vs. Received Mental Health Assistance



Data Cleaning Methodology

NSDUH

- Determine relevant columns out of 2000 existing columns
- Refactor column names
- Consolidate non-committal answers

HPSA

- Remove variables with more than 30% data missing
- Remove variables without any variation

Statistical Analysis & Methods

To analyze the relationship between a participant's serious psychological distress indicator (0=NO/1=YES) in the past month and exposure variables for adults using the NSDUH survey.

- Bivariate Analysis (Chi-Square) test
- SMOTE (Synthetic Minority Oversampling Technique)
- Feature Selection - Forward selection, RFE
- Multivariate Analysis/Logistic Regression

Table 2. Bivariate Associations Between Susceptibility to Mental Health Issues with County's Population Density Type in NSDUH Survey (2015-2019)

	High susceptibility to mental health issues (n = 16,078); n(%)	Low susceptibility to mental health issues (n= 181,505), n(%)	χ^2	p-value
Population Density Type			46.83	< 0.01
>=1 Million Persons	7,017 (44)	84,317 (46)	-	-
<1 Million Persons	9,061 (56)	97,188 (54)	-	-

Final Model

R^2 Score: 0.5797

Features: 20

Accuracy: 0.94
(2.398% above baseline)

Table 4. Multivariate Logistic Regression Analysis Between Susceptibility to Mental Health Issues with Population Density Type, and Covariates in NSDUH Survey Participants (2015-2019)

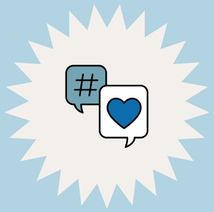
Outcome: Susceptibility to Mental Health Issues	Coefficient	Adjusted Odds Ratio
Overall_Health_Fair_Poor	0.9477***	2.58
Education_Category_Less_than_HS	0.6343***	1.89
Perceived_Unmet_Need	0.5933***	1.81
Adult_Employment_Status_Unemployed	0.5616***	1.75
Education_Category_HS_Grad	0.5268***	1.69
Overall_Health_Good	0.4836***	1.62
Treatment_Type_Past_Year_Inpatient_Only	0.4594***	1.58
Worst_Psychological_Distress_Level	0.3719***	1.45
Adult_Employment_Status_Other	0.3012***	1.35
Education_Category_Some_College_Assoc	0.2479***	1.28
Race_Ethnicity_Black	0.2352***	1.27
Gender_Male	0.1904***	1.21
Overall_Health_Very_Good	0.1414***	1.15
Num_Days_Skipped_Work_Past_30_Days	0.0656***	1.07
Year	-0.0038***	1.00
PDEN10_Less_than_1_Mil	-0.0552**	0.95
Total_Income_Family_Recode_75000orMore	-0.1595****	0.85
Age_Category_Six_Levels_35-49	-0.228***	0.80
Age_Category_Six_Levels_26-34	-0.2291***	0.80
Age_Category_Six_Levels_50-64	-0.2628***	0.77
Age_Category_Six_Levels_65_And_Above	-0.3817***	0.68

Findings

Likelihood of Having Experienced Serious Psychological Distress In the Past Month Using Adjusted Odds Ratio

1.Perceived Unmet Need for Treatment or Counseling	Yes: 1.81x more likely
2. Perceived Health (Excellent Health Baseline)	Poor Health: 2.58x more likely Good Health: 1.62x more likely Very Good Health: 1.15x more likely
3.Education Level (College Graduate Baseline)	Below high school: 1.8x more likely High school: 1.6x more likely College level: 1.2x more likely
4.Age (Group 18 to 25 Baseline)	Ages 35 to 49: 20% less likely Ages 26 to 34: 20% less likely Ages 50 to 64: 23% less likely Ages 65+: 32% less likely

Recommendation



- Combat stigma around mental health
- Targeted distribution of how to get help
- Target younger age groups and people with lower education levels

Limitations

- Inability to relate geographic HPSA and Grant data to individuals
- Methods should be performed to adjust for confounding

Future Work

Breaking down models by age group and education level

Thank you!

Questions and comments?