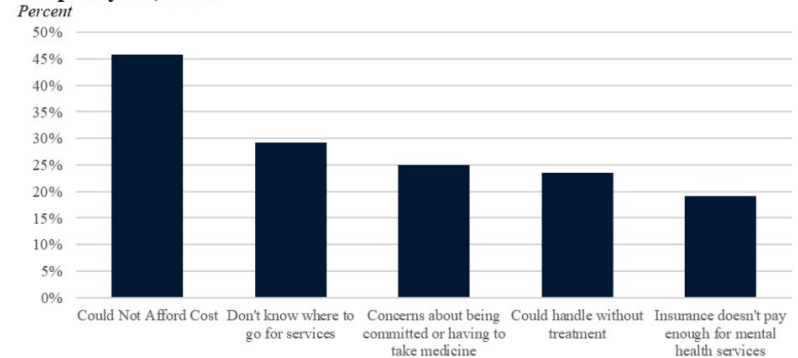# Mental Health Treatment

Shelly Chang

Overview

- Mental health disorders consist of a wide range of mental conditions and issues that can negatively impact people's thoughts, emotions, behaviors and even physical health. When not treated effectively, ongoing symptoms can lead to decline in their sense of well-being and ability to function in daily lives, leading to economic burden as they lose productivity in the workplace.
- National Institute of Mental Illness ("NIMH") reported that In 2021, there were an estimated 57.8 million adults aged 18 or older in the U.S. with any mental illness ("AMI"), which represented 22.8% of all U.S. adults. Of these 57.8 million adults, only 26.5 million (47.2%) received mental health services in the past year.
- The National Alliance on Mental Illness ("NAMI") estimated that untreated mental illness already costs more than $300 billion annually in the U.S. due to lost productivity and associated costs due to absenteeism, employee turnover and increases in medical and disability expenses.

Research Question

- ***What factors predict whether employees will seek mental health services?***
- Inability to afford mental health treatment cost and lack of sufficient insurance coverage are cited as some of the top reasons for not seeking treatment in 2020.
- The results of this investigation will provide valuable insights to employers on how they can better support employees that may be struggling with such conditions, motivating them to seek treatment and improve daily function.

Figure 3. Top five reasons for not receiving mental health services in the past year, 2020

Percent

A bar chart showing percentages for five reasons:
- Could Not Afford Cost: ~46%
- Don't know where to go for services: ~29%
- Concerns about being committed or having to take medicine: ~25%
- Could handle without treatment: ~23%
- Insurance doesn't pay enough for mental health services: ~19%

Y-axis ranges from 0% to 50% in 5% increments.

Source: Substance Abuse and Mental Health Services Administration
Note: Respondents were allowed to select more than one reason.

Data Analyzed

Dataset
- Open Sourcing Mental Health ("OSMI") Mental Health in Tech Survey 2019 - 2021
- Data accessible via:
  - https://www.kaggle.com/datasets/osmihelp/osmh-2021-mental-health-in-tech-survey-results
  - https://www.kaggle.com/datasets/osmihelp/osmi-2020-mental-health-in-tech-survey-results
  - https://www.kaggle.com/datasets/osmihelp/osmi-mental-health-in-tech-survey-2019

- Questions include respondent's personal history of mental health conditions and the types of support and resources they receive from their employers.

Features Reduction

- The top 6 categorical features with the highest values in the correlation matrix and for the chi2 stat indicate higher relevance and importance in predicting whether employees will seek treatment. These should be included in our model:
  - current disorder, past disorder and family history of disorder
  - availability and awareness of mental health benefits as part of employer-based healthcare coverage,
  - ease of request for medical leave
  - how much their work is interfered when symptoms are not treated effectively.
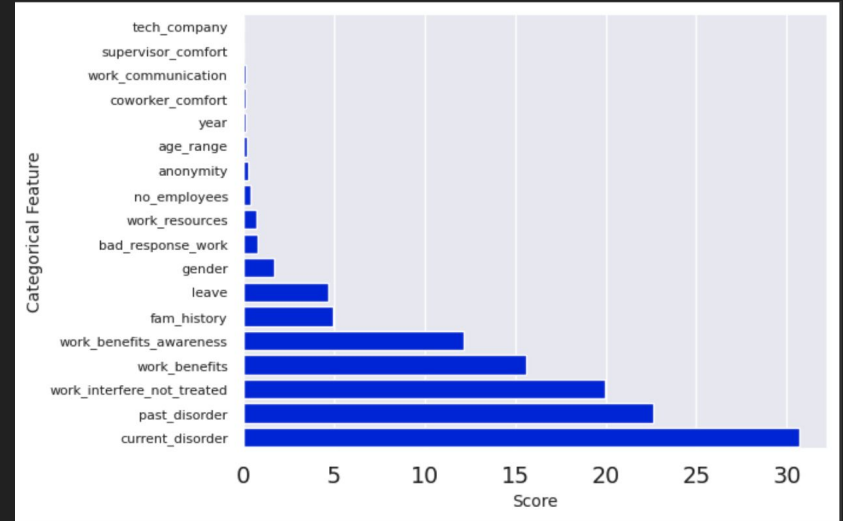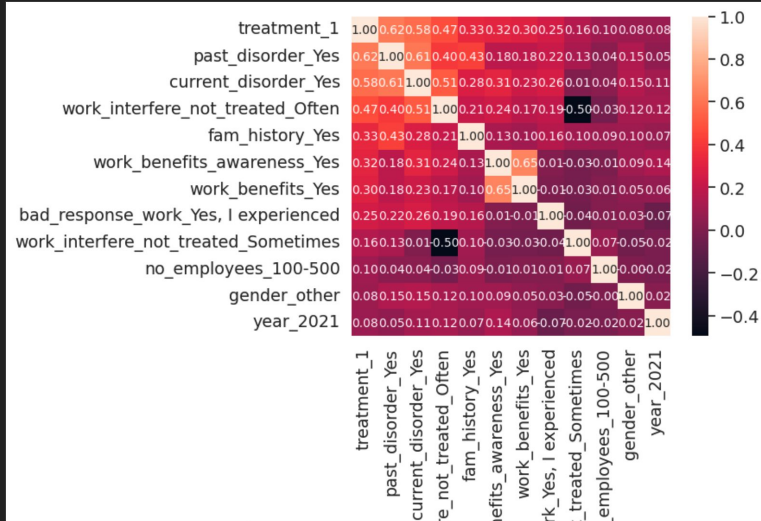
Model Selection

Clustering methodologies under unsupervised learning will be employed to determine where the survey provides insights to help distinguish employees between two clusters:

1. those that seek mental health treatment
2. those that do not seek treatment.

Two clustering methodologies selected:

- K-mode for categorical variables, as the answers for most survey questions are coded in Yes, No, Maybe responses.
- K-means for numerical variables after converting the categorical variables to numerical variables using one-hot encoding.

Clustering using K-modes on Categorical Data

- Elbow is formed at K=2 clusters (ie., optimal number). We will create a model with 2 clusters.

Elbow Method For Optimal k
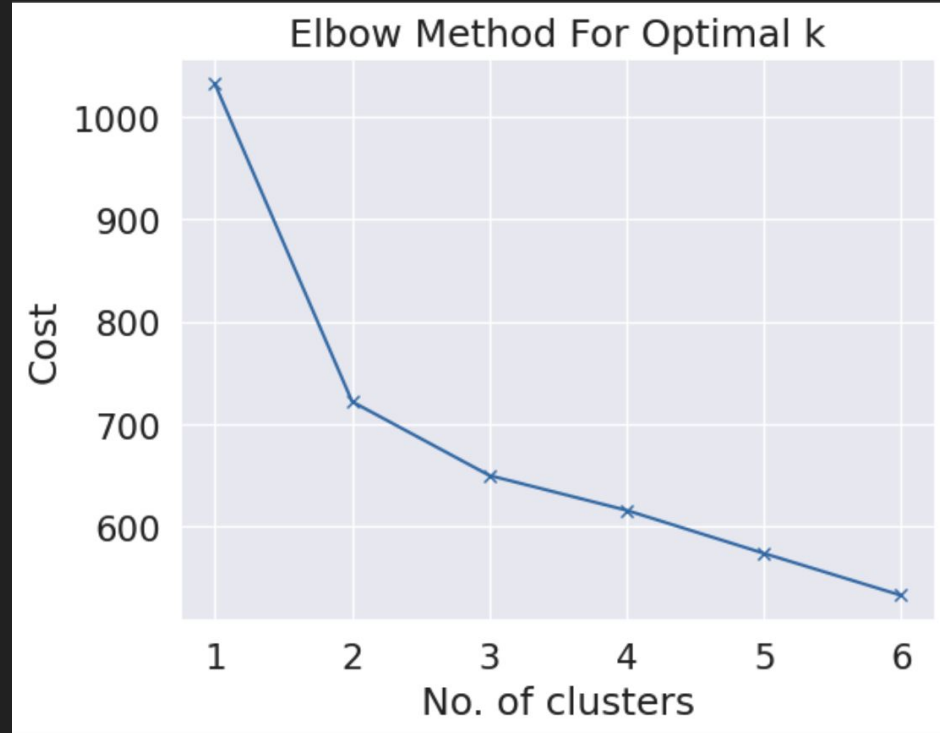
Clustering using K-means on Numerical Data and PCA

- Maximum silhouette score is at 2 clusters: 0.121
- PCA: Variance drop-off occurs after the second component which shows that the first 2 components explain most of variance in data. It's also clear that there are 2 distinct clusters per the principal component analysis.
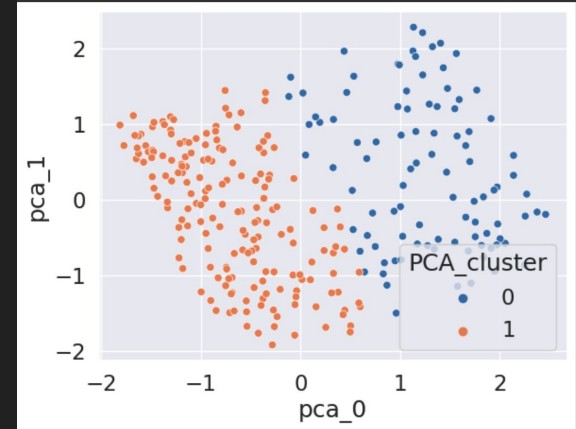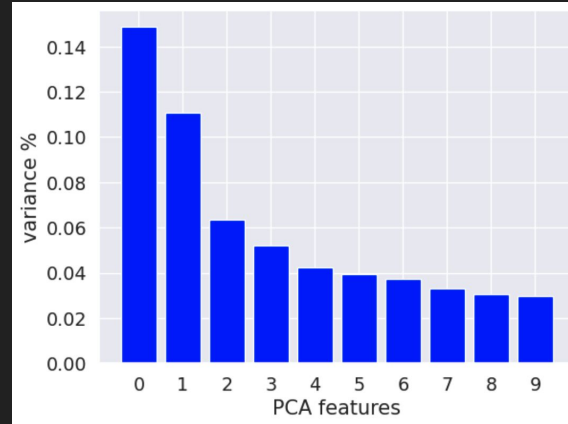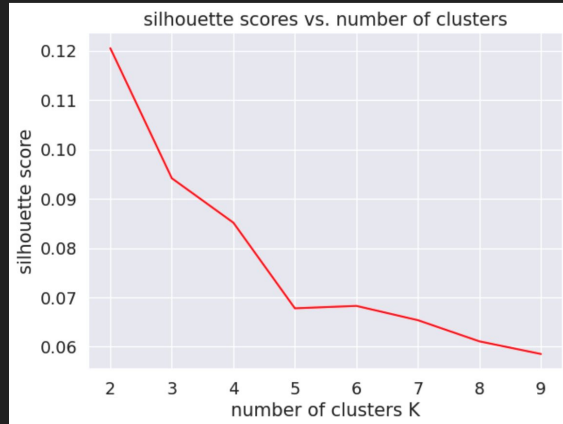
Accuracy of K-means Model

- Accuracy: The Kmean model correctly classified 90.22% of the employees to those that seek treatment or not.
- Precision: 96.65% of the model's positive assignment are correct.
- Recall: 89.18% of instances in the treatment class were correctly assigned.

```
                  precision    recall    f1-score    support

No Treatment         0.78        0.93       0.85          82
   Treatment         0.97        0.89       0.93         194

    accuracy                                0.90         276
   macro avg         0.87        0.91       0.89         276
weighted avg         0.91        0.90       0.90         276
```


Confusion Matrix

accuracy=0.9022; misclass=0.0978

*True labels are usually not available in unsupervised learning. However, as they are available in the dataset we are using in our analysis, we calculated accuracy, precision and recall to assess how our clustering performed.
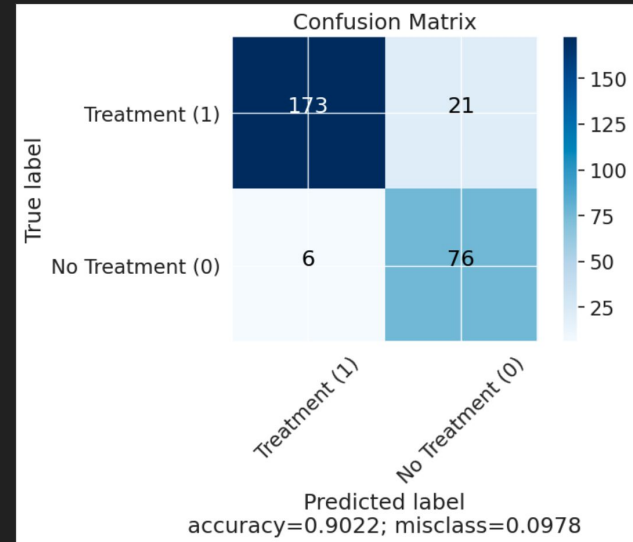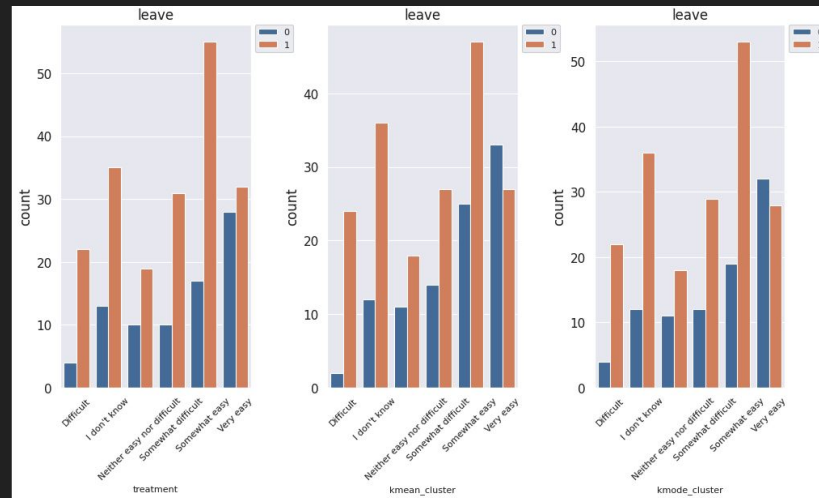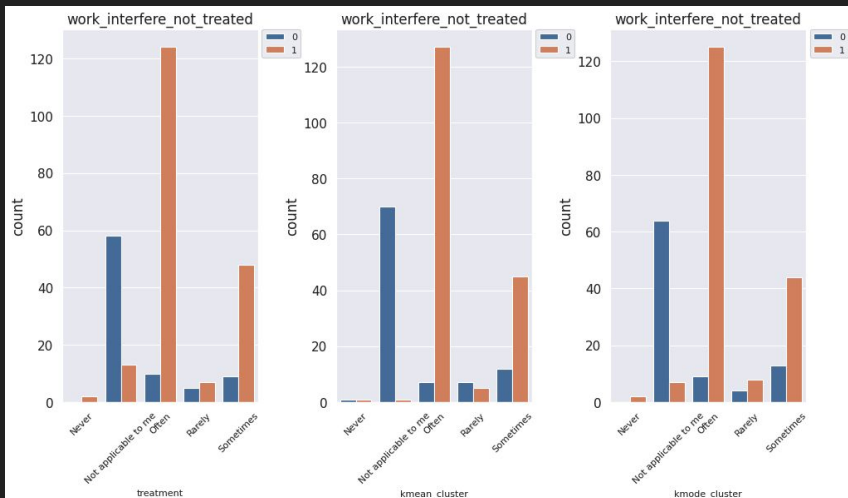
Clustering Insights

- Cluster 1 consists mostly of employees who seek treatment for mental health issues.
- Within cluster 1, employees' workplace provides mental health benefits as part of healthcare coverage and they are also more aware of these benefits and care options available.
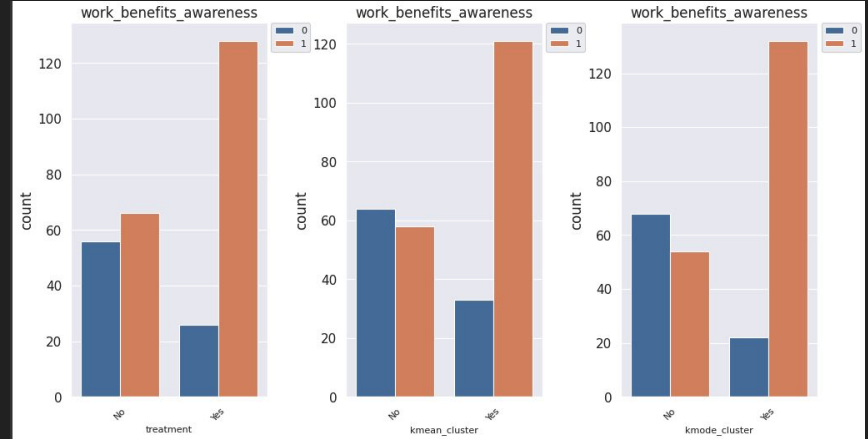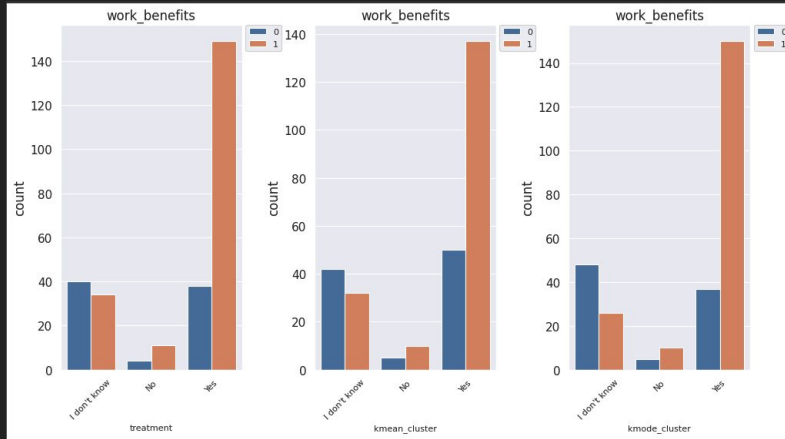
Clustering Insights

- If employees feel their work is OFTEN interfered by their symptoms when NOT treated, they are more motivated to seek treatment.
- Employees who feel it is "somewhat easy" to request a medical leave from work for mental health issues also tend to seek treatment more than not.

Clustering Insights

- Employees with a current mental health disorder, past disorder or family history of disorders are more likely to seek treatment.
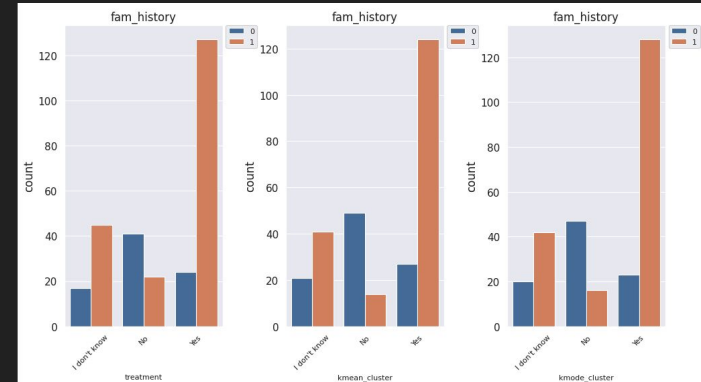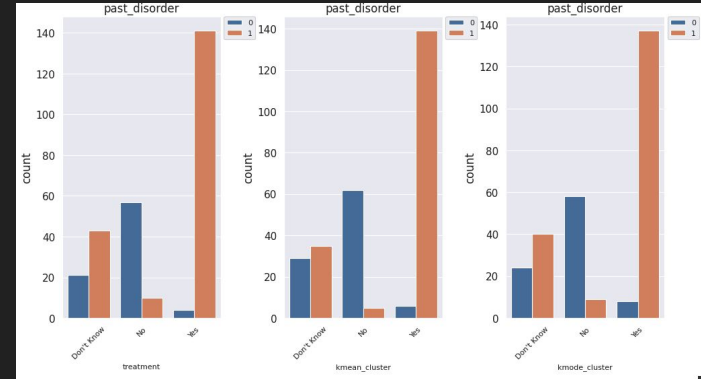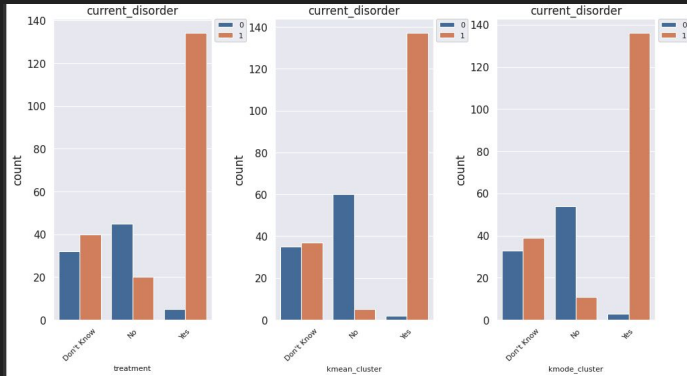
Conclusion

In order to encourage employees to seek mental health treatment, employers could do more to:

- Offer more comprehensive health care benefits that cover mental health care.
- Increase employees' awareness and knowledge of options for mental health care available under their employer-provided health coverage, i.e., through email communication, team forums or other wellness campaigns and publications.
- Encourage employees to pay more attention to their emotions, stress level and overall sense of well-being.
- Improve the ease to request medical leave to address mental health issues, while incorporating some eligibility criteria that motivate employees to start discussions with medical professionals and setting up treatment plans.

Challenges

- There are approximately 80 survey questions, some of which seem redundant. In addition, some questions have over 80% missing values (i.e., the respondents did not answer).
- This survey contains respondents from different countries around the globe. If we include all countries and this vast amount of data in the analysis, we may run into issues with computational power and feature processing.
- Years 2020 and 2021 are included in the analysis to show whether the pandemic had an impact on people's willingness to seek mental health treatment. However, it seems the number of responses in these 2 years were less than 50% of 2019's response rate (pre-pandemic).