

A Knowledge Discovery Approach to Analyzing Mental Health Problems in NYC

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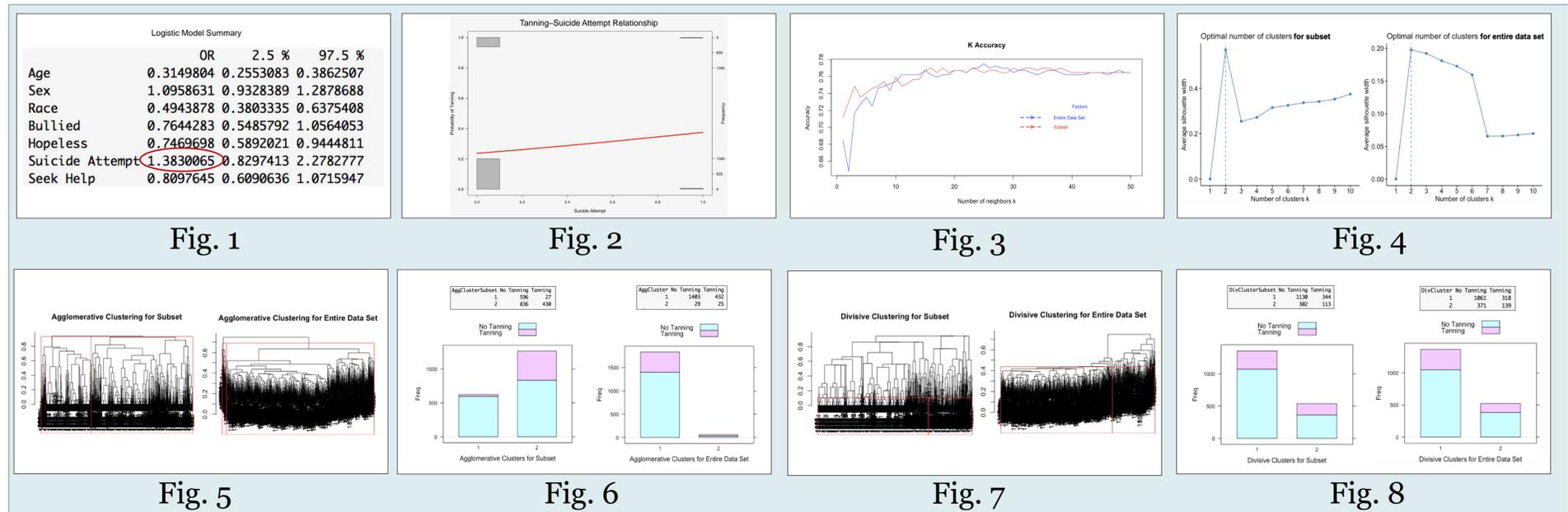
Introduction

- This research analyzes the relationship between artificial tanning and some of the mental health problems in New York City (NYC).
- Previous research has discovered a relationship between frequent use of artificial tanning devices and suboptimal mental health using a logistic regression.
- Our research expands upon previous research, as we introduce a knowledge discovery approach.
- Our goal is to compare traditional hypothesis-driven statistical analyses that test an already existing statistical model (e.g. a logistic regression) and exploratory analyses that are not driven by an experimenter's model, but by hidden patterns in the raw data (e.g. a knowledge discovery approach).

Methods

- **Data collection:** The data collection for this research consists of the Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Survey (YRBS) 2015 NYC data (1889 total responses).
- **Logistic Regression:** The logistic regression uses independent variables (mental health predictor questions and demographic covariates) to fit a model for a binary dependent variable (artificial tanning behaviors).
- **K-Nearest Neighbor (KNN):** KNN is a supervised classification machine learning algorithm. Instances of training data are used to classify new data objects by calculating the minimum distance.
- **Agglomerative and Divisive Clustering:** Agglomerative and Divisive clustering are two unsupervised hierarchical clustering machine learning algorithms. Agglomerative clustering is a bottom-up method, while divisive clustering is a top-down method.

Results



Discussion

- Fig. 1: Odds ratio (OR) results from binary logistic regression (OR > 1 indicates positive correlation with tanning).
- Fig. 2: Graphical representation of OR showing positive correlation between suicide attempts and tanning.
- Fig. 3: Plot of accuracy of KNN for every K from 1 through 50, where K = number of neighbors.
- Fig. 4: Plot of average silhouette width for every K, where K = number of clusters (K = 2 is optimal).
- Fig. 5: Dendrogram for agglomerative clustering method.
- Fig. 6: Distribution of tanners and non-tanners for the agglomerative clustering method.
- Fig. 7: Dendrogram for divisive clustering method.
- Fig. 8: Distribution of tanners and non-tanners for the divisive clustering method.
- **Conclusion: All algorithms are sufficient for this study, but the subset yields more accurate results.**

References

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