## C11

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## Using Machine Learning to Predict Smoking Cessation in Serious Mental Illness: Study Timeline

Tobacco use disorder (TUD) is a disabling illness with 2-4 times higher prevalence in people with serious mental illness (SMI) compared to the general population. Many interventions have been devised to achieve smoking cessation, including pharmacotherapy (e.g., nicotine replacement therapy (NRT), Bupropion, Varenicline), contingency management, and behavioral support. All of these approaches work for some, but not the majority of individuals in controlled clinical trials. Predicting responses to specific interventions from individual characteristics would significantly improve abstinence and tobacco harm reduction outcomes. Machine learning approaches could achieve this, potentially preventing the development of chronic disease and preventing premature mortality for millions of individuals. One category of machine learning problems, classification, could be used to predict outcomes from specific inputs. During model development, a classification model is trained on labeled data before getting tested on data with concealed labels to determine the model's prediction accuracy. "Ideal" model performance requires high accuracy and low complexity.

Twelve previous studies have examined the prediction of smoking cessation in the general population using Random Forests or Deep Neural Networks. These studies have only focused on smoking in the general population and did not include participants with SMI. Moreover, only one of these studies directly compared the performance of RF to DNN and found them to be essentially similar. Machine-learning algorithms created from data on people in the general population who smoke may not be generalizable to people with SMI who smoke due to differences in smoking behavior, quit rates, relapse rates, and neurobiological vulnerability to nicotine. We here present the timeline of a project aiming to compare the accuracy of DNNs and RFs in predicting smoking cessation in people with SMI and comorbid TUD.