# Utilizing Artificial Neural Networks to Further Understand Psychiatric Comorbidity

## Project Proposal

For Completion of a Bachelors of Science in Computer Science and Mathematics

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## 1. Introduction and Motivation

Mental illness can be a burden for those whose lives are impacted from it, especially those with serious mental illness. This burden is exasperated when multiple mental illnesses co-occur - a phenomenon known as comorbidity.

Persons with serious mental illness are more likely to have comorbid medical conditions than those in the general population [7]. There also have been multiple studies identifying a comorbidity between drug abuse and mental illness ([8], [5], [3]).

While the identification of illnesses commonly co-occuring is important for diagnosis and treatment, much is unknown about why diseases co-occur and what is causing them and the discovery of these causal factors and predictive features would have vast implications in the diagnosis and treatment of comorbid mental illness.

Today, the prevailing psychiatric theory is the latent variable model which is the assumption that psychiatric diseases are all caused by some root variable such as depression or schizophrenia. This has recently come under scrutiny with the development of a network model by Cramer et. al. This network model has promising findings using a network approach to identify "pathways to comorbidity" [1]. I propose to extend these network pathways using artificial neural networks.

## 2. Proposed Solution

Despite this natural segue from a network perspective to artificial neural networks (ANNs), there has been very limited work done with psychiatric data and ANNs. Much of the work done that utilizes ANN for psychiatry is used to map neural pathways and analyze brain scans for autism and schizophrenia [4], [6]. There has been no work done on identification and analysis of comorbidity using ANNs.

I propose that by utilizing ANNs we can identify additional pathways and provide further insight into the comorbidity of mental illness using the Baseline National Comorbidity Survey (NCS-1) [2]. The NCS-1 provides robust data compiled by the analysis of surveys by trained professionals overseen by psychiatrists.

## References


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