Perceived Vulnerability to Disease (PVD), Resilience, and Mental Health Outcome of Korean Immigrants Amid the COVID-19 Pandemic: A Machine Learning Approach

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Perceived Vulnerability To Disease (PVD)

-The onset of the COVID-19 pandemic has rapidly increased PVD due to the easily contagious and life threatening nature of the virus (Shook et al. 2020).

-**PVD is defined as a person's' susceptibility to infectious disease transmission and emotional distress of potential occurrence of disease transmission** (Ahmadzadeh et al. 2013).

-Outcomes of PVD
• *Positive:* higher level of engagement in preventative health behaviors (i.e. handwashing, social distancing)
• *Negative:* consistently heightened levels of vulnerability can cause psychological distress and negative outcomes due to stress and social isolation (Scharloo, 2000)

-The current study explores the predictive ability of PVD and fear of COVID-19 affecting psychological distress among U.S. Korean immigrants.

Retrieved from: https://www.mcleanhospital.org/essential/why-asian-americans-dont-seek-help-mental-illness

Korean immigrants, Psychological Distress, and COVID-19

-Foreign-born Korean immigrants tend to become culturally and ethnically isolated due to monolingual status and reliance on Korean ethnic groups for socializing (Yasui, 2018).

-This isolation is linked with psychological distress and malfunctioning (Choi 2009; Min 2005) which can be further exacerbated by the COVID-19 pandemic.

-Previous research shows that:
one's perceived risk of COVID-19 is significantly associated with their preventative behaviors (Ildirim et al., 2020)
high levels of PVD is associated with higher levels of engagement in preventative behaviors (Shook et al., 2020)
greater levels of perceived vulnerability to COVID-19 indicated more significant COVID-19 related worries, social isolation, and traumatic stress (Boyraz et al., 2020)
reporting higher levels of PVD to COVID was associated with increased anxiety and fear (Ahorsu et al., 2020; Park et al., 2021)

Social Support and Resilience as Protective Factors

-Social support is a critical component in helping racial minorities deal and cope with negative life events as it provides individuals with a sense of belongingness and security which helps relieve the stress of negative events (Brondolo, 2008)

-Korean immigrants who are well connected with their ethnic community benefit from this level of social support (Noh, 2003).

-An individual's level of resilience has also been found to be a predictor of their ability to cope with stressful life events and higher levels of resilience can decrease hopelessness and vulnerability to developing anxiety, depression, or obsessive compulsive disorder (Hjemdal et al., 2011).

-During the SARS epidemic, resilient individuals showed lower levels of SARS-related worries (Bonanno, 2008)

Methods

-Through **purposive sampling**, Korean immigrants above the age of 18 residing in the U.S. (including both foreign-born and U.S.-born) were invited to respond to a survey on Koreans' wellbeing during the COVID-19 pandemic in the U.S.
• **Data were collected from 24 May 2020 to 14 June 2020.**

-All the questions in the survey were developed by multicultural social science scholars who are both fluent in Korean and English languages.

-Study variables were measured by valid and reliable scales such as Kessler Psychological Distress Scale (K10), Perceived Vulnerability to Disease (PVD) Scale, Connor-Davidson Resilience Scale-10, and the Social Interaction Scale. Additionally, researchers developed 2 items to measure respondents' fear of COVID-19. Socio-demographic information were also collected.

Data Analysis

-All the analysis was conducted on SPSS 24.0

-In order to account for missing values, the list-wise deletion was used if the remaining cases were large enough

-A descriptive analysis was conducted in order to check the distribution of variables

-Afterward, Artificial Neural Network (ANN) modeling was conducted in order to test the predictability of two types of coping mechanisms as well as the PVD and fear of COVID-19 for the respondents psychological distress

Articial Neural Network

-ANN is a preferred method for predictive data mining applications (Haykin, 1998). By mimicking the complex human brain activities, ANN predicts the relationships between variables in a powerful way.

-There are several advantages of using ANN, such as reducing statistical problems when analyzing non-linear multiple variables (IBM, n.d.).

-Furthermore, ANN can be used when there are associations between independent and dependent variables that are non-expressible via other methods.

Results

-Korean immigrants above the age of 18 who reside in the U.S. were recruited by an online survey. The final sample (N = 790) was recruited from 42 states.

-Of the entire dataset, 68.8% was randomly chosen to create a training sample. The other 25.5% was used as a testing sample, and the holdout sample used the last 5.7% of the dataset.

-The Area Under the ROC Curve (AUC), is 0.801 for both ROC curves. This means that the given neural network can predict a person with high vs. low psychological distress with sensitivity above 80.1%.
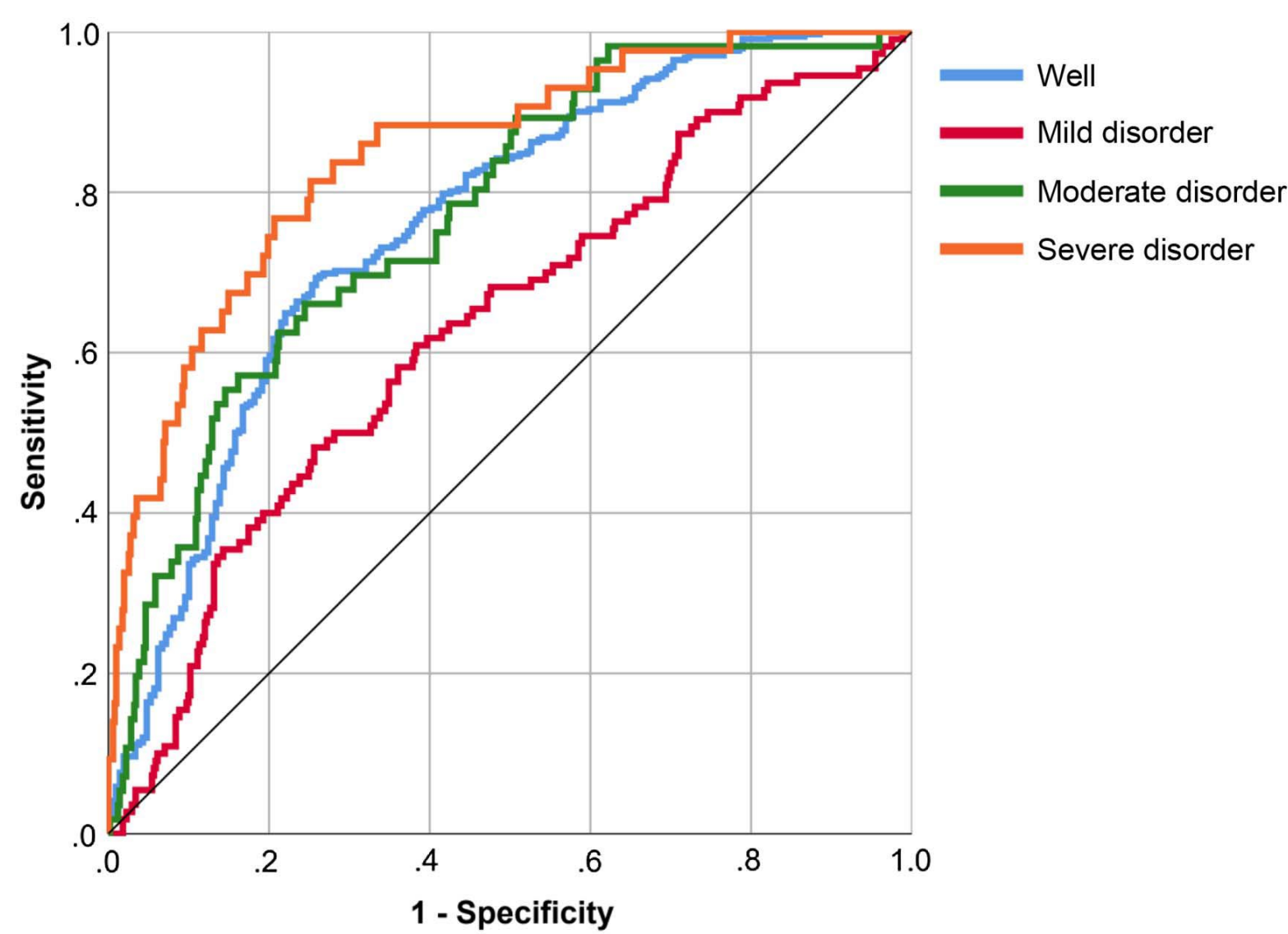

Sample Characteristics

Table 1. Characteristics of the Study Sample.

Variables	Mean or Percentage All Sample (N = 790)	Variables	Mean or Percentage All Sample (N = 790)
Dependent Variable		Covariates	
Psychological distress		Education	
Low	49.4%	High school diploma or less	7.9%
High	49.2%	Some level of college education	20.9%
Factors		Bachelor's degree	34.4%
Racial discrimination (range: 3–12)		Graduate degree	36.8%
Mean: 5.87	Std.Dev: 2.06	Employment status	
Everyday discrimination (range: 9–54)		Employed full-time	53.4%
Mean: 12.43	Std.Dev: 4.93	Employed part-time	14.3%
COVID-19 discrimination (range:3–15)		Out of labor force	32.4%
Mean: 8.64	Std.Dev: 2.65	Marital status	
Resilience (range:25–175)		Married	73.8%
Mean: 35.03	Std.Dev: 6.85	Never married	21.0%
Racial/Ethnic Identity (range:0–16)		Widowed/separated/divorced	5.2%
Mean: 11.63	Std.Dev: 2.26	Household income	
Age (years)		<$34,999	21.6%
Min: 20	Mean: 42.74	$35,000-$49,999	13.3%
Max: 81	Std.Dev: 12.14	$50,000-$99,999	27.8%
Yrs in the U.S. (years)	Mean: 16	≥$100,000	27.8%
Range: 1–61	Std.Dev: 10.96	Sex	
U.S. Nativity		Male	40.3%
Foreign (South Korea)-born	90.9%	Female	59.7%
U.S.-born	1.9%		

ANN results

Higher levels of PVD and fear of COVID-19 are associated with higher levels of psychological distress

Variables related to individuals' coping, such as resilience and perceived emotional support, were important protective factors.

Resilience was the most powerful predictor in the model
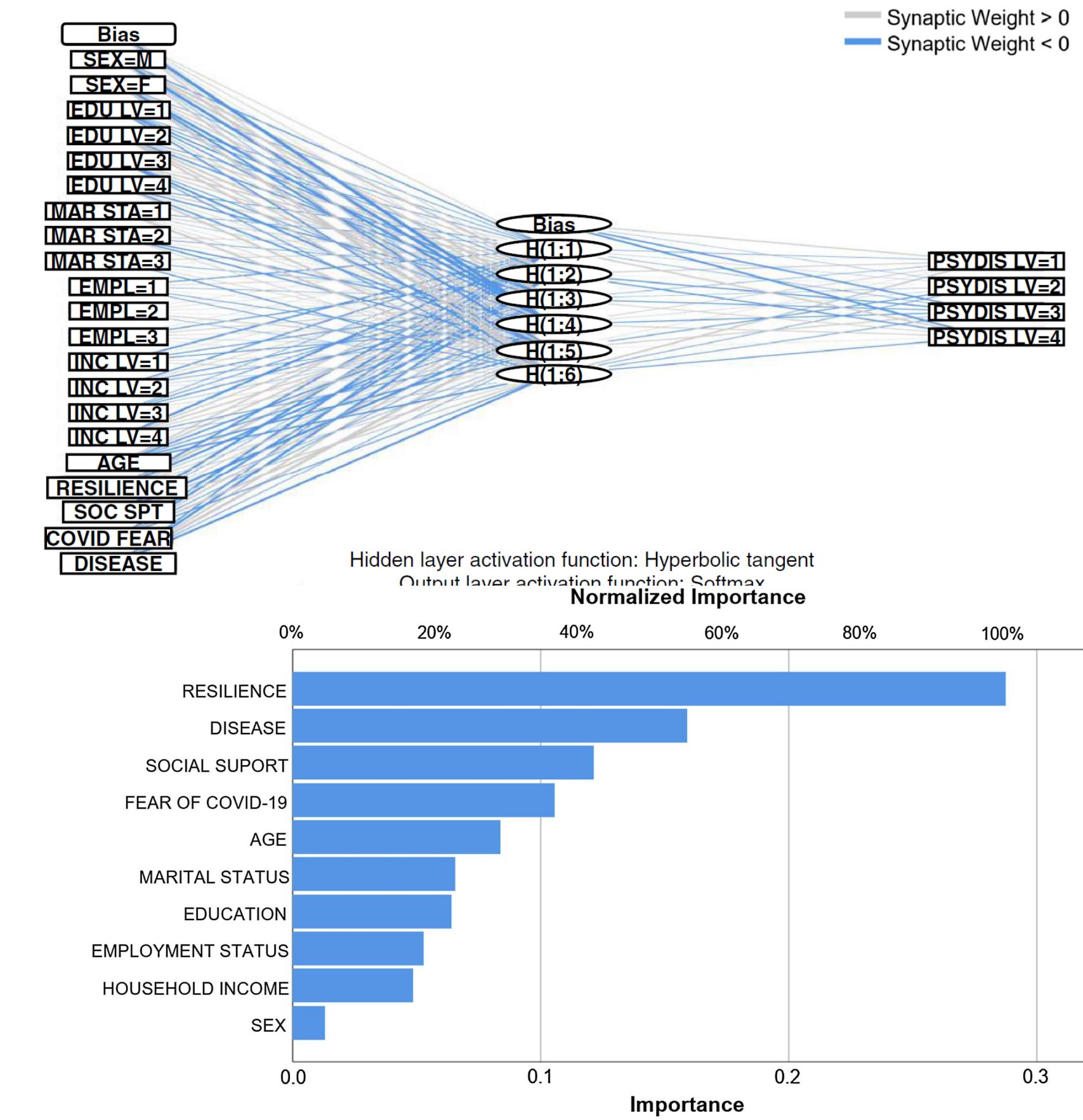
Implications

-Crucial to **implement programs and interventions that focus on resilience**.

-**It is important for practitioners to utilize telehealth services** when implementing these programs as it ensures individuals with all comfort levels around COVID-19 can access them. This **also helps provide a level of social support to those that are experiencing increased isolation** at this time.

• Also important to consider one's PVD and accommodate in-person meetings to match their comfort level (i.e. providing hand sanitizer, wearing a mask, or opening a window)

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