Lowering Depression and Anxiety: A Quantitative Research on the Relationship of Six Common Habits on Human's Mental Health

Dang Quang Hoang, Karthikeyan Marikrishnan
Yuqing Ren, Muhammad Hamza Raza, Hadi Sharifi

I. INTRODUCTION AND PROBLEM STATEMENT

Depression and anxiety are two widespread types of disorders that cause a tremendous consequence on human life. The World Health Organization (WHO) has ranked depression as the fourth leading cause of human disability. By 2020, it is expected to be the second leading cause [15]. Many researches touch the symptoms of anxiety and depression. As an example, depression causes health complications [28], cardiovascular diseases [10], in some cases increases the risk of cardiovascular diseases by 80% [21]. In case of anxiety, on average, up to 33.7% of the human populations experience it in their life time [8]. Anxiety not only affects the human body physically but also affects learning and reasoning capabilities [23][11]. Undeniably, these are two major risks for human life. This proposal analyzes data from the Behavioral Risk Factor Surveillance System (BRFSS)[3] for several years. It tries to find a relationship between six habit factors (physical activity, eating disorder, smoking, drinking alcohol, social media, and education/technology) and depression and anxiety. It proposes a solution that could lead to reduction of depression and anxiety in the society.

II. OBJECTIVE

○ *What this research is trying to accomplish?*
Identifying the relationship between the six factors and depression and anxiety to provide guidelines based on the factors in hope to reduce depression and anxiety.

○ *How is research in this field is done today; what are the limits of current practice?*
Majority of research papers on anxiety and depression covers few variables. This limits the scope of influence in exacerbating these disorder.

○ *What's new to this research? Why will it be successful?*
This research investigates more recent dominant habits. The outcome of the research provides guidance for the larger body of human society. The key to success of this research is the data and by using the data we hope to understand depression and anxiety and hopefully find ways to prevent it. The type of data we are using is BRFSS which will be analyzed and used in this research.

○ *Who cares?*
The general public, medical society, insurance industry, and corporation. Depression and anxiety is so widespread that it is a part of human life and it is in interest of the society to prevent or mitigate the effect of it.

○ *If this research is successful, what difference and impact will it make, and how do you measure them?*
We expect to prevent depression and anxiety in our society as much as we can and also mitigate the effect it has on people currently. Surveys such as BRFSS and local and internal surveys can provide a great measure on how this research impacted them.

○ *What are the risks and payoffs?*
The risk is to convince mass public, human resource organizations, and small to large companies that the results of this research will indeed assist them get better and faster results. The payoffs are happier work, happier life, happier families, and happier society.

○ *How much will it cost?*
The major cost is the time it will take. The data is available, but it needs to be cleaned, information to be extracted and analyzed. At this stage, we anticipate 150 to 200 hours of scientific work.

○ *How long will it take?*
The research can be done in 3 to 6 months. But we are going to start with only 6 factors and hopefully start the spark for future research.

○ *How will progress be measured?*
The progress of this research is measured by first establishing a clear connection between the six habits and anxiety and depression. Second understanding the nature of the cause and effects. And third by providing the golden guidelines for various parties.

III. LITERATURE REVIEW

○ *The effects of physical activity?*
We have studied three research papers. The [26] paper provided a survey on the association between physical and therapeutic activity on depression and anxiety. The [17] paper analyzes multiple databases to identify factors causing depression as well as examine whether physical activity prevents depression. Both show that physical activity reduces and, in some cases, prevents depression and anxiety. The criticism on these papers are that they do not pay adequate attention to symptoms and approaches to deal with depres-

sion and anxiety as well as benefits of exercise training. Interestingly, the [27] found that there is no relation between vigorous physical activity and mental health or well-being. We believe the reason of this results is the vigorous nature of physical activity.

○ *The effects of alcohol abuse and smoking?*
We picked four papers [14][25][7][20] , all corroborated our hypothesis that abusing alcohol and smoking leads to anxiety and depression. Two of the researches used the BRFSS data set. These are valuable research to us. Almost all of them did show a shortcoming that the effects on mental health goes beyond one to two variables. Interestingly, research [20] from 96 advised school to look into using smoke to help teenagers cope with depression. We are not going to use this paper. Smoking may temporarily alleviate depression but it leads to more mental and health symptoms.

○ *The effects of social media?*
We have studied three research papers in this topic. They show a strong correlation between social media and depression and anxiety. The paper [16] emphasizes on the correlation between social media and depression while considering other environmental and factors such as family and financial. The second paper [13] analyzes social networking sites and the relation to depression in older adolescents. The participants used have small age difference which lowers the risk of many environmental factors skewing the results. The third paper [29] analyzes the use of social media and how it relates to depression, anxiety, sleep quality and self-esteem in adolescents.

○ *The effects of technology/education?*
We have studied three papers [12][9][19]. All show positive correlation between factors such as high usage of smartphone, low education level and type 2 diabetes, and depression and anxiety. They have confirmed our hypothesis that smartphone/education/diabetes are among leading factors of depression disorder and anxiety. All three papers touch particular aspects of technology and we think we should follow the same trend. We may focus on a particular technology, such as cellphone, instead of "technology" in general.

○ *The effects of eating disorder?*
The first of the three papers [22] shows that eating disorder leads to stress and anxiety in high school girls. The second paper [18] shows that women with eating disorder get highly stressed and the stress led to anxiety behaviors. They also concluded that traditional female role causes these symptoms. The third paper [24] shows genetically some patients are showing symptoms of eating disorder. This genetic issue leads to other issues such as depression and anxiety. The criticism we have on these papers that they only pick female population. For our research we will use these papers nevertheless, we will make sure to use data for both male and female.

IV. METHODLOGY

We have distributed the five factors among the researchers to study the dataset based on the factor they own and to find the relationship between the designated factor and the depression and anxiety. Figure 1 shows the details on how various tasks with deadline are distributed among team members. For the initial data observation, we are using Microsoft Excel, Numpy[4], and opendatanetwork.com[2]. We are planning to use python/pandas[6] to program, openRefine[5] to clean data, and D3[1] to visualize the results.

Our preliminary observation of the BRFSS[3] dataset is that, there are two sets of data. A set belongs to years 1995 to 2010 and another set from 2011 to 2017. BRFSS questionnaire changed (or modernized) after 2011. It gathered not only from land line but also from cellphone. Questions where updated to contain more recent related topics such as internet usage. And some territories such as Preto Rico where also included in the list of states (territories) to conduct the questionnaire [3]. The combined data is around one gigabyte of unclean data.

We noticed that BRFSS are questions about the state itself than individuals. Which means that, if a person answered a quesiton that he/she is a smoker, the same person cannot be traced to know what was his/her answer for being depressed or not. Instead, the BRFSS is a questionnaire for the state and shows how many people of the sampled population from a particular state are smoker or are depressed. Hence, our conclusion would have similar nature too.

BRFSS has two sets of questions. The core question and optional one. The core questions are asked by all state participating in the BRFSS program but the optional one is not mandatory on states. Hence, some of the questions that were very interesting and important to our research, were not used in all states. We think that some factors may end up more generalized or tweaked in order to draw some related conclusion from the dataset. For example, social media is an important factor but this is not part of BRFSS questionnaire. We did find that the dataset after 2011 does have data on internet usage. We thought we can bring internet usage as a factor that can explicitly expresses social media usage. We have tweaked or generalized these factors: Eating disorder to eating vegetable and fruits, social media usage to internet usage, and technology and education to education grade level.

The research got more challenging when we noticed that the depression factor is not called out in the dataset from prior 2011. Depression and anxiety are optional questions and it was not mandatory to ask. And, to make the matter worse, anxiety was not mentioned in both datasets. It is also an optional topic for BRFSS.

Nevertheless, we found out that there are two features

that could get us some research answers from BRFSS on wheather someone is suffering from mental ilness. One feature is "Overall health score" (calculated by BFRSS based on several survey questions). It gives a percentage estimate of individuals with "good or better" health and "fair or poor" health. The other feature is "Perceived Overall health"(this value is based on survey question which directly asks participants if they feel healthy) We believe that combination of health score, overal health, and answers to questions on depression will give us a picture of mental health of people of a state.

The preliminary data observations

As for physical activity, we found data on both datasets. Our initial analysis showed that low physical activity led to low level of overall health and increase of depression. We found similar initial results with respect to alcohol and smoking consumption and overall health status.

With respect to social media factor, as per the data, we will be finding the relationship between internet vs depression and anxiety. Using the dataset, we can analyze the categories of internet usage based of several factors such as gender, race, income, age and several more. We can see whether there is a direct correlation between internet use and depression and anxiety by comparing the depression rate of those factors. If they are very similar, we can see that internet use is a direct cause of depression and if they are not, there may be other factors that were not accounted for.

Regarding the correlation between education level and the chance of having depression, we picked some state that used the direct quesiton on depression and anxiety in their BRFSS. We examined information such as whether an individual has been informed to have depressive disorder such as depression, major depression, dysthymia, or minor depression, and the level of education one attained. Based on initial analysis, it seems the higher the level of education one completed, the higher the chance of having mental issues. We are going to put extra attention on this factor to understand the nature of this initial results.

As for eating behavior factor, there are clear features to know if the person getting questioned has healthy eating habit or not in both BRFSS datasets. For example, "consume vegtables and fruits five or more times per day". The quistionair does not ask if a person is diagnosed with eating disorder. But asks if the person consumes fruits and vegetables through his/her day. Clearly, we can take the answer to this question along with overall health result would provide us an indication of wheather a person has eating disorder.

We are still working on the dataset to consolidate our analysis and draw conslusion.
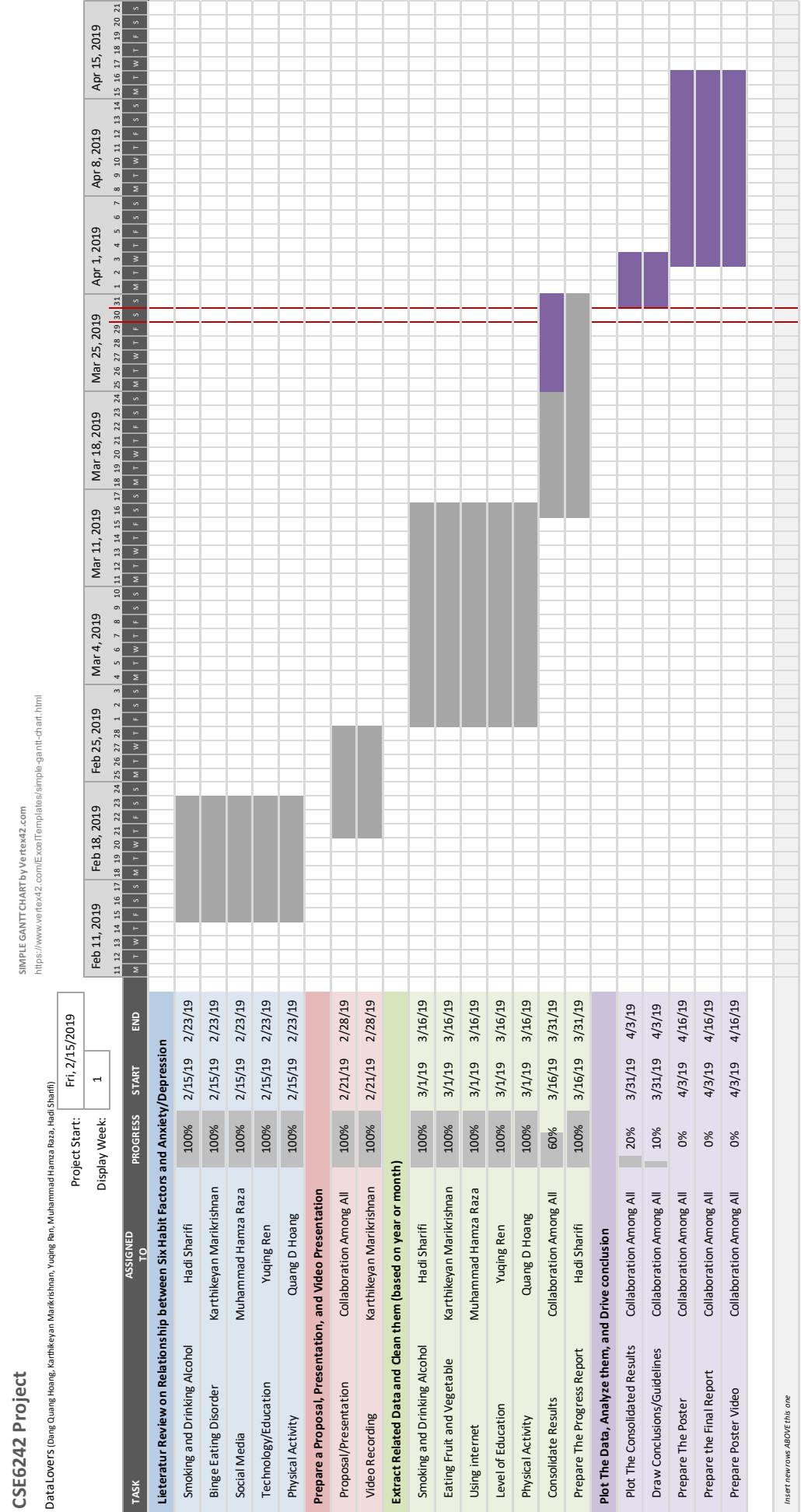
V. EVALUATION

Work in progress.

VI. CONCLUSION AND DISCUSION

Work in progress.

Figure 1: The schedule of the team for the research.

CSE6242 Project

Data Lovers (Dang Quang Hoang, Karthikeyan Marikrishnan, Yuqing Ren, Muhammad Hamza Raza, Hadi Sharifi)

Project Start: Fri, 2/15/2019

Display Week: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Lieteratur Review on Relationship between Six Habit Factors and Anxiety/Depression				
Smoking and Drinking Alcohol	Hadi Sharifi	100%	2/15/19	2/23/19
Binge Eating Disorder	Karthikeyan Marikrishnan	100%	2/15/19	2/23/19
Social Media	Muhammad Hamza Raza	100%	2/15/19	2/23/19
Technology/Education	Yuqing Ren	100%	2/15/19	2/23/19
Physical Activity	Quang D Hoang	100%	2/15/19	2/23/19
Prepare a Proposal, Presentation, and Video Presentation				
Proposal/Presentation	Collaboration Among All	100%	2/21/19	2/28/19
Video Recording	Karthikeyan Marikrishnan	100%	2/21/19	2/28/19
Extract Related Data and Clean them (based on year or month)				
Smoking and Drinking Alcohol	Hadi Sharifi	100%	3/1/19	3/16/19
Eating Fruit and Vegetable	Karthikeyan Marikrishnan	100%	3/1/19	3/16/19
Using internet	Muhammad Hamza Raza	100%	3/1/19	3/16/19
Level of Education	Yuqing Ren	100%	3/1/19	3/16/19
Physical Activity	Quang D Hoang	100%	3/1/19	3/16/19
Consolidate Results	Collaboration Among All	60%	3/16/19	3/31/19
Prepare The Progress Report	Hadi Sharifi	100%	3/16/19	3/31/19
Plot The Data, Analyze them, and Drive conclusion				
Plot The Consolidated Results	Collaboration Among All	20%	3/31/19	4/3/19
Draw Conclusions/Guidelines	Collaboration Among All	10%	3/31/19	4/3/19
Prepare The Poster	Collaboration Among All	0%	4/3/19	4/16/19
Prepare the Final Report	Collaboration Among All	0%	4/3/19	4/16/19
Prepare Poster Video	Collaboration Among All	0%	4/3/19	4/16/19

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VII. APPENDIX

ⓘ There are 1192 words and 2 floats (tables, figures, etc.) in the LaTe…

The total number of words in the proposal.