Pakistan Journal of Life and Social Sciences

www.pjlss.edu.pk

RESEARCH ARTICLE

Determinants of Physical, Mental Health, and Chronic Disease: An Empirical Study of Lifestyle Impacts

Ting Tin Tin[1*], Looi Jing Jie[2], Lee Jun Qi[3], Chong Wyxin[4], Chaw Jun Kit[5], Wan Nor Al-Ashekin Wan Husin[6], Ali Aitizaz[7], Lee Kuok Tiung[8*], Sunday A. Afolalu[9], Umar Farooq Khattak[10]

[1,6,9]Faculty of Data Science and Information Technology, INTI International University, Nilai 71800, Malaysia

[5]Institute of Visual Informatics, Universiti Kebangsaan Malaysia, Bangi 43600, Malaysia

[7]School of technology, Asia Pacific University, Malaysia

[8]Faculty of Social Science and Humanities, 88400 Kota Kinabalu, Universiti Malaysia Sabah, Malaysia

[9]Department of Mechanical and Mechatronics Engineering, Afe Babalola University, Ado-Ekiti, 360101, Nigeria

[9]Department of Mechanical Engineering Science, University of Johannesburg, 2092, South Africa

[10]School of IT, Unitar International University, Malaysia

ARTICLE INFO	ABSTRACT
	The undeniable impact of lifestyle behaviors such as diet, smoking, alcohol consumption, physical activity levels, and past health issues significantly impact adult physical and mental well-being, as well as their risk of chronic diseases. The increasing incidence of chronic diseases and mental illness worldwide highlights the urgent need for all-encompassing health approaches. A focus on a balanced diet, consistent exercise, abstaining from tobacco and excessive alcohol use are all essential measures to prevent these health problems and advance general well-being. However, a crucial knowledge gap remains in understanding the exact pathways through which these factors intertwine and exert their influence. The present study aims to discover the role of Diet, Smoking addiction, Drinking addiction, Physical abilities, and Medical histories in the connections between each (Physical health,, Mental health and Chronic disease) by using a large data set from the BRFSS, a project supported by the Centers for Disease Control and Prevention (CDC) which has approximate number of 491,776 respondents and 331 variables. After cleaning the "IVs", three existing 'DV' (dependent variables), which are physical health mental health, and chronic disease, are separated into different three major datasets by implementing the software application. In addition, the analysis was performed using the "PSPP" software application. According to the result, some of the correlations are considered moderately weak to positive, and correlations between diet and physical health, smoking addiction and physical health, and physical abilities and physical health have been involved. The result of the study will raise awareness among families and communities of the importance of health issues and encourage them to adopt healthy habits. This enables people to make well-informed decisions about their own well-being and personal empowerment.

INTRODUCTION

In today's world, mental health and disease are very important that require discussion. The current mental health issue can be addressed more effectively with a deeper understanding of how mental illness affects people worldwide (Kerstetter, 2022). According to the global overview of mental health data, 970 million people worldwide suffer from mental illness. 1 in 4 people has mental illness in their lives.   An estimated 8 million deaths per year, or 14.3% of all deaths worldwide were related to mental health issues. 1990-2013, the population possessing mental illness increased 50%. The specific population thrived for the growth from 416 million to 615 million. The highest rate of drug misuse and mental health disorder-related deaths worldwide is seen in the United States. Adults with mental illnesses make up 19.86% of the population and 4.91% of those are with serious mental illnesses (Kerstetter, 2022).

Besides mental health issues, physical health issues are also important, as it will severely affect the health of individuals if it is not well taken care of. There will be a higher chance of contracting conditions including diabetes and cardiovascular disease and eventually harm an individual's health. Research indicates that Gallup estimates that 38.4% of adult Americans are obese, which is higher than 6%percentage in 2019 and just below the all-time high of 39.9% set in 2022. Since 2019, a record-breaking 13.6% of respondents have claimed to have received a diabetes diagnosis from a medical professional. The age-specific growth in obesity since 2019 varies. The largest increases are reported by people between the ages of 45 and 64 and 30 and 44 (Witters, 2024).

In addition, chronic disease is also another important issue that will have a negative impact on individuals' health. Chronic diseases usually last for more than a year, and it may become worse as the time passes. One of the most common and expensive medical illnesses in the United States is chronic disease. Nearly 45% of Americans, or 133 million people, are facing one chronic disease, and it is increasing after years. Chronic illnesses, such as diabetes, cancer, heart disease, and stroke, can result in hospitalization, disability in life, and most crucially, death. Based on the Centers for Disease Control in the US, chronic illnesses cost $5300 per individual annually, or almost 75% of all healthcare expenses (Raghupathi, 2018; Westreich, 2005).

To avoid all the issues stated above, having a healthy diet is one of the most important solutions to prevent all kinds of health issues. Balanced nutrition in daily life plays a crucial role in improving an individual's health as it helps to prevent conditions including heart disease, stroke, and diabetes. A healthy diet can also help prevent obesity due to the control of the level of sugar and fat. In addition, regular exercise can help to lead to a healthier lifestyle and a stronger body. People who exercise regularly can keep body weight under control and treat physical and mental issues such as depression and being obese. Preventing the use of tobacco and alcohol is also another way to avoid any health problems as it will only bad effects and harm body health. Smoking is the leading cause of emphysema chronic obstructive lung disease (COPD) which will cause breathing problems with breathing in daily life. An excessive consumption of alcohol will cause damage to the liver and eventually lead to cancer and more chronic diseases (Leisa Bailey, 2023).

Problem Statement

The increasing incidence of chronic diseases and mental illness worldwide highlights the urgent need for all-encompassing health approaches. A focus on a balanced diet, consistent exercise, abstaining from tobacco and excessive alcohol use are all essential measures to prevent these health problems and advance general well-being.

2.0 LITERATURE REVIEW

Adult diet and its impact on Physical Health:

Physical health is the foundation of life. It allows us to move freely and manage daily tasks. However, there are factors that play an important role in this. The diet is what we eat to fuel our bodies. A balanced diet provides essential nutrients, but excessive consumption can contribute to weight gain. It is estimated that 42% of adults worldwide and 1 in 5 children were overweight or obese (body

mass index (BMI) > 25), according to (Ritchie & Roser, 2024). Many high-income countries, such as the United States, are believed to have more than 60% of adults who are overweight or obese.

Mediterranean Diet

To accommodate that Mediterranean diet (MedDiet) is the way to go. It is inspired by traditional dietary patterns of counties bordering the Mediterranean Sea. It prioritizes plant-based foods such as fruits, vegetables, and whole grains, along with healthy fats from olive oil and seafood. Due to the fact that the typical Greek diet contains a comparatively high percentage of total fat energy - approximately 40% - the general public frequently believes that a MedDiet will result in an increase in body weight. As a result, several physicians and nutritionists are hesitant to advise obese people. On the other hand, data from observational studies indicate that MedDiet is not linked to increased waist circumference or weight gain. According to Romaguera et al. (2010), people who adhered to MedDiet closely dropped 0.16 kg and had a 10% lower risk of developing obesity or being overweight than those who did not. In addition to that, MedDiet is believed to help prevent cardiovascular disease (CVD) in groups that include people with diabetes. A meta-analysis of eight prospective studies showed that those on a MedDiet had a 13% lower incidence of Type 2 Diabetes (T2D) (Becerra Tomás et al., 2019).

Paleo Diet

The Paleo diet was created to replicate the foods that our ancestors consumed thousands of years ago. Frczek et al. (2021) revealed that, in the short and long term, Paleo diets significantly reduced body mass index (BMI), waist circumference (WC) and Fat Mass (FM). Frączek et al., (2021) revealed that those who followed the Paleolithic diet lost an average of −3.52 kg in weight compared to other diets. According to the data, pursuing a paleolithic diet is associated with losing weight. The impact on waist circumference, body mass index, and weight was noteworthy.

Adult physical abilities and its impact on physical health:

The physical abilities of a person are also a factor that contributes to physical health. People with disabilities will have one or more physical qualities that may be affected, which restricts their ability to participate in sports, stay fit, and engage in activities related to home or household activities. People living with disabilities are 16-62% less likely to meet physical activity standards than people without disabilities and are more likely to develop major health problems as a result of their inactivity (Martin Ginis et al., 2021).

Adults' smoking and drinking addictions, and its impact on physical health:

Smoking and drinking addiction are the leading causes of preventable death and disease worldwide. Cigarette smoke can cause damage to parts of your body, especially the respiratory system. Smoking has an unpleasant health effect on every aspect of the lung; it affects lung functions including impairing lung defense against infections. Approximately 6 million deaths worldwide are due to tobacco use each year; in the United States, smoking is directly responsible for more than 500,000 deaths, with second-hand smoke exposure accounting for 10% of these deaths (Gallucci et al., 2020). People with the condition normally have functional defects such as airflow obstruction and decreased diffusion capacity. Individuals with COPD are observed to have an increased breathlessness and frequency of worsening symptoms that restrict daily physical activity, regardless of muscle mass and strength (Albarrati et al., 2020). These are defects that eventually lead to a loss of physical health. Those with COPD had difficulties managing ADL (Activities of Daily Living) and IADL (Instrumental of Daily Living) (Kanervisto et al., 2010). People with COPD were more likely to have difficulty managing daily activities such as dressing, bathing, and housework. On the other hand, the chance of experiencing difficulties with IADL, such as using public transport or grocery shopping, was much higher in those with COPD.

Furthermore, excessive alcohol intake has been associated with a variety of undesirable outcomes, including an increased risk of illness, crime, and dependency. Alcohol has a wide range of complex effects on the management of food intake, mental health, sleeping, and depression symptoms, all of

which can have an impact on body weight (Åberg & Färkkilä, 2020). The heaviest drinking group had a 70% higher risk of obesity than the lightest. On their day of highest drinking, these individuals consumed more than 75% of their entire daily energy intake from alcohol, while the lowest group consumed less than 24% (Traversy & Chaput, 2015). In short, binge drinking leads to a higher risk of obesity and a large waist circumference. Alcohol disrupts body's metabolism and may cause the ability to burn fat to slow down. Alcohol is high in calories but low in nutrients, so these additional calories can lead to more weight gain. In addition to that, it also stimulates your appetite and makes you crave more food.

Adults' medical histories and its impact on physical health:

Stroke

People with medical histories are often restricted at some point. Stroke as the leading cause of adult disability. For survivors, 35% of them cannot live without any assistance. Li et al. (2021) showed that the population who had a stroke in the past has potential risk to gain balance disorder. A stroke might disrupt your sense of balance and make it difficult to concentrate on maintaining balance for long periods.

Asthma

Asthma is a chronic respiratory condition marked by inflammation and hyperresponsiveness of the airways, including wheezing, coughing, shortness of breath, and tightness in the chest. Uncontrolled asthma is associated with limitations in a range of activities. For uncontrolled patients, they are required to avoid going to places where allergens might be present (smoke, dust, mold) and also participating in intensive exercises (Haselkorn et al., 2009). In addition to the above, according to Dockrell et al., (2007) almost 70% of the patients claimed that physical activity was restricted, 50% were barred from owning pets, 30% from taking vacations, and many felt their work possibilities were limited.

COVID-19

The most common study findings were abnormal lung CT scans and abnormal pulmonary function tests, followed by fatigue, psychological symptoms (mostly depression and PTSD), and neurological symptoms (primarily cognitive impairment and memory impairment) (Zeng et al., 2022).

Chronic Diseases

Adult diet and its impact on Chronic Disease

In recent years, there has been an obvious development in several relevant sectors, and reliable studies, which have been implemented with a population-based methodology, have acted as an aid to elaborate on the importance of diet in reflecting the growth and death of chronic disease (Galbete et al., 2018; Magkos, 2019; Neuhouser, 2019). As a result of studies by Galbete et al. (2018), Magkos (2019) and Neuhouser (2019), it has suggested that diet has found a strong relationship and burden to indicate infection of chronic diseases, and valid research has been increasingly to stand the points that diet has an effective influence to bring an outcome of unpredicted conditions in developing such category of diseases, whether positive or negative throughout life stages. In addition to that, cultural differences in diet and lifestyle due to regional behaviors and regional limitations (Galbete et al., 2018; Magkos, 2019). Consequently, various regions have established standardized guidelines for optimal dietary patterns, characterized by high vitamin intake, low fat consumption, and adequate protein levels (Magkos, 2019; Neuhouser, 2019). In addition, dietary patterns have been formed in a complicated way by combining various foods (Neuhouser, 2019). As a discovered fact, a scoring scale has been implemented to assess the interest in dietary patterns from two studies, which are Galbete et al. (2018) and Neuhouser (2019). With persuasive evidence, much research has claimed that non-vegetarians have a higher rate of developing chronic disease in the same community (Galbete et al., 2018; Magkos, 2019; Neuhouser, 2019). Subsequently, it has indicated that vegetarianism has a lower risk of infecting certain types of chronic diseases with a comparable condition (Magkos, 2019).

Adults' smoking addiction and its impact on chronic disease

Based on recent studies by Chi et al. (2024), Santoro et al. (2019), and Wang et al. (2019), it has been shown that discontinuation of a long-term habit of smoking will strongly affect chronic disease morbidity, mortality, and medical loads in a premature and preventative state due to an association between smoking addiction and chronic diseases. For further clarification, the studies of Chi et al. (2024) claimed that the establishment of smoking addiction occurs in highly populated countries, and this proportion of the population lives on a background of low social income. In addition, Chinese citizens who earn a monthly income have a higher preference for smoking (Wang et al., 2019). Under the influence of the combination of income profile and other relatable factors in biological and cultural contexts, which have an obvious demographic difference between the communities, these factors have been considered to affect the rate of smoking cessation among the community (Chi et al., 2024). In addition to that, this population has limited knowledge of possessing an insight to maintain health conditions (Chi et al., 2024). Recent research by Santoro et al. (2019) has found that people who smoke less than 10 cigarettes each day have a perspective of refusing to accept the truth of possibly gaining any risk of chronic diseases. By observing the burden of smoking addiction from the perspective of a community, it has directly had an overwhelming effect on society, contributing enormous economic costs to health care services and degrading overall productivity (Chi et al., 2024; Santoro et al., 2019). Both studies, Chi et al. (2024) and Wang et al. (2019), consistently stated or claimed that existing smokers, who have been diagnosed with any chronic disease, are increasing in self-courage to decrease the frequency of smoking.

Adult drinking addiction and its impact on chronic disease

By defining the term drinking addiction, it is generally acknowledged as a high frequency of drinking habits and an excessive volume of consumption within a specific period, and drinking addiction has acted as an active contributor to having a direct influence on determining the risk of the possibility of available chronic diseases (Beulens et al., 2017; Rehm et al., 2017). Furthermore, previous studies by Barbera-Latasa et al. (2022), Beulens et al. (2017) and Rehm et al. (2017) have examined that drinking patterns are a modification of the condition of chronic diseases, and studies have stated that a high drinking addiction increases the severity of existing chronic diseases in infected individuals. In addition to that, alcohol consumption has been involved in a wide range of diseases, which are categories of chronic diseases (Rehm et al., 2017). Each drink or alcohol consumption is linked to the occurrence of cancer exposure (Barbera-Latasa et al., 2022; Beulens et al., 2017; Rehm et al., 2017). The guidelines addressed adults of different genders to control their drinking behavior to maintain a healthy rate and advised individuals to gain a preference for drinking less than certain suggested number of drinks daily, while men are preferred to intake 2 drinks per day and women with only a drink per day (Barbera-Latasa et al., 2022; Beulens et al., 2017). To emphasize the importance of drinking patterns, an appropriate drinking pattern has been justified as an intervention to bring beneficial and reversal effects on health conditions by adjusting the level of diabetes (Barbera-Latasa et al., 2022; Rehm et al., 2017). However, there are differences between each individual body, which has resulted in the fact that a general guideline of the drinking pattern is not applicable to every individual as a measurement, and it has difficulties in identifying a proper drinking pattern for everyone. Furthermore, biological factors have been considered to indicate drinking addiction, as most studies have shown that men consume a moderately larger volume of alcohol than women (Barbería-Latasa et al., 2022; Beulens et al., 2017; Rehm et al., 2017).

Adults' medical history and its impact on chronic disease

With the help of different types of medical histories, general medical histories of all those gained in the past can be fully used to build provisional insight into understanding the risk factors and model a predictive solution for preventive solutions that lead to a healthy lifestyle (Barnes, 2018; Duke et al., 2021; Yang et al., 2021). Furthermore, both Barnes (2018) and Yang et al. (2021) studies have claimed that symptoms caused by chronic diseases can be undetectable or diagnosed at an early stage and suggested that medical histories be implemented to examine the prominent association between medical history and chronic diseases. The awareness of early chronic diseases is low and insufficient

diagnosis tests have been performed (Barnes, 2018; Yang et al., 2021). In addition to that, recent studies from Duke et al. (2021), Lin et al. (2021), and Yang et al. (2021) have reflected a significant indication that timely factors through different stages, which represent a sign of medical histories, can be improved to eliminate potential risk stacks. Additionally, socioeconomic and demographic data from individuals can be formed in combination with data generated from medical histories to better examine the outcome, but socioeconomic and demographic data are not the key components that have a direct influence on health outcomes (Duke et al., 2021; Lin et al., 2021; Ariani et al., 2024).

Adult physical abilities and its impact on chronic diseases

Physical activity and physical inactivity have been used as determinants of the metric to represent the level of physical abilities. In recent years, physical activity or inactivity has acted as a risk factor that can indirectly modify the status of chronic diseases (Anderson & Durstine, 2019; Burini et al., 2020). Furthermore, physical abilities have a great impact on preventing chronic diseases and increasing the quality of individual life (Anderson & Durstine, 2019; Burini et al., 2020; West et al., 2019; Jam et al., 2018). Based on recent studies from Anderson & Durstine (2019), Burini et al. (2020) and West et al. (2019), the studies have consistently concluded that regular physical activities have been treated as a medication or therapy to eliminate the potential risk of chronic diseases, since sufficient physical activity, which results in good physical ability, can optimize the performance of body biological function to form internal defense against disease infection. In addition to that, regular exercise is essential because the association between physical abilities and chronic diseases is closely related. Therefore, physical inactivity shows a decrease in life expectancy, resulting in high mortality and morbidity from chronic diseases (Anderson & Durstine, 2019; Burini et al., 2020; West et al., 2019; Jam et al., 2014). Furthermore, both Anderson & Durstine (2019) studies and West et al. (2019) stated that many institutions have provided guidelines for children with chronic diseases or healthy conditions to achieve a standard level of daily physical activity, which is a prescription.

Mental health

Adults' diet and its impact on mental health

The impact of diet on mental health has been a topic of discussion for a long time. According to the results of studies, obesity and diet can directly impact mood. Mental health issues could also lead to changes in eating habits that affect weight. Alternatively, common issues like stress or predisposition can lead to both obesity and mental disorders. For example, depression and post-traumatic stress disorder (PTSD) (Bremner et al, 2020). Diet and mental health problems are complicated and related. Studies have shown that obese individuals have a higher rate of depression compared to an individual who has normal weight (Moazzami et al., 2019).

Obese people may experience depression because of psychological problems related to self-consciousness about appearance and common variables such as a history of childhood abuse. Early trauma is associated with obesity in adulthood. This is due to the resetting of metabolism of the individual that changed the habit of eating related to mental health issues (Williamson et al., 2002). Research from Wells et al. (1997) studies that fat intake will lead to feelings of sleepiness. Studies also revealed a link between anxiety and depressive symptoms. A reduction in fat intake in depressed patients has resolved their depression and the symptoms of anxiety. Survey studies have also shown that patients who had a diet like the Mediterranean diet had a reduced risk for the development of depression (Alonso et al., 2009).

Adult smoking addiction and its impact on mental health

The use of tobacco and smoking continues to be the most preventable cause of death worldwide. People with mental illness are disproportionately harmed by high smoking rates. They account for more than 200,000 of the 520,000 tobacco-related deaths in the United States each year, dying 25 years earlier on average (Prochaska et al, 2017). According to the results of studies by Prochaska et al. (2017), smoking is two to three times more prevalent among people with mental illness, compared with the general population. When assessed by psychiatric diagnoses, smoking prevalence is

particularly high (almost five times higher) among those with schizophrenia, bipolar disorder, post-traumatic stress disorder (PTSD), and alcohol, drug use disorders (Fu et al, 2007).

Adult drinking addiction and its impact on mental health

Alcoholic addiction often affects the course of mental illness. Excessive consumption of alcohol must be handled together with mental health treatment because it can both create and worsen their symptoms. Alcohol will cause depressive and will anxiety syndromes and also affect the quality of sleep. It also has harmful interactions with psychiatric medications. Alcohol consumption often mirrors the common stigma associated with clinical depression, including mood disorders, hopelessness, and insomnia (Washington et al, 1994). Pharmacologically speaking, alcohol is classified as a depressant of the central nervous system. Therefore, it is not surprising that it causes anxiety and depression (Schuckit, 1989).

Anxiety spectrum disorders and alcohol use disorders (AUDs) often co-occur. For example, although panic disorder with agoraphobia occurs in the general population at approximately 6.1%,11 alcoholics suffer from panic disorder at a rate of up to 21% (Myers, 1984; Westreich, 2005). The problem for the anxious alcoholic remains that alcohol initially treats anxiety, which worsens later on. This will only cause them to face a more severe mental disorder.

Adult physical abilities and its impact on mental health

People with mental diseases such as depression, bipolar disorder, schizophrenia, and even anxiety disorders have poorer physical health, particularly cardiovascular disease, and live shorter lives than the general population (Tiihonen, 2009). Developing physical morbidity on top of a mental health problem, particularly if it results in additional fatigue, sensory disability, or mobility impairment, can make it even more difficult for people to participate in education, training, employment, or care for their families, contributing to social isolation. Reduced mental health, namely psychiatric diseases, is one of the most significant disease burdens worldwide, particularly among disabled people (Tough et al, 2017). Well-performing physical abilities defined as subjective appraisal of an individual's performance and satisfaction with life complements the concept of mental health to demonstrate the importance of mental health and physical disabilities (Diener et al, 1999).

Adults' medical histories and their impact on mental health

Post-stroke depression is defined as having depression after recovery from a stroke. It has been linked to a higher chance of death even after recovering from a stroke. Based on studies from Williams et al. (2004) 51,119 patients who were hospitalized after an ischemic stroke and eventually survived beyond 30 days were identified; 2,405 (5%) obtained a diagnosis of depression, and 2,257 (4%) received another mental health diagnosis within 3 years of their stroke. Post-stroke depression affects almost one-third of all ischemic stroke survivors and has been associated with poorer functional outcomes, slower recovery, and reduced quality of life (Parikh et al., 1990).

Studies by Williams et al. (2004) also discovered that even after controlling for common cardiovascular diseases and other diagnoses, mental health diagnoses in the first three years following stroke increase the chance of death by more than 10%. This shows how closely related medical histories are to mental health. It will cause an increase in death after having poor mental health even if patients recover from a stroke. The link between depression and increased mortality risk has also been observed in other diseases, particularly after cardiovascular disease (Lespérance et al., 2000).

The physical health covariates of the literature review are summarized in Table 1, the mental health covariates of mental health from the literature review are summarized in Table 2, and the chronic disease covariates of the literature review are summarized in Table 3. These tables list different types of "DVs" (Dependent variables) of the current study from previous studies, it is aimed to interpret the differences between all the studies.

Table 1. Covariates of Physical Health from previous studies

Covariate	Detail Variables	Types of Physical health	Previous studies
Diet	(TC), Total Cholesterol (WC), Waist circumference (BMI), Body mass index, Calories intake	Obesity	Frączek et al. (2021) Becerra-Tomás et al. (2019) Romaguera et al. (2010)
Smoking addiction	Smoking in lifetime	Chronic bronchitis, (COPD) chronic obstructive pulmonary disease, (CVD) Cardiovascular Disease, (ADL), Activities of Daily Living and (IADL), Instrumental of Daily living	Kanervisto et al. (2010) Gallucci et al. (2020) Albarrati et al. (2020)
Drinking addiction	(BF%), percentage of body fat (WC), waist circumference. Alcohol consumption, energy intake, physical activity, lifestyle	Obesity	Sayón-Orea et al. (2011) Åberg & Färkkilä (2020) Traversy & Chaput (2015)
Medical Histories	(TUG), Timed Up and Go Test (FSST), Four Square Step Test (GPT), Gait and Pivot turn (FRT), Functional reach test (SLBT), Single Leg Balance Test	Gait and Balance Disorder	Li et al. (2021)
Physical abilities	People living with disabilities (PLWD), cardiovascular fitness, musculoskeletal fitness, cardiometabolic risk factor	Physical Abilities Standard	Martin Ginis et al. (2021).

Table 2. Covariates of Mental Health from Previous Studies

| Covariate	Detail Variables	Types of mental health	Previous studies
Diet	Obesity, diet, self-consciousness, history of childhood abuse, trauma	Depression, post-traumatic stress disorder (PTSD), mental disorder	Bremner et al. (2020) Moazzami et al. (2019) Williamson et al. (2002)
Smoking addiction	tobacco use, smoking rates, tobacco-related deaths	Psychiatric diagnoses, schizophrenia, bipolar disorder,post-traumatic stress disorder (PTSD)	Prochaska et al. (2017) Fu et al. (2007)
Drinking addiction	Consumption of alcohol	Depression, anxiety syndromes, insomnia,agoraphobia	Washington et al. (1994) Myers (1984)
Medical Histories	Chance of death even after recovering from stroke, slower recovery rate	Poststroke depression	Williams et al. (2004) Parikh et al. (1990)
Physical abilities	Cardiovascular disease, sensory disability	Depression, bipolar disorder, schizophrenia	Tiihonen (2009) Tough et al. (2017)

Table 3. Covariates of Chronic Disease from previous studies

Covariate	Detail Variables	Types of chronic disease	Previous studies
Diet	BMI values, protein, fat, carbohydrate, vitamin	Obesity	Magkos (2019)
	BMI, nutritive compound (score)	Heart disease, cancer, cerebrovascular disease, and diabetes	Neuhouser (2019)
	energy intake (score) and nutritive component (score)	diabetes (T2D), myocardial infarction (MI), stroke, and cancer	Galbete et al. (2018)

Smoking addiction	tobacco use	hypertension, coronary disease, cerebral apoplexy, diabetes, chronic bronchitis, asthma, COPD, chronic gastritis, chronic hepatitis and cancer	Wang et al. (2019)
	tobacco use, smoking intensity, smoking cessation behavior	cancer, heart disease, stroke, hypertension, diabetes, asthma, chronic lung disease, liver disease, or gastric disease	Chi et al. (2024)
	daily intake of nicotine	lung cancer	Santoro et al. (2019)
Drinking addiction	Drinking pattern: alcohol consumption	neurological diseases, diabetes, hepatitis, chronic liver disease, cirrhosis, cancer, cardiovascular disease	Barbería-Latasa et al. (2022)
	Daily alcohol consumption, total alcohol consumption, types of drinkers, period of alcohol consumption	alcohol-related cancer	Beulens et al. (2017)
	alcohol use, drinking patterns, alcohol consumption on average per day	HIV, Cardiovascular diseases, cancer	Rehm et al. (2017)
Medical History	childhood experiences, latest health assessment variables (14 chronic diseases)	Hypertension,dyslipidemia,diabetes,heart disease, stroke, chronic lung disease, asthma, liver disease, cancer, digestive disease ,kidney disease, arthritis, psychiatric disease, and memory-related disease	Lin et al. (2021)
	diabetes, hypertension, cancer, coronary heart diseases	renal failure (chronic lung disease)	Yang et al. (2021)
	Number of days with poor mental health, number of depression symptoms per month, number of chronic health conditions	Depression	Barnes (2018)
	heart attack, heart surgery, stroke, mini stroke, stroke surgery, high blood sugar, diabetes, high blood pressure, hypertension, cancer, obesity, depression, lymphoma, leukemia, high blood cholesterol and triglycerides	Cardiovascular disease, diabetes, hypertension, hyperlipidemia, obesity, cancer, and depression	Duke et al. (2021)
Physical abilities	Physical activity (Aerobic Exercise, HIIT Exercise, Resistance Training, and Flexibility Training)	respiratory, congenital heart, metabolic, systemic inflammatory/autoimmune, and cancer	West et al. (2019)
	Physical activity and physical inactivity	Lower respiratory disease, obesity, cancer, cardiovascular disease (CVD), diabetes, and stroke	Anderson & Durstine (2019)
	Physical activity and physical inactivity	Cardiovascular disease, and diabetes	Burini et al. (2020)

In accordance with the literature review, a conceptual framework has been developed to outline the relationships between different types of health problems and the factors considered. Generally, demographic and cultural originality from everyone is not able to define deeply the relevant objectives and insight of a particular research. However, demographic and cultural data have been implied as a minor determinant to indirectly affect the research outcomes and implemented with the covariates as a combination to draw the conclusion of the results. The factors considered, also known as the covariates, have been identified in the categories of diet, smoking addiction, drinking addiction, physical abilities, and medical histories. Furthermore, the development of these specific covariates is utilized to monitor and indicate the long-term and constant modification of different health issues, also known as independent variables, which are physical health, mental health and chronic disease.
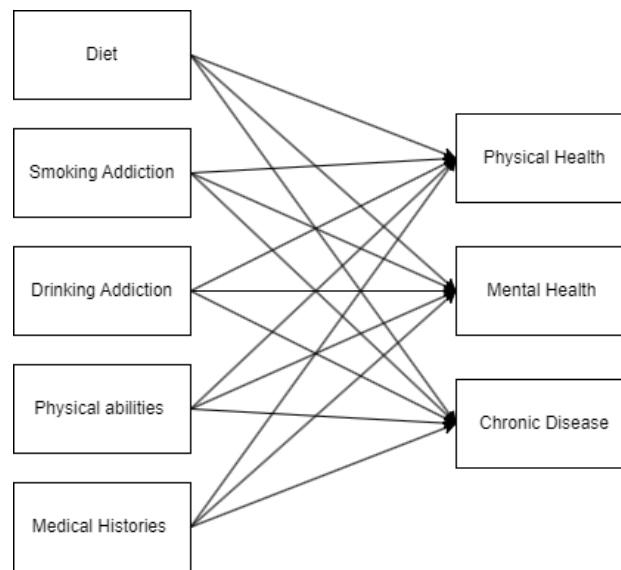
Figure 1. Conceptual framework comprising linkage of the covariates and dependent variables.

The hypotheses of this study are formed referring to the conceptual framework, which is demonstrated in Figure 1, and the hypotheses are listed below:

H1. There is a positive relationship between Diet and Physical health.

H2. There is a positive relationship between Diet and Mental health.

H3. There is a positive relationship between Diet and Chronic disease.

H4. There is a positive relationship between Smoking Addiction and Physical health.

H5. There is a positive relationship between Smoking Addiction and Mental health.

H6. There is a positive relationship between Smoking Addiction and Chronic disease.

H7. There is a negative relationship between Drinking Addiction and Physical health.

H8. There is a positive relationship between Drinking Addiction and Mental health.

H9. There is a negative relationship between Drinking Addiction and Chronic disease.

H10. There is a positive relationship between Physical abilities and Physical health.

H11. There is a negative relationship between Physical abilities and Mental health.

H12. There is a negative relationship between Physical abilities and Chronic disease.

H13. There is a positive relationship between Medical Histories and Physical health.

H14. There is a positive relationship between Medical Histories and Mental health.

H15. There is a negative relationship between Medical Histories and Chronic disease.

3.0 RESEARCH METHODOLOGY

The quantitative data used in this study was derived from a well-known platform, known as Kaggle, and it is one of the largest virtual communities in the field of data science and machine learning. Powerful tools and reliable resources are available to solve data science challenges and achieve data-science goals. In the environment of the platform, Kaggle has facilitated users to actively explore or publish datasets and enabled collaboration between different parties (Wikipedia Contributors, 2019). The BRFSS (Behavioral Risk Factor Surveillance System) has associated a dataset on the mentioned platform, which is a project supported by the Centers for Disease Control and Prevention (CDC), and the dataset comprises the participation of respondents from over 50 states in the United States. The data collection process has been implementing the methodology of telephone surveys

through telephone interviews. It is a study measuring behavioral risk factors among adults who are aged from 18 years old onward and collecting a massive amount of categorized data (health care, general health, preventive screening, preventive testing, measurement of physical activity, chronic disease, mental health, measurement of overweight and obesity, consumption of tobacco and alcohol, measurement of sexual behavior, and injury risks). The study was initiated in 1984, which is still present, and this article has implemented the version of 2013 with an approximate number of 491,776 respondents (Pierannunzi et al., 2013). When taking the data set as a referral, it requires techniques and methodologies to perform data cleansing and data transformation to overcome an existing issue in fulfilling the completeness of existing data sets. As Pierannunzi et al. (2013) indicated, the studies are still on-going, and many new variables have been included annually to the survey, which makes a challenge to the researchers in collecting converged datasets. Furthermore, there is an obvious growth in participants contributing to the survey, with an estimated number of more than 400,000 individuals each year.

During the data cleansing process, the existing data and selected variables have been treated in different ways based on the predetermined criteria, and exemption is allowed for the occurrence of unique conditions which have directly or indirectly impacted the entire dataset. The cleaning workflow is presented in Figure 2. Exemplification, some variables contain the highest significance that are essential to support the other subsequent variables, and those specific variables will be exempted from removal. In the first stage of data cleansing, there is a total number of 331 variables and approximately 491,776 respondents in the original dataset, and 77 variables will then be obtained from the dataset by going through a manual selection process for interrelated variables to conform the current research; the total number of cases remain unchanged. The data from each column (selected variables) will then be converted or superseded to vary the values (number form) that are retrieved from the 'code book'. According to the respective steps for the cleaning, these variables are categorized as part of 'IV' (independent variables) which are diet, smoking addiction, drinking addiction, physical abilities, and medical history will be treated ahead. For consistency, every variable is required to review its missing values based on the statistical description, and every variable contains a different number of missing values, which are treated in different ways; the process iterates through each required variable. If variables have exceeded 30% of missing values, it has been assessed to determine their importance to the entire dataset, and missing data from prominent variables that have a direct impact on the dataset are removed; otherwise, the variables itself are removed. On the other hand, if a variable contains missing values which are within 30%, the missing values will be replaced by mode, mean, or 0 value. It depends on the situation, and the variables without missing values will remain unchanged. In addition, encountering variables that are interrelated or highly dependent on each other, these variables will be merged to form a new variable to avoid complications. Additionally, data cleaning application has been performed by using "SPSS" software application.
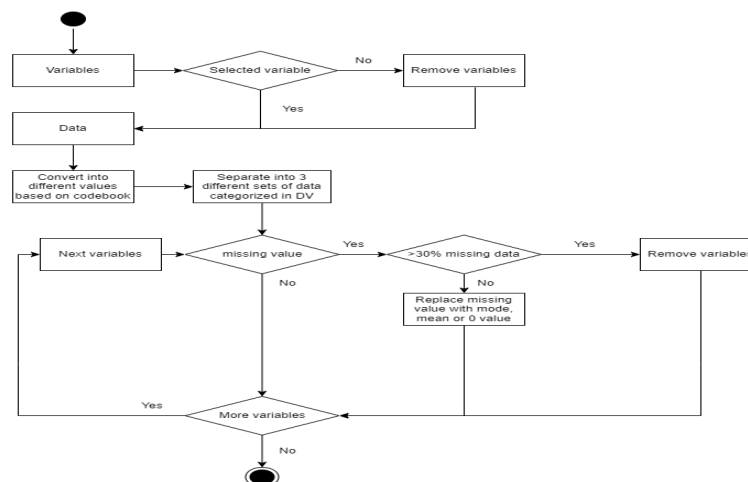
Figure 2: Diagram of data set cleansing and transformation process (flow)

After cleaning the IVs, three existing DV (dependent variables), which are physical health mental health, and chronic disease, are separated into different three major datasets, and each is formed as a combination with the IVs to stand individually. Furthermore, DV (dependent variables) undergo a consistent methodology of handling missing data. By gaining the finalized version of the datasets, it has results that three individual datasets comprise a unique number of cases and variables: Physical health (49 variables and 20587 available cases), mental health (52 variables and 1878 available cases), chronic disease (50 variables and 362 available cases). The three datasets are not combined into one dataset due to weakened relationships that exist in between three independent variables (IVs), and these specific variables will have an indirect impact on each other within a dataset; it might result in an insufficient number of usable cases after the data cleansing process. Lastly, IV and DVs are merged into an individual variable to represent an overall healthy level by undergoing preset equations. Lastly, data from different datasets undergo analysis by using the PSPP software application.

4.0 RESULTS AND DISCUSSIONS

Demographic

Table 4. Demographic data was extracted from the three datasets. Each dataset contains a different number of participants, and the table has categorized the participants into two demographic groups, which are the common characteristics (age and gender), and the table has provided an accurate frequency and percentage for a specific group. Based on the table, the highest age ranges from each dataset. With that, the age range between 65 and 69 has consistently recorded the highest percentage among the three existing datasets, which reflects 16% in the dataset of physical health, 16.4% in the dataset of mental health, and 21.3% in the dataset of chronic disease data set. Additionally, the table has determined that most participants are male, showing 59.9% in the dataset of physical health data set, 57.2% in the mental health, and 70.4% in the dataset of chronic disease. In summary, the table gives a brief overview of the participants, who are male and from an older generation and have contributed a large part to this study.

Table 4. Demographic information of the dataset.

		Physical Health	Mental Health	Chronic Disease
Age	18 - 24	0.7% (143)	0.4%(7)	0%(0)
	25 - 29	2.0% (407)	1.1%(22)	0%(0)
	30 - 34	3.9% (816)	3.2%(59)	0%(0)
	35 - 39	4.8% (977)	4.9%(93)	0%(0)
	40 - 44	5.3% (1102)	4.5%(84)	1.1%(4)
	45 - 49	6.2% (1272)	7%(131)	0.8%(3)
	50 - 54	9.5% (1947)	10.4%(196)	4.5%(16)
	55 - 59	12.1% (2494)	12.3%(230)	9.9%(36)
	60 - 64	14.5% (2985)	15.9%(300)	20.7%(75)
	65 - 69	16% (3287)	16.4%(307)	21.3%(77)
	70 - 74	12% (2481)	11.8%(222)	20.7%(75)
	75 - 80	13% (2676)	12.1%(227)	21%(76)
Gender	Female	40.1% (8250)	42.8% (804)	29.6% (107)
	Male	59.9% (12337)	57.2% (1074)	70.4% (255)

RESULTS

The result analyzed with statistical data of Pearson's correlation between IV (independent variables) and DV (dependent variables) has been exhibited in **Table 5**. First, the analyzed result has revealed the significant values of each relationship between physical health and all the existing covariates, and the realization of the data has stated that physical health involves significant positive and negative correlations among all the covariates. The correlations of four specific covariates, which involve diet, smoking addiction, physical abilities, and medical history, are significantly positive in the

correlations with physical health, and the analyzed result assessed that diet (r = 0.037, Sig. (2-tailed)<0.001), smoking addiction (r = 0.040, Sig. (2-tailed)<0.001), physical ability (r = 0.026, Sig. (2-tailed)<0.001), and medical history (r = 0.155, Sig. (2-tailed)<0.001) have maintained the significant level at 0.000. Interprets that the condition from each of the four specific covariates in a correlation has a direct impact on the condition of physical health in an equivalent proportion. In addition to that, the result also examined the correlation between alcohol addiction and physical health (r = -0.050, Sig. (2-tailed)<0.001), and indicates a significant negative correlation that maintains a significant value at 0.000. Therefore, H1, H4, H7, H10, and H13 are accepted. When emphasizing the correlations of mental health among all covariates, only a significant positive correlation is found at a significant level of 0.000 between mental health and smoking addiction (r = 0.130, Sig. (2-tailed)<0.001). Based on the indication, H2, H8, H11 and H14 are rejected, excluding H5, which is accepted. Observing the correlations of chronic disease among all covariates, only a significant negative correlation is discovered at a significant level of 0.002 between chronic disease and medical history (r = -0.159, Sig. (2-tailed)<0.01). Therefore, H15 is accepted; H3, H6, H9, and H12 are rejected. In summary, the strengths of the overall correlations based on the analyzed results have been distinguished into different categories to measure every relationship. According to the result, some of the correlations are considered moderately weak to positive, and correlations between diet and physical health, smoking addiction and physical health, and physical abilities and physical health have been involved. Other correlations between medical histories and physical health or mental health and smoking addiction are indicated as positively weak correlations, and a correlation between physical health and drinking addiction is showing a negative moderate; especially the correlation between chronic diseases and medical histories is recognized as negatively weak. Lastly, the rejected cases did correlate significantly with the dependent variables.

Table 5. Pearson correlation analysis between covariates & dependent variables (Physical Health, Mental Health and Chronic Disease).

Variables	Diet	Smoking Addiction	Drinking Addiction	Physical Abilities	Medical Histories
Physical Health	.037***	.040***	-.050***	.026***	.155***
Mental Health	.001	.130***	.038	-.016	.015
Chronic Disease	-.046	.042	.021	.093	-.159**

Note: *Sig. <0.05; **Sig. <0.01; & ***Sig. <0.001; Test of significance (two-tailed)

DISCUSSION

Diet

Based on the results obtained, the diet is significantly related to physical health, which is consistent with the research by Ritchie & Roser (2024) showing that having a balanced diet will provide important nutrients needed by the body. However, excessive consumption may lead to overweight and might face the risk of obesity that will cause death, heart disease and stroke. Previous research by Romaguera et al. (2010) proves that different diets will also influence the relationship between diet and physical health. It shows that having a Mediterranean diet will lose more weight compared to a control diet and directly affect the physical health of an individual.

The correlation between diet and mental health was not significant in the present study. Therefore, this result disagrees with studies by Bremner et al. (2020) that provide information about there is a relationship between diet and mental health. According to the results of studies, obesity and diet can directly impact mood and mental health problems, leading to obesity due to improper diet. However, this is inconsistent with the result of the present study in which diet does not affect mental health. An additional analysis is carried out to further discover that the data used in this study are not normally distributed due to the imbalance of sample sizes in the population with mental health

problems (Figure 3). There is a total of the 73.4% of people in this dataset with mental health problems and only 26.4% of people with good mental health.
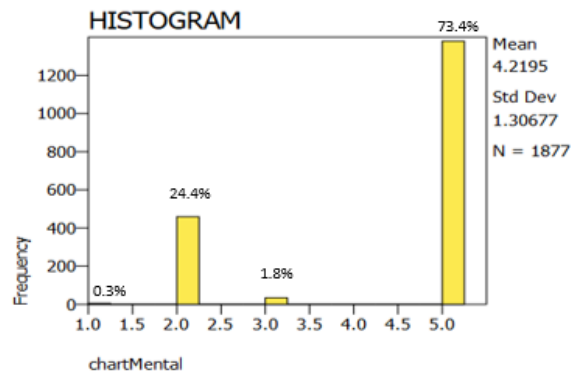
Figure 3: Abnormal distribution of mental health

The correlation of diet with chronic disease is not significant according to the present study. However, Galbete et al. (2018), Magkos (2019), and Neuhouser (2019) suggested that diet and chronic diseases have come across a strong relationship.

Smoking addiction

In this study, smoking addiction is significantly related to physical health. Gallucci et al. (2020) supported the present study that shows that there is a strong relationship between smoking addiction and physical health. Albarrati et al. (2020) already proves that smoking is recognized as the most important factor for Chronic obstructive pulmonary disease (COPD). Chronic obstructive pulmonary disease has become a factor in having a respiratory impairment for most smokers. According to Albarrati et al. (2020), individuals with COPD are observed to have increased breathlessness and frequency of worsening symptoms that restrict daily physical activity, regardless of muscle mass and strength. Therefore, it is obvious that smokers should control and change the habit of becoming addicted to smoking due to the risk of getting (COPD) that will lead to having difficulties in breathing.

According to the present study, smoking addiction is also associated with mental health which aligns with the studies of de Leon and Diaz (2005) that revealed that people who were suffering with mental health problems have a higher rate of smoking compared to the general population. The same applies to the research finding that the smoking rate is particularly high, almost five times higher among those who have the problem of psychiatric diagnoses. For instance, post-traumatic stress disorder (PTSD) and bipolar disorder (Fu et al, 2017). Judith et al. (2017) have also shown that people who suffer with mental illnesses are disproportionately affected by high smoking rates and cause them to die 25 years earlier on average.

According to the results obtained, smoking addiction is not significantly related to mental health. However, Chi et al. (2024) have reported a correlation between smoking addiction and chronic disease and have shown that addiction in smoking will affect chronic disease morbidity in a premature state due to the relationship between smoking addiction and chronic disease.

Drinking addiction

The correlation of drinking addiction with physical health is significant according to the present study. This aligns with the studies of Åberg et al. (2020), excessive alcohol consumption will lead to several negative effects. For example, it increases the risk of diseases and crime. A huge increase in BMI when drinking more than one drink per day which will cause a higher rate of getting diseases.

Sayón-Orea et al. (2011) also found that drinking more than seven times a week was associated with a higher chance of gaining weight and becoming overweight or obese.

The association between alcohol addiction and mental illness is not significant on observation of the results. Nevertheless, the result disagrees with several studies, Washington et al. (1994) suggesting that the course of mental illness is often affected by overload of consumption of alcohol. Alcohol will cause depression and will anxiety syndromes and also affect the quality of sleep. Alcohol consumption often mirrors the common stigma associated with mental disorders, including mood disorders and insomnia.

In this study, drinking addiction is not significantly related to mental health. However, studies by Barbería-Latasa et al. (2022), Beulens et al. (2017), and Rehm et al. (2017) have examined that drinking patterns are a modification in the condition of chronic diseases. The studies also showed that excessive consumption of alcohol increases the severity of existing chronic diseases, especially infected people.

Physical abilities

According to the results obtained, physical abilities and physical health are significantly related. This aligns with the study that proved this result. Martin Ginis et al. (2021) suggests that disabled people comprise a percentage of 16-62% less likely to fulfill the requirement of physical exercise than non-disabled people. Physical disabilities do not affect the physical health of an individual. However, there are still some differences compared to individuals without disabilities. For example, individuals with physical disabilities may not move freely as an individual without disabilities.

In this study, there is no significant difference between physical ability and mental health. This study has opposed studies that showed individuals that have physical disabilities may have fewer opportunities for favorable exchange, and therefore the effects on mental health may be less advantageous (Tough et al., 2017). The association between physical ability and chronic disease is significant based on the observation of the results.

Medical histories

There is a correlation of medical history with physical health that is significant based on our study. There is a study that proves that there is a correlation between them. Li et al. (2021) suggested that people with medical histories often have issues with their current physical health. For example, stroke was the leading cause of adult disability. For people who survived after having medical history, 35% of them need assistance to live their daily life. The correlation between medical history and mental health was not significant in the present study. However, Williams et al. (2004) suggested the opposite side of the study by showing that patients who recovered from stroke eventually have depression, which is called post-stroke depression. Patients have a higher chance of dying even after recovering from stroke and are mainly affected by depression. According to the studies, 51,119 patients who were hospitalized after an ischemic stroke and eventually survived beyond 30 days were identified; 2,405 (5%) obtained a diagnosis of depression and 2,257 (4%) received another mental health diagnosis within 3 years of their stroke. In this study, medical history is significantly related to chronic disease.

5.0 CONCLUSION

In this study, we evaluate the determinants of physical, mental health, and Chronic Disease which includes Diet, Physical abilities, Smoking addiction, Addiction to alcohol and Medical Histories. The findings reveal that men aged 65 to 69 are found to have the highest percentage of health and have chronic diseases. The present study has found that maintaining a healthy diet and staying physically active are the cornerstones of good physical health. In contrast, smoking and excessive alcohol consumption can significantly deteriorate our physical well-being. Interestingly, smoking may have some positive effects on mental health, although more research is needed. Additionally, poor physical ability often presents challenges to maintain good physical health. Our medical history also plays a

crucial role. It can not only offer insight into our current physical state, but also indicate a predisposition to chronic diseases.

However, the study has several limitations that should be considered in future research. First, the data sample taken was limited to the United States, so it is unknown if these findings apply to other nations or countries with different cultural backgrounds in health issues. For example, in Russia, drinking is an acceptable behavior, and alcohol has made a major contribution for the country's revenue. Furthermore, for the data sample that we used in the study, the method used to collect data was using a phone survey and phone interviews. Since the surveys are conducted over the Internet, it might introduce bias or provide limited data depending on how they are designed. It is wise to broaden the methods of collecting data and choose between qualitative and quantitative data.

In addition to that, future studies could consider other possible variables that could affect the study. For example, the study above did not consider other variables that could affect health, such as socioeconomic status and educational level. In that case, it is difficult to determine the impact of determinants on health compared to other aspects that cannot be measured. In addition to that, build on existing findings. Look for unanswered questions or unexpected results in current research. As well as focusing on real-world applications, research should aim to bridge the gap between theory and practice. Future studies can prioritize practical applications and involve individuals who can put the results into action. In addition, future studies should aim to go beyond national boundaries and identify diversity in cultural contexts that map health behaviors and outcomes. By comparing the variations in behavioral acts and practices related to health matters, the study can comprehensively adjust cultural contexts.

6.0 REFERENCE

Åberg, F., & Färkkilä, M. (2020). Drinking and obesity: Alcoholic Liver Disease/Nonalcoholic Fatty Liver Disease interactions. *Seminars in Liver Disease*, *40*(02), 154–162. https://doi.org/10.1055/s-0040-1701443

Albarrati, A., Gale, N. S., Munnery, M., Cockcroft, J. R., & Shale, D. J. (2020). Daily physical activity and related risk factors in COPD. *BMC Pulmonary Medicine*, *20*(1). https://doi.org/10.1186/s12890-020-1097-y

Anderson, E. & Durstine, J. L. (2019). Physical activity, exercise, and chronic diseases: A brief review. In *Sports Medicine and Health Science* 1(1), 3–10. KeAi Communications Co. https://doi.org/10.1016/j.smhs.2019.08.006

Ariani, M., Miswaty, M., Yuliani, T., & Husniyah, H. (2024). Empowering MSMEs to Support Local Economic Development: Case Study of Processed Mangrove Fruit Products. Pakistan Journal of Life and Social Sciences (PJLSS), 22(2).

Barbería-Latasa, M., Gea, A., & Martínez-González, M. A. (2022). Alcohol, drinking pattern, and chronic disease. *Nutrients*, *14*(9), 1954. https://doi.org/10.3390/nu14091954

Becerra-Tomás, N., Mejía, S. B., Viguiliouk, E., Khan, T., Kendall, C. W., Kahleová, H., Rahelić, D., Sievenpiper, J. L., & Salas-Salvadó, J. (2019). Mediterranean diet, cardiovascular disease and mortality in diabetes: A systematic review and meta-analysis of prospective cohort studies and randomized clinical trials. *Critical Reviews in Food Science and Nutrition*, *60*(7), 1207–1227. https://doi.org/10.1080/10408398.2019.1565281

Beulens, J. W. J., Fransen, H. P., Struijk, E. A., Boer, J. M. A., de Wit, G. A., Onland-Moret, N. C., Hoekstra, J., Bueno-de-Mesquita, H. B., Peeters, P. H. M., & May, A. M. (2017). Moderate alcohol consumption is associated with lower chronic disease burden expressed in disability-adjusted life years: a prospective cohort study. *European Journal of Epidemiology*, *32*(4), 317–326. https://doi.org/10.1007/s10654-017-0247-x

Bremner, J. D., Moazzami, K., Wittbrodt, M. T., Nye, J. A., Lima, B. B., Gillespie, C. F., Rapaport, M. H., Pearce, B. D., Shah, A., & Vaccarino, V. (2020). Diet, stress and mental health. *Nutrients*, *12*(8), 2428. https://doi.org/10.3390/nu12082428

Burini, R. C., Anderson, E., Durstine, J. L., & Carson, J. A. (2020). Inflammation, physical activity, and chronic disease: An evolutionary perspective. In *Sports Medicine and Health Science* (Vol. 2, Issue 1, pp. 1–6). KeAi Communications Co. https://doi.org/10.1016/j.smhs.2020.03.004

Chi, X., Liu, X., Li, C., & Jiao, W. (2024). The impact of chronic disease diagnoses on smoking behavior change and maintenance: Evidence from China. *Tobacco Induced Diseases*, *22*. https://doi.org/10.18332/tid/176947

De Leon, J., & Diaz, F. J. (2005). A meta-analysis of worldwide studies demonstrates an association between schizophrenia and tobacco smoking behaviors. *Schizophrenia research*, *76*(2-3), 135-157. https://doi.org/10.1146/annurev-publhealth-031816-044618

Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological bulletin*, *125*(2), 276. https://doi.org/10.1186/s12889-017-4308-6

Dockrell, M., Partridge, M. R., & Valovirta, E. (2007). The limitations of severe asthma: the results of a European survey. *Allergy*, *62*(2), 134–141. https://doi.org/10.1111/j.1398-9995.2006.01304.x

Duke, N. N., Jensen, T. M., Perreira, K. M., Hotz, V. J., & Harris, K. M. (2021). The Role of Family Health History in Predicting Midlife Chronic Disease Outcomes. *American Journal of Preventive Medicine*, *61*(4), 509–517. https://doi.org/10.1016/j.amepre.2021.02.021

Frączek, B., Pięta, A., Burda, A., Mazur-Kurach, P., & Tyrała, F. (2021). Paleolithic Diet—Effect on the health status and performance of athletes? *Nutrients*, *13*(3), 1019. https://doi.org/10.3390/nu13031019

Fu, S. S., McFall, M., Saxon, A. J., Beckham, J. C., Carmody, T. P., Baker, D. G., & Joseph, A. M. (2007). Post-traumatic stress disorder and smoking: a systematic review. *Nicotine & tobacco research*, *9*(11), 1071-1084. https://doi.org/10.1146/annurev-publhealth-031816-044618

Galbete, C., Kröger, J., Jannasch, F., Iqbal, K., Schwingshackl, L., Schwedhelm, C., Weikert, C., Boeing, H., & Schulze, M. B. (2018). Nordic diet, Mediterranean diet, and the risk of chronic diseases: The EPIC-Potsdam study. *BMC Medicine*, *16*(1). https://doi.org/10.1186/s12916-018-1082-y

Gallucci, G., Tartarone, A., Lerose, R., Lalinga, A. V., & Capobianco, A. (2020). Cardiovascular risk of smoking and benefits of smoking cessation. *Journal of Thoracic Disease*, *12*(7), 3866–3876. https://doi.org/10.21037/jtd.2020.02.47

Haselkorn, T., Jones, C. A., Chen, H., Rhoa, M., Miller, D. P., Peters, S. P., Weiss, S. T., EpiMetrix, Inc., University of Southern California, University of California San Francisco, Genentech, Inc., ICON Clinical Research, Wake Forest University Health Sciences Center for Human Genomics, & Channing Laboratory, Harvard Medical School. (2009). Relationship between asthma control and activity limitation: Insights from the REACT study. *Journal of Asthma*, *46*, 614–617. https://doi.org/10.1016/j.jaci.2007.12.587

Jam, F. A., Rauf, A. S., Husnain, I., Bilal, H. Z., Yasir, A., & Mashood, M. (2014). Identify factors affecting the management of political behavior among bank staff. *African Journal of Business Management*, *5*(23), 9896-9904.

Jam, F. A., Singh, S. K. G., Ng, B., & Aziz, N. (2018). The interactive effect of uncertainty avoidance cultural values and leadership styles on open service innovation: A look at malaysian healthcare sector. *International Journal of Business and Administrative Studies*, *4*(5), 208-223.

Kanervisto, M., Saarelainen, S., Vasankari, T., Jousilahti, P., Heistaro, S., Heliövaara, M., Luukkaala, T., & Paavilainen, E. (2010). COPD, chronic bronchitis and capacity for day-to-day activities: Negative impact of illness on the health-related quality of life. *Chronic Respiratory Disease*, *7*(4), 207–215. https://doi.org/10.1177/1479972310368691

Kerstetter, B. (2022). *Global Mental Health Statistics*. Children's HopeChest. https://www.hopechest.org/global-mental-health-statistics/#:~:text=Global%20Mental%20Health%20Statistics%20Overview,are%20attributable%20to%20mental%20disorders.

Leisa Bailey (2023). *What you can do to maintain your health*. familydoctor.org. https://familydoctor.org/what-you-can-do-to-maintain-your-health/

Lespérance, F., Frasure-Smith, N., Juneau, M., & Théroux, P. (2000). Depression and 1-year prognosis in unstable angina. *Archives of internal medicine*, *160*(9), 1354-1360. https://doi.org/10.1176/appi.ajp.161.6.1090

Li, N., Li, J., Gao, T., Wang, D., Du, Y., & Wang, W. (2021). Gait and Balance Disorder in Patients with Transient Ischemic Attack or Minor Stroke. *Neuropsychiatric Disease and Treatment*, *Volume 17*, 305–314. https://doi.org/10.2147/ndt.s289158

Lin, L., Wang, H. H., Lu, C., Chen, W., & Guo, V. Y. (2021). Adverse Childhood Experiences and Subsequent Chronic Diseases Among Middle-aged or Older Adults in China and Associations With

Demographic and Socioeconomic Characteristics. *JAMA Network Open*, *4*(10), e2130143. https://doi.org/10.1001/jamanetworkopen.2021.30143

Magkos, F., Tetens, I., Felby, C., Schacht, S. R., Hill, J. O., Ravussin, E., & Astrup, A. (2020). A perspective on the transition to plant-based diets: a diet change may attenuate climate change, but can it also attenuate obesity and chronic disease risk?. *Advances in Nutrition*, *11*(1), 1-9. https://doi.org/10.1093/advances/nmz090

Martin Ginis, K. A., Van Der Ploeg, H. P., Foster, C., Lai, B., McBride, C. B., Ng, K., Pratt, M., Shirazipour, C. H., Smith, B., Vásquez, P. M., & Gregory W Heath. (2021). Participation of people living with disabilities in physical activity: a global perspective. *The Lancet*, *398*, 443–455. https://doi.org/10.1016/S0140-6736(21)01164-8

Moazzami, K., Lima, B. B., Sullivan, S., Shah, A., Bremner, J. D., & Vaccarino, V. (2019). Independent and joint association of obesity and metabolic syndrome with depression and inflammation. *Health psychology*, *38*(7), 586. https://doi.org/10.3390/nu12082428

Myers, J. K., Weissman, M. M., Tischler, G. L., Holzer, C. E., Leaf, P. J., Orvaschel, H., ... & Stoltzman, R. (1984). Six-month prevalence of psychiatric disorders in three communities: 1980 to 1982. *Archives of General psychiatry*, *41*(10), 959-967. https://doi.org/10.1001/archpsyc.1984.01790210041006

Neuhouser, M. L. (2019). The importance of healthy dietary patterns in chronic disease prevention. *Nutrition Research,* 70(2019), 3–6. https://doi.org/10.1016/j.nutres.2018.06.002

Parikh, R. M., Robinson, R. G., Lipsey, J. R., Starkstein, S. E., Fedoroff, J. P., & Price, T. R. (1990). The impact of poststroke depression on recovery in activities of daily living over a 2-year follow-up. *Archives of neurology*, *47*(7), 785-789. https://doi.org/10.1176/appi.ajp.161.6.1090

Patel, K., Schlundt, D., Larson, C., Wang, H., Brown, A., & Hargreaves, M. (2009). Chronic illness and smoking cessation. *Nicotine and Tobacco Research*, *11*(8), 933–939. https://doi.org/10.1093/ntr/ntp088

Pierannunzi, C., Hu, S. S., & Balluz, L. (2013). A systematic review of publications assessing reliability and validity of the Behavioral Risk Factor Surveillance System (BRFSS), 2004–2011. *BMC medical research methodology*, *13*, 1-14. https://doi.org/10.1186/1471-2288-13-49

Prochaska, J. J., Das, S., & Young-Wolff, K. C. (2017). Smoking, mental illness, and public health. *Annual Review of Public Health*, *38*(1), 165–185. https://doi.org/10.1146/annurev-publhealth-031816-044618

Raghupathi, W., & Raghupathi, V. (2018). An Empirical study of chronic diseases in the United States: A Visual Analytics Approach to Public Health. *International Journal of Environmental Research and Public Health/International Journal of Environmental Research and Public Health*, *15*(3), 431. https://doi.org/10.3390/ijerph15030431

Rehm, J., Gmel, G. E., Gmel, G., Hasan, O. S. M., Imtiaz, S., Popova, S., Probst, C., Roerecke, M., Room, R., Samokhvalov, A. V., Shield, K. D., & Shuper, P. A. (2017). The relationship between different dimensions of alcohol use and the burden of disease—an update. *Addiction, 112*(6), 968–1001. Blackwell Publishing Ltd. https://doi.org/10.1111/add.13757

Ritchie, H., & Roser, M. (2024). *Obesity*. Our World in Data. https://ourworldindata.org/obesity

Romaguera, D., Norat, T., Vergnaud, A.C., Mouw, T., May, A.M., Agudo, A., Buckland, G., Slimani, N., Rinaldi, S., Couto, E., & Clavel-Chapelon, F. (2010). Mediterranean dietary patterns and prospective weight change in participants of the EPIC-PANACEA project. *The American Journal of Clinical Nutrition*, *92*(4), 912–921. https://doi.org/10.3945/ajcn.2010.29482

Sánchez-Villegas, A., Delgado-Rodríguez, M., Alonso, A., Schlatter, J., Lahortiga, F., Majem, L. S., & Martínez-González, M. A. (2009). Association of the Mediterranean dietary pattern with the incidence of depression: the Seguimiento Universidad de Navarra/University of Navarra follow-up (SUN) cohort. *Archives of general psychiatry*, *66*(10), 1090-1098. https://doi.org/10.3390/nu12082428

Santoro, A., Tomino, C., Prinzi, G., Lamonaca, P., Cardaci, V., Fini, M., & Russo, P. (2019). Tobacco Smoking: Risk to Develop Addiction, Chronic Obstructive Pulmonary Disease, and Lung Cancer. *Recent Patents on Anti-Cancer Drug Discovery*, *14*(1), 39–52. https://doi.org/10.2174/1574892814666190102122848

Sayón-Orea, C., Martínez-González, M. Á., & Bes-Rastrollo, M. (2011). Alcohol consumption and body weight: a systematic review. *Nutrition Reviews*, *69*(8), 419–431. https://doi.org/10.1111/j.1753-4887.2011.00403.x

Schuckit M. A. (1989). An overview. Drug and Alcohol Abuse. 3rd ed. New York; Plenum: 1989:1-18.

Tiihonen, J., Lönnqvist, J., Wahlbeck, K., Klaukka, T., Niskanen, L., Tanskanen, A., & Haukka, J. (2009). 11-year follow-up of mortality in patients with schizophrenia: a population-based cohort study (FIN11 study). *Lancet 374*(9690), 620–627 https://doi.org/10.1007/s00127-014-0847-7

Tough, H., Siegrist, J., & Fekete, C. (2017). Social relationships, mental health and wellbeing in physical disability: a systematic review. *BMC Public Health*, *17*(1). https://doi.org/10.1186/s12889-017-4308-6

Traversy, G., & Chaput, J. (2015). Alcohol Consumption and Obesity: An update. *Current Obesity Reports*, *4*(1), 122–130. https://doi.org/10.1007/s13679-014-0129-4

Wang, R., Jiang, Y., Yao, C., Zhu, M., Zhao, Q., Huang, L., Wang, G., Guan, Y., Michael, E., & Zhao, G. (2019). Prevalence of tobacco related chronic diseases and its role in smoking cessation among smokers in a rural area of Shanghai, China: A cross sectional study. *BMC Public Health*, *19*(1). https://doi.org/10.1186/s12889-019-7110-9

Wells, A. S., Read, N. W., Uvnas-Moberg, K., & Alster, P. (1997). Influences of fat and carbohydrate on postprandial sleepiness, mood, and hormones. *Physiology & behavior*, *61*(5), 679-686. https://doi.org/10.1016/S0031-9384(96)00519-7

West, S. L., Banks, L., Schneiderman, J. E., Caterini, J. E., Stephens, S., White, G., Dogra, S., & Wells, G. D. (2019). Physical activity for children with chronic disease; A narrative review and practical applications. *BMC Pediatrics*, *19*(1). https://doi.org/10.1186/s12887-018-1377-3

Westreich, L. M. (2005). Alcohol and mental illness. *Primary Psychiatry*, *12*(1), 41-46.; 1994. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=c1f7b2d8baa3c1a925c18b9c7d1cd6e00e46142a

Wikipedia Contributors. (2019). Kaggle. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Kaggle

Williams, L. S., Ghose, S. S., & Swindle, R. (2004). Depression and other mental health diagnoses increase mortality risk after ischemic stroke. *the American Journal of Psychiatry*, *161*(6), 1090–1095. https://doi.org/10.1176/appi.ajp.161.6.1090

Williamson, D. F., Thompson, T. J., Anda, R. F., Dietz, W. H., & Felitti, V. (2002). Body weight and obesity in adults and self-reported abuse in childhood. *International Journal of Obesity*, *26*(8), 1075-1082. https://doi.org/10.1038/sj.ijo.0802038

Witters, D. (2024). *In U.S., physical health plummets after the pandemic*. Gallup.com. https://news.gallup.com/poll/546989/physical-health-plummets-pandemic.aspx#:~:text=The%20_percent%20of%20US.%20_adults,up%201.1%20_points%20since%202019

Yang, Y., Li, Y., Chen, R., Zheng, J., Cai, Y., & Fortino, G. (2021). Risk Prediction of Renal Failure for Chronic Disease Population Based on Electronic Health Record Big Data. *Big Data Research*, *25*. https://doi.org/10.1016/j.bdr.2021.100234

Zeng, N., Zhao, Y. M., Yan, W., Li, C., Lu, Q. D., Liu, L., Ni, S. Y., Mei, H., Yuan, K., Shi, L. & Li, P. (2022). A systematic review and meta-analysis of long term physical and mental sequelae of COVID-19 pandemic: call for research priority and action. *Molecular Psychiatry*, *28*(1), 423–433. https://doi.org/10.1038/s41380-022-01614-7