

Do “happier” countries have lower levels of depression and anxiety – A study to explore the association between the World Happiness Index and the prevalence of depression and anxiety disorders by Country.

TOTAL WORD COUNT: 6,000 (EXCLUDING REFERENCES, APPENDIX AND FIGURES)

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Abstract:

Introduction: It is a common preconception that countries with higher levels of “happiness” would have lower levels of mental diseases. This essay interprets happiness as subjective wellbeing and explores its association with depression and anxiety disorders.

Aims: Investigate the relationship between the world happiness index and the prevalence of depression and anxiety

Method: Statistical analysis are employed in this review. Scatter graphs were plotted for the WHI and its six explanatory factors against depression and anxiety prevalence to investigate the correlation. Subsequent Pearson’s correlation coefficient is calculated using STATA.

Findings: No linear correlation is observed between the WHI and the prevalence of depression and anxiety. A positive correlation was shown between the explanatory factors GDP per capita, social support and healthy life expectancy at birth with anxiety and depression prevalence. However, due to the nature of mental health and its diagnosis criterias, the current epidemiological data for mental disease do not reflect the actual global mental health burden.

Conclusion: The essay found some overlaps between subjective well-being and its constituents with the prevalence of depression and anxiety disorders. Yet, other determinants also has a strong influence on the development of anxiety and depression.

Introduction:

Ever since human existence, attempts have been made to define, explore, and attain happiness. Research on the linguistic and historical roots of happiness suggests that the concept has gradually evolved from the meaning of luck and fortune in ancient China, to its contemporary usage in the English language to describe one's inner positive feelings,[1] often conceptualised as affective wellbeing – the fulfilment of pleasure and avoidance of misery.

In the healthcare context, happiness is used interchangeably with subjective wellbeing. [2] The literature agrees on the necessity of experiencing positive emotions in achieving happiness but also mentions the essence of perceiving one's life as meaningful and worthwhile,[3] this can be conceptualised as eudemonic wellbeing- pursuit of purpose and meaning in life. Moreover, Greek philosophy, Christianity, and Buddhism emphasise the importance of self-development, mindfulness, and mental health rather than objective social or economic circumstances of the individual in achieving happiness. Both affective and subjective well-being are interlinked with life satisfaction experienced in daily life. Since 2012, an annual publication called The World Happiness Report (WHR) has attempted to quantify the concept of happiness by ranking life evaluations by country. Its aims are to understand and measure global wellbeing and encourage governments across the globe to centre sustainable development goals around "happiness". The report discusses a two-way interaction that links happiness with personal factors, and mental and physical health. [4]

Intuitively, one would assume that the concept of happiness is not compatible with depression and anxiety disorders, as these diseases are characterised by prolonged low mood, feelings of guilt, reduced self-esteem, and irritability, while happiness is more commonly associated with joy, contentment, and satisfaction. Therefore, a natural conjecture is presumed that societies with high levels of happiness would have a low occurrence of affective mental disorders. Numerous studies have shown that people who experience happiness tend to be less prone to mental illnesses, whilst breeding success across multiple life domains, including health, income, friendships, and marriage. [5]

The ambivalence between happiness and depression also captured the attention of the media. In 2019 BBC Worklife published the news article titled: "being depressed in the "world's happiest country," reporting the mental health challenges in Finland, [6] the nation that topped the world happiness index in 2019. However, there is minimal academic research linking the association between happiness and mental health.

Despite the presence of ICD-10 and DSM-5 standard diagnostic criteria, there lacks a guideline that accounts for biopsychosocial differences. These diagnostic criteria and supplementary questionnaires are mostly subjective unidimensional measures. Mental

disorders, more than any other branches of medicine, are closely intertwined with social determinants of health, and their diagnosis can have a heavy reliance on cultural influences. Social determinants including inequalities in income and education can influence one's susceptibility to mental illnesses through epigenetic interactions with their environment.[7] The mission to fully understand and tackle mental illness remains an urgent global health priority.

Background:

World Happiness Report – What is it

Similar to medical literature [2], the World Happiness Report (WHR) uses subjective well-being in relation to the concept of happiness. The WHR measure of subjective well-being are based on life evaluations, which is defined as “a reflective assessment of a person’s life or some aspects of it.”[8] The life evaluation measure is based on the Gallup world poll surveys, which select 500-3000 individual responses annually from each country across the globe to provide a representative sample. The respondents are asked to evaluate their life positions using the Cantril ladder scale, which ranks the best possible life as 10 and the worst as 0. A population-representative average is then generated for each country. The ranking uses data average of the the 3 years prior to the year it is evaluating. The reason behind this is that not every country is surveyed annually, and increased sample size would give more precise estimates. [9] Thus, the world happiness index is effectively a ranking of average life evaluation scores by country.

World Happiness report – explanatory factors

The WHR uses six key comparable national variables to explain the difference in average life evaluation for the countries included in the ranking. These are continuous numerical values to illustrate the likely two-way correlations between the variables and life evaluations. The six variables are the perception of corruption, generosity, freedom to make life choices, healthy life expectancy at birth, social support, and GDP per capita. The final seventh variable, Dystopia- a hypothetical country with the world’s lowest value (1.83) for the six variables is included to allow a positive calculated contribution for every actual country. [9] Dystopia is used as a benchmark for comparison among different countries to provide an explanation for the rankings of the average life evaluation in the annual world happiness report.

The six factors used to explain the average life evaluation rankings are chosen to

reflect a component of happiness. Intriguingly, they have a degree of overlap with the determinants of depression and anxiety disorders. For example, social support can offer both direct protection through positive social relationships and indirectly acting as a buffer against stressful events. In children and young adults, positive family support appeared to be the most protective factor against depression.[10] Youths need to rely on their parents to sustain their basic needs, including both emotional support and material resources. In addition, family support can enhance self-esteem in young adults and decrease negative self-evaluation and the subsequent depressive symptoms. [11] In adults, spousal support is the strongest protective factor against depressive symptoms. Both giving and receiving support from spouses are related to increased positive mood, less anxiety, and depression. [12]

Freedom to make life choices correlates closely with mental health symptoms. Cognitive impairment, referring to deficits in problem-solving, short-term and working memory, and visual and auditory processing is a defining feature of major depression, [13] which affects short-term and long-term decision making, restricting the patient from their free will. Furthermore, in forensic psychiatry, free will is an essential requirement for moral responsibility, and that free will can be compromised by mental disorders.[14]

Generosity can influence the maintenance of positive emotions, stress reduction and enhances one's sense of purpose. Generosity is the act of altruism, a form of positive social connection and empathy. The 2015 WHR involved neuroimaging studies that have shown activation of the ventral tegmental area and ventral and dorsal striatum when individuals donate and receive money. The ventral tegmental area is associated with reward and motivation, while the ventral striatum plays a key role in emotion and learning. Surprisingly, these areas are more active when people donated money than when they received it. [15] These findings rehearse philosophical ideas of eudemonic wellbeing, which emphasise the importance of self-development and living a meaningful life.

GDP per capita is a good measure of the country's wealth and average individual income, but it may not provide valid insight into the distribution of wealth in society. Countries with a high income per capita tends to have a well-developed welfare system, which includes a good education system, and a universal healthcare system. These factors are strong influences on the development and progression of depression and anxiety disorders. Research has identified how social-economic variation can create a treatment gap for mental diseases. Analysis showed around 75% of the population in middle and low-income countries have not received any forms of treatment for their depression, because of a lack of trained staff and resources, and the social stigma associated with the illness. [16] This was supported by WHO estimates in 2019 which also found that 80% of patients suffering from mental health disorders are not able to afford treatment or receive psychiatric help because the country does not have universal healthcare. [17]

Life expectancy at birth can also be reflective of a country's healthcare developments and population living conditions. More importantly, depression and anxiety disorders are one of the leading causes of the global disease burden, accounting for 7% of total global DALY (disability-adjusted life years) and 19% of disabilities lived worldwide.[18] One retrospective using US mortality data demonstrated that people with depression/anxiety died on an average of 7.9 years earlier than their non-diseased counterparts.[19] These findings provide strong evidence that mental health can affect one's overall quality of life and give rise to health complications, which subsequently influence their life expectancy.

Corruption may seem unrelated to depression and anxiety at first glance, but discretely it is related to the other variables discussed and can indirectly affect social determinants of mental illness. For example, the main form of corruption is direct financial bribery. The loss of income and the arbitrariness nature of bribery can create anxiety and other negative emotions in the briber. Also, in some countries, violence or harassment used to popularise the bribery culture aggravates feelings of helplessness and erodes the accountability of the governing structures and essential services, including healthcare, social services, and education. [20] The corruption of government officials means less economic input for public structures. Consequently, fewer resources and medical training are provided, causing mentally ill patients not being offered treatments or not treated promptly. Furthermore, the loss of income may render one's labour meaningless. The feeling of despair coupled with an inability to provide for one's family can induce pessimistic thoughts, leading to vicious cycle breeding symptoms of depression and anxiety disorders. This phenomenon is described by economists as the "depression poverty trap."

World Happiness Report – Reports on mental health

Since its first publication in 2012, mental health has been a recurrent theme in world happiness reports. For example, the 2012 WHR has attempted to address the question of how important mental health is in explaining the variation of happiness within any particular country. The reports suggest that the indirect effects of mental health also have a significant effect on later life. For example, adolescents who have experienced depression are more likely to experience unemployment, teenage pregnancy, criminal records, poor physical health, low income, and worse educational performance. All of these consequences have a direct effect on happiness, both on the individual and the community. [4] The 2013 WHR dedicates a specific chapter to mental health and unhappiness. The report showed mental health to be the biggest and the single most important determinant of happiness for individuals but are mostly ignored by policymakers. [21] It argues that mental illnesses such as depression and anxiety not only restrict individual fulfilment in life but also cause difficulties in communication

and the formation of relationships, resulting in social isolation. In addition, severe mental illness can affect one's mental capacity, robbing individuals of their natural thoughts, feelings, and behaviours. In addition, the report indicates that mental health problems are the most important explanatory variable, exceeding the impacts of physical health problems, income, and unemployment. The report concludes that mental health is closely tied with global happiness in two ways. "Better treatment for mental health would improve happiness directly, and improving happiness in other ways would reduce the frequency of mental illness." [21]

The discussion around mental health continued in 2018 and 2019 WHR, where the Easterlin paradox drew attention. The Easterlin paradox describes the phenomenon in USA where the income per capita in has doubled since 1972, but subjective wellbeing remains roughly unchanged or declined. The report proposes a causal relationship between non-income-related social determinants and increased levels of obesity, substance abuse disorders, and major depressive disorders.[22] More strikingly, these factors are most likely to be interlinked. Obesity was found to increase the risk of depression, most prominently patients with clinically diagnosed depression. [23] One of the many implications of addictive behaviours is the development and worsening of mood and anxiety disorders. Substance abuse can lead to mood dysregulation and secondary acute stress events, giving rise to clinical depression. Conversely, mood disorders can also provoke addictive behaviours as depression patients attempt to "self-medicate" out of their dysphoria and resort to medication abuse. [24]

The 2022 report examined people's emotional experiences and wellbeing through analysing text communications on social media. As emotions are not mere internal feelings, but also social in nature. Therefore, positive and negative emotions can be spread through social media, influencing other people's emotions. [25, 26] The findings revealed there was a large upsurge of anxiety-related terms on Twitter in all countries shortly before and with the onset of lockdowns. In addition, the rise in anxiety was more significant in countries with greater number COVID-19 cases. In comparison, the phrases on social media expressing anger decreased and sadness increased two weeks later. [9]

Study Design

Statistical analysis

The study is facilitated using the statistical analysis functions on STATA (17.0) software [27], where scatter plots and pearson coefficients are used to analysis the raw data. The process is summarised by the algorithm in figure 1.

The Pearson's coefficient (r) is used in the statistical analysis to measure of the strength of the linear association between the two variables. The first part of the analysis involves examining the relationship between the average life evaluation from 2017 WHR and the WHO estimates of the prevalence of anxiety and depression. The Pearson's correlation coefficient is determined at the 95% significance level with the dependent variable being the 2017 world happiness index, and the independent variable being the prevalence of depression and anxiety respectively. The null and alternative hypothesis for this analysis is stated below:

H0: There is no correlation ($r=0$ or no pattern on scatter graph) between average life evaluations and depression and anxiety prevalence.

H1: There is a correlation ($r \neq 0$ or pattern identified scatter graph) between average life evaluations and depression and anxiety prevalence.

The second and third part of the statistical analysis aims to determine the correlation between the six explanatory factors and the prevalence of depression and anxiety. In these two parts of the statistical measurements, the significance level of 95% is used with the dependent variables being anxiety and depression prevalence respectively and the independent variable being the explanatory factors for the 2017 WHI rankings. The null and alternative hypothesis for the second and third regression analysis is stated below:

The null hypothesis for the second part of the statistical analysis:

H0: There is no correlation ($r=0$) between the explanatory factors for the 2017 WHI and depression prevalence.

H1: There is a correlation ($r \neq 0$) between the explanatory factors for the 2017 WHI and depression prevalence.

The null hypothesis for the third part of the statistical analysis:

H0: There is no correlation ($r=0$) between the explanatory factors for the 2017 WHI and anxiety prevalence.

H1: There is a correlation ($r \neq 0$) between the explanatory factors for the 2017 WHI and anxiety prevalence.

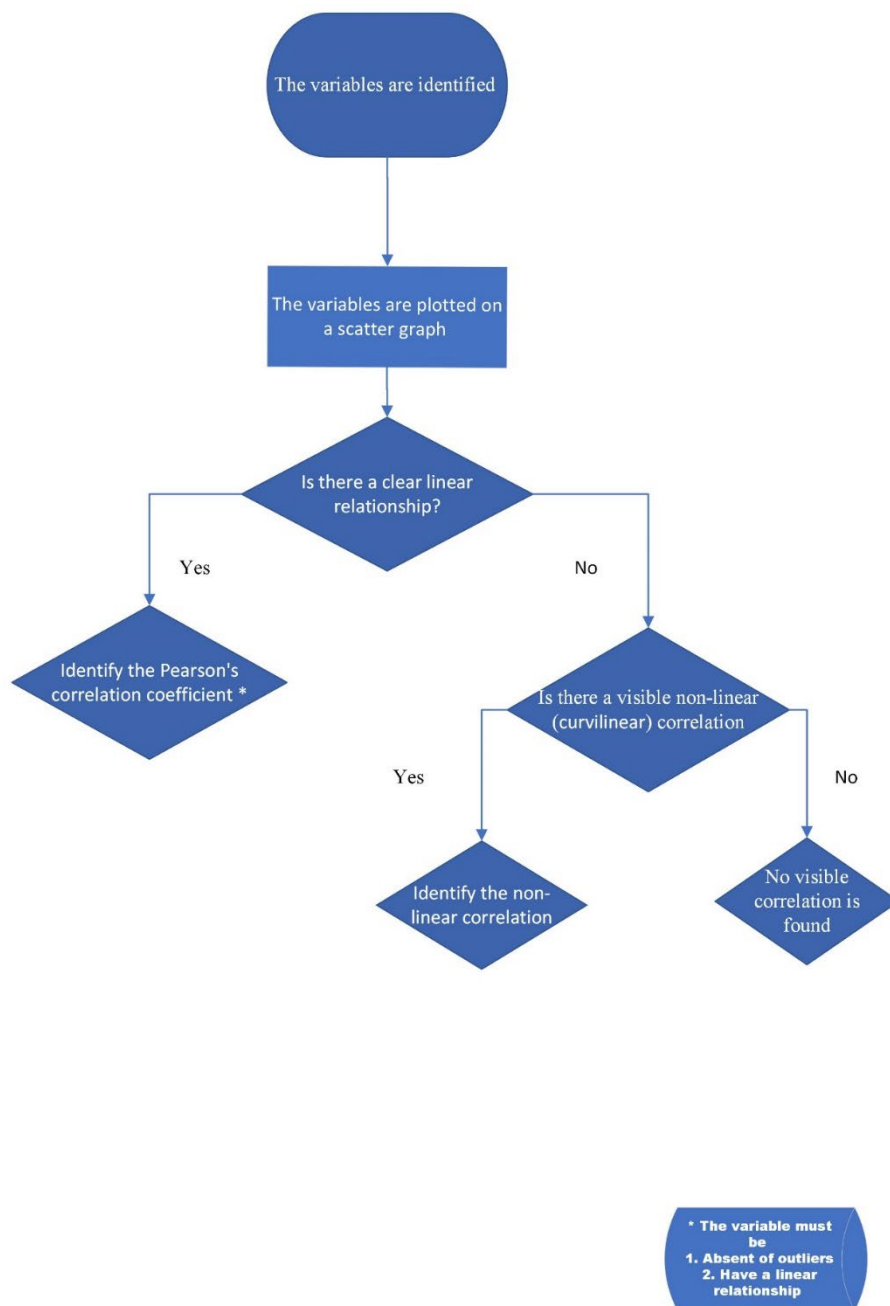


Figure 1 Flowchart showing the algorithm for the statistical analysis procedure

Data collection

The data variables for the statistical analysis are based on the 2017 World Happiness Report [8] and WHO global health estimates of depression and other common mental health disorders published in 2017. [28] The WHO estimates are the most up-to-date, global epidemiological estimations by country on depression and anxiety disorders. [29] The WHO estimations are synthesised from the Global Burden Disease study [30] to provide a country-specific estimation of depression and anxiety prevalence for the year

2015. Similarly, the 2017 WHI is produced from an average of 2014-2016 Cantril ladder scores. The average life evaluation values and the explanatory factors are taken from chapter 2, online data in the appendix of the 2017 World Happiness Report. [8]

The WHO 2017 global mental health estimates report did not include Taiwan, Hong Kong, Kosovo, North Cyprus, and Palestine Territories. [28] To minimise the statistical bias of introducing new datasets from other estimates and literature, these countries are excluded from the analysis.

Study design limitations

The most significant limitation for ecological studies is ecological fallacy. Therefore, the findings from this study on the relationship between happiness prevalence levels of depression and anxiety may not apply at individual levels. In addition, this is an observational study, which makes it difficult to draw causational conclusions. Maybe there are relationships between the investigated variables, but they are complex and non linear.

Results

Quantitative analysis

Examining the scatter plots, no visible linear relationship can be observed between the World Happiness Index scores and the prevalence of depression and anxiety. Neither of the two scatter plots demonstrates a strong positive or negative correlation between the variables.

From the scatter plot, we can observe the majority of the countries have a WHI score between 3-7 and an anxiety prevalence of 2-6% of the population. There are several outliers for the scatter plot comparing anxiety prevalence and WHI, which defies the applicability of Pearson's correlation coefficient, as the outliers would distort the measure of linearity between the variables. The data plots were more spread out for the depression prevalence, where most of the countries measured had a depression prevalence of 3-6% of the total population. No linear relationship can be identified between the independent and dependent variables, so it does not satisfy the criteria for

determining Pearson's correlation coefficient. No alternative patterns (e.g., quadratic curvature) can be observed from the scatter plots in figure 2. Therefore, we would accept the null hypothesis based on the scatter plot, where no correlation between the world happiness index and the prevalence of depression and anxiety can be observed. We conclude that no correlation between the world happiness index and the prevalence of depression and anxiety can be observed.

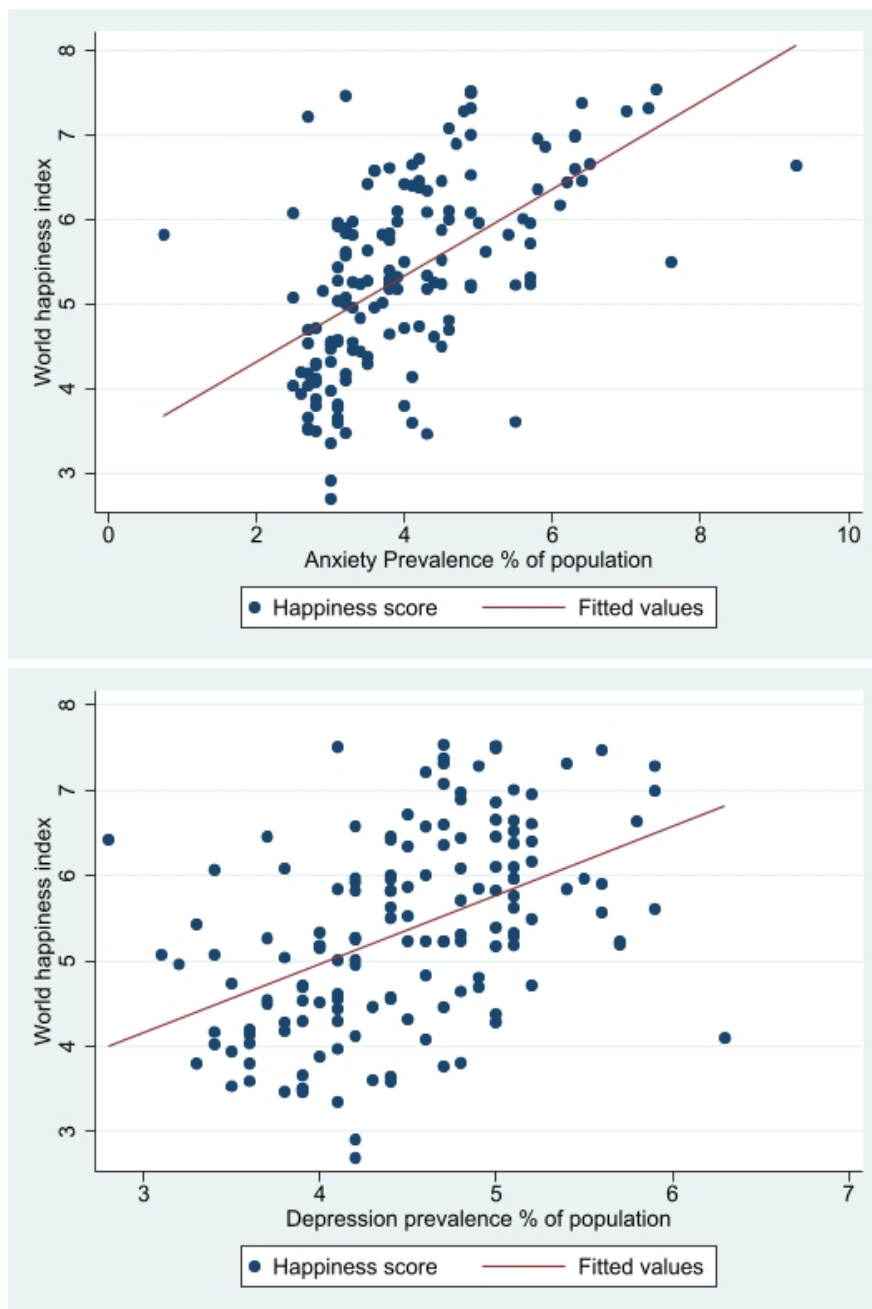


Figure 2 Scatter plot showing the association between world happiness index and depression/anxiety prevalence

For the scatter plots in figure 3, the independent variables plotted on the X axis are the explanatory factors for the WHI, and the dependent variable plotted on the Y axis is the depression prevalence estimates. The scatter plots failed to show an observable correlation between perception of corruption, freedom of choice, generosity, and the independent variable of depression prevalence. A moderate positive correlation can be identified for the GDP per capita and healthy life expectancy at birth, which has a Pearson's correlation coefficient of 0.579 ($p=0.00$ $r^2 = 0.335$) and 0.553 ($p=0.00$ $r^2=0.306$) respectively (see appendix). The GDP per capita can explain 33.5% of the variation in depression prevalence, while healthy life expectancy at birth can explain 30.6% of the variation in depression prevalence. In comparison, social support only had a weak correlation of 0.411 ($p=0.00$ $r^2=0.169$) with the prevalence of depression, which explains 16.9% of the independent variable. These findings imply that with the increase in GDP per capita, healthy life expectancy, and social support, there is a rise in depression prevalence. The null hypothesis is rejected and the alternative hypothesis is accepted at the 95% significance level, which suggests there is a correlation between the dependent variables comprising social support, GDP per capita, life expectancy, and the independent variable of depression prevalence.

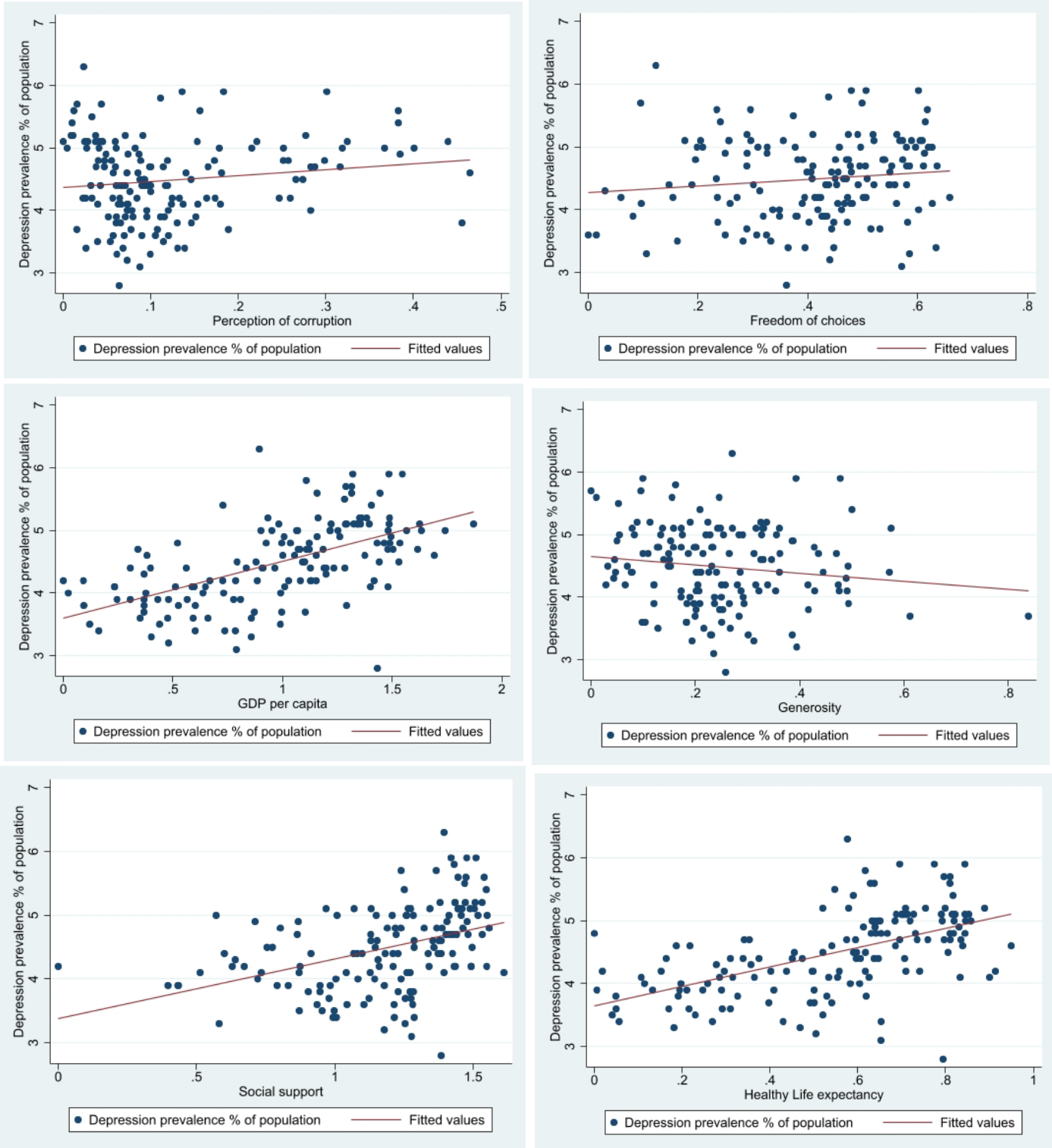


Figure 3 Scatter plots showing the association between the explanatory factors of WHI and depression prevalence

Figure 4 plots anxiety prevalence as the dependent variable and the explanatory factors for happiness as the independent variable. There is no observable correlation between perception of corruption, freedom of choices, generosity, and the independent variable of the prevalence of anxiety. There is a weak positive correlation between social support and anxiety prevalence with an r-value of 0.366 ($p=0.00$ $r^2= 0.134$), which explains 13.4% of the variation in anxiety prevalence in different countries. A moderate correlation is identified for the dependent variables of healthy life expectancy at birth and GDP per capita and the independent variable, which has a correlation coefficient value of 0.539($p=0.00$ $r^2= 0.291$) and 0.507($p=0.00$ $r^2=0.257$) respectively (see appendix). These statistical findings imply that healthy life expectancy explains 29.1% of the variation in anxiety prevalence, while GDP per capita can explain 25.7% of the variation in the independent variable. In summary, the scatter plots and the correlation coefficient suggest surprisingly, that with the increase in social support, healthy life expectancy at birth, and GDP per capita, there is an increase in anxiety prevalence in the population. Therefore, we can reject the null hypothesis and accept the alternative hypothesis at the 95% significance level.

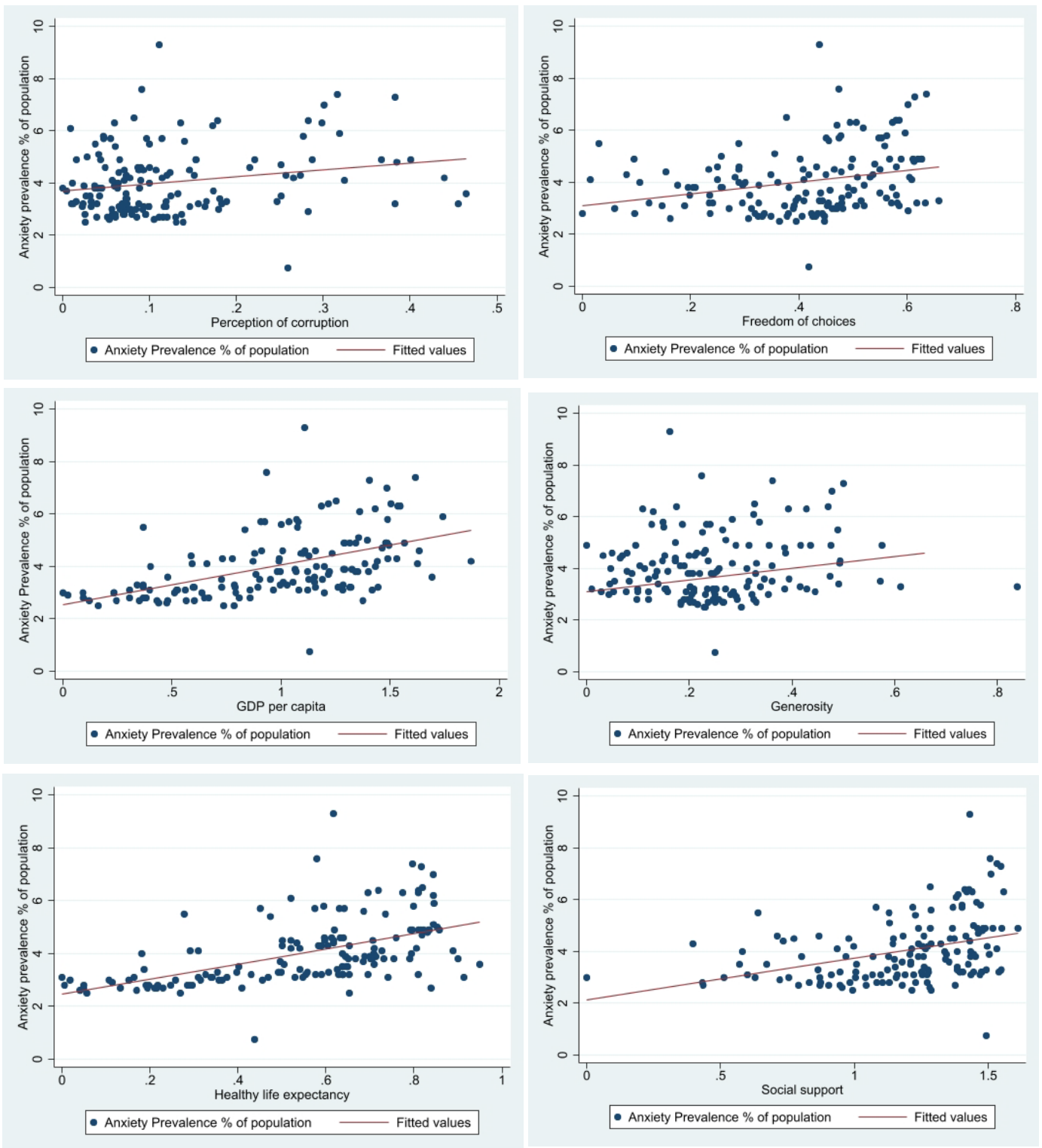


Figure 4 Scatter plots showing the association between the explanatory factors for happiness and anxiety prevalence

Discussion

GDP, life expectancy, social support, and mental health

The result from the analysis implies countries with higher GDP per capita, healthy life expectancy at birth, and high levels of social support have a higher prevalence of depression and anxiety disorders in the population. These findings paradoxically suggest that high income, longer life expectancy, and good levels of social support can become risk factors for the development of depression and anxiety.

Contrary to the statistical findings, popular preconceptions and research studies acknowledged that wealth and high income are protective against depressive disorders. A multivariate logistic regression study based on the national survey in the US showed higher predicted probabilities of depressive symptoms for low family saving groups compared to high family saving groups at every income level. Even after controlling for other confounding factors including gender, age, education, marital status, ethnicity, and family income, a person with low family savings has 1.49 times (OR 1.49 1.01-2.21 95% CI) higher odds of having depressive symptoms than individuals with high family savings (above \$20,000). A person in a family with an annual income less than \$20,000 is 2.74 more likely to have depression symptoms than a person in families with an annual income greater than \$75,000 (OR 2.74 1.87-4.01 95% CI)[31]. In addition, accumulating evidence has demonstrated that poverty and mental health conditions are traveling partners. Negative income shocks, such as job loss and excessive debts can worsen a person's mental status through resultant worries and uncertainties. While the provision of social welfare, insurance, and health can lower depression and anxiety occurrence. [32] Research where providing free health insurance worth \$550-\$750 a year to low-income individuals showed a reduction in depression rate by a quarter within a few months, this effect cannot be fully explained by a mere improvement in affordable healthcare. [33]

However, GDP per capita may not reflect accurately one's income. High GDP per capita is a crude measure of modernisation, a sociological transformation associated with greater inequality, more life stresses, malnourishment from over-consumption of processed foods, and social isolation. For example, China has undergone a rapid social transformation in the past decades. But social disparities, unemployment, domestic migrations, and high-intensity overtime work have become common problems. One of the main costs of becoming the world's second-largest economy is the mental health of the younger generations. A retrospective study showed that Chinese individuals born after 1966 were 22.4 times more likely to suffer from a depressive episode than the generations born before 1937. This finding was unforeseen, considering those born in 1937's China would have experienced Japanese invasion, civil warfare, and political instability. The sudden increase in depressive episodes between the two generations

reflects the mental stresses present in modern societies. [34]

Furthermore, Similar results to my statistical analysis were found in Hidaka's paper. A correlation between lifetime risk of mood disorders and GDP per capita showed a statistical significance ($r= 0.464$ $r^2= 0.215$ $p= 0.06$) (Figure 5). [35] My results from assessing the correlation between GDP per capita and depression prevalence ($r=0.579$ $r^2 = 0.335$ $p=0.00$) were supportive of Hidaka's findings.

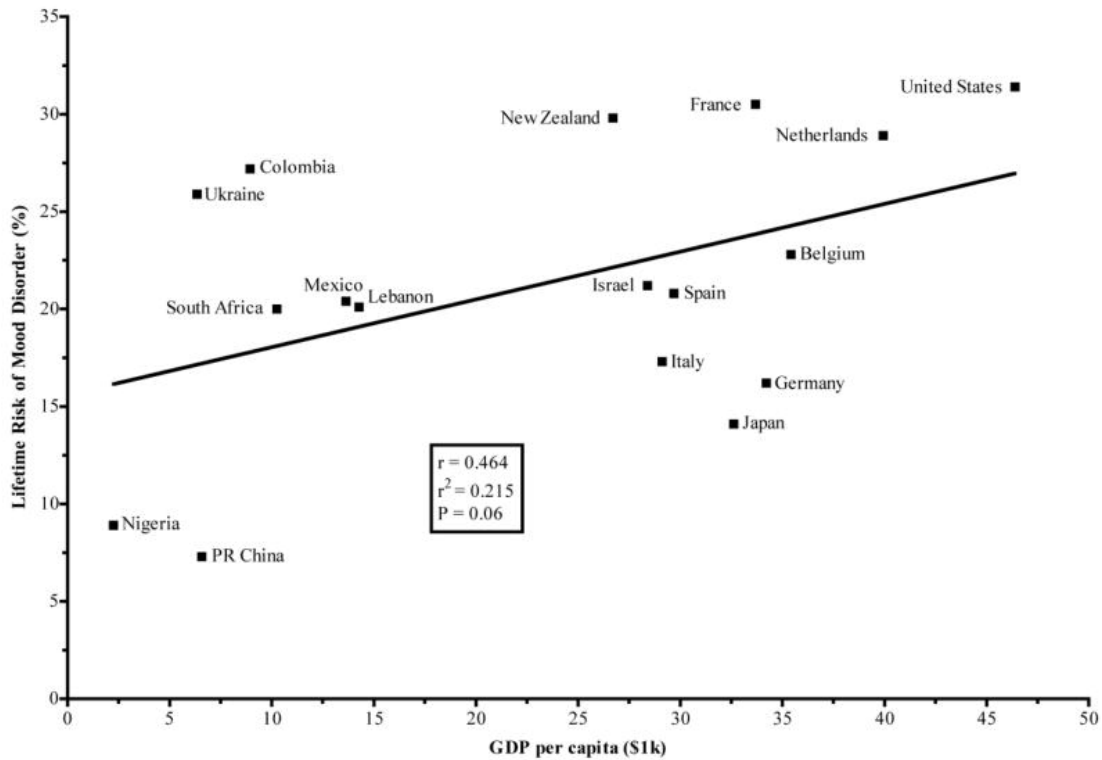


Figure 5 – Scatter graph showing the correlation between lifetime risk of mood disorder (%) and GDP per capita (\$1k). (36)

In addition, inequality generated from the modernisation process predisposes individuals to higher levels of social distrust, excessive worrying, and competition, all risk factors for the development of depression and anxiety. Figure 6 is a scatter graph plotting lifetime risk for mood disorders against each country's Gini coefficient. A strong positive correlation can be observed from the graph ($r=0.716$) accounting for 51.2% of the results ($r^2= 0.512$ $p=0.03$). [35] Therefore, while high individual income and wealth appear to be protective of one's mental health, GDP per capita reflects the country's modernisation which unfortunately is accompanied by greater social and economic inequalities and stresses from modern-day living.

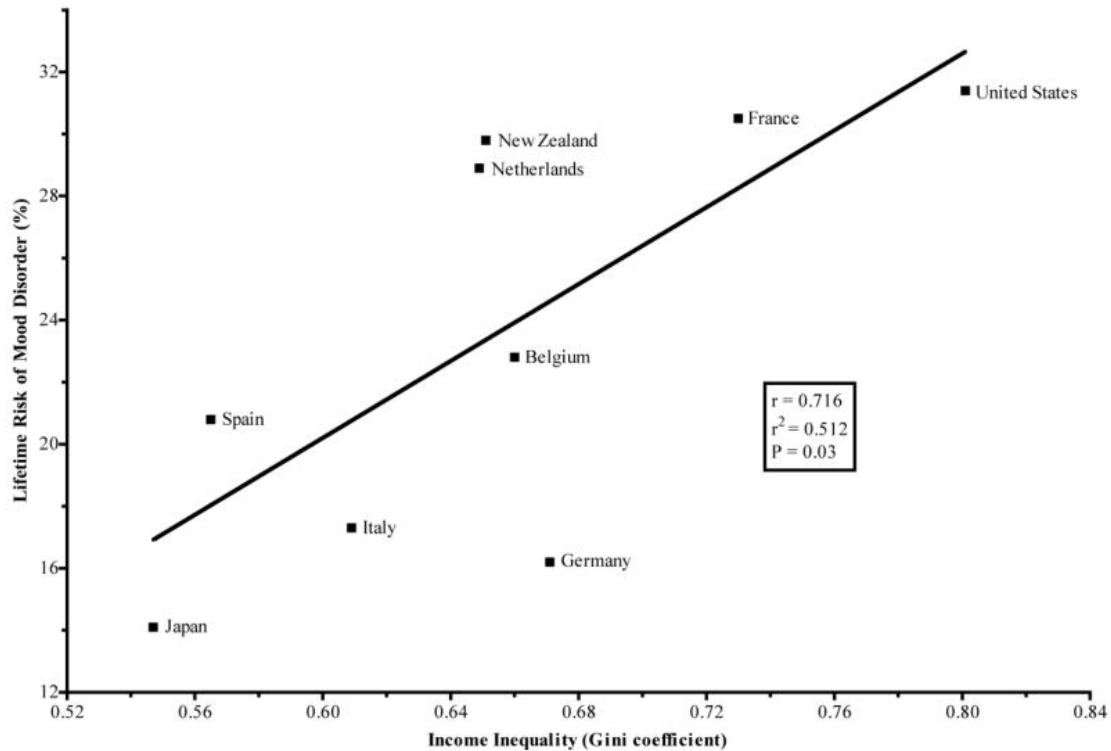


Figure 6 - Scatter graph showing the correlation between lifetime risk of mood disorder (%) and GDP per capita (\$1k) (36)

Interestingly, our results also found a positive correlation between increases in healthy life expectancy at birth and prevalence levels of depression and anxiety. This was a strange finding as the mental disease is associated with 7% of DALYs and 19% of YLDs in 2016,[18] so one should expect an inverse correlation between the two variables. Research has shown that individuals with mental disorders have an increased risk of premature mortality. The risk of early death was significantly higher in people of all ages with a mental disorder. In the Danish population cohort study, it was identified that males and females suffering from mood affective disorders had a reduced life expectancy of 7.9 and 6.2 years respectively compared to their healthy counterparts. Using the Poisson regression models, the mortality rate ratio for mood disorders is 1.92 (95% CI 1.91-1.94), this means that there are 92% more cases of premature deaths due to mood disorders in the cohort assessed compared to the national population. [36]

One possible explanation for our finding is that anxiety and depression have become common in old age. Old age is accompanied by various changes in brain structure and neuropathways, as well as health changes from the aging process such as reduced mobility and increased loneliness. [37] New onset anxiety disorders, previously thought to be non-existent in the older population, have now become better recognised by geriatricians over the past years. A study examining the age at onset in older adults with GAD, showed a bimodal distribution with 57% of participants reporting an early-onset (before 50) and 43% reporting a late-onset (after 50). [38] Likewise, in a separate retrospective study with a mean age of 74.1 years, 46% were late onset and the mean

age of disease diagnosis is 48.8 years. Furthermore, for patients with both diagnosis of GAD and MDD, typically GAD diagnosis precedes MDD, [39] which is in concordance with clinical practice as both mental conditions shares some common risk factors and one can influence the development of the other. Therefore, a plausible explanation for the positive correlation between life expectancy and depression and anxiety prevalence could be the increased recognition of late-onset anxiety and depression disorders.

From the results of this study, only a weak positive correlation is identified between social support and depression and anxiety prevalence. While existing literature suggests that social support is a protective factor against mental illness through positive social relationships and indirectly as buffers against social stresses. [10-12, 40-43] Depression and anxiety-affected individuals can experience cognitive impairments, which means they may not recognise or even deny that they have a mental disorder. In communities with a good level of social support, people look out for each other and are form intimate social relationships, communicating their inner feelings with friends and families. Therefore, signs of mental diseases are quickly picked up, and timely medical help sought. Conversely, for individuals who are not supported by their social relations, their mental health symptoms may not be picked up resulting in underdiagnosis. Furthermore, social support is integral to health promotion, addressing individuals' physical and emotional needs, as well as spreading medical information to their social groups. Poor levels of social support can lead to underdiagnosis and ineffective health promotions, which inaccurately show low mental health prevalence.

Moreover, unlike GDP per capita and healthy life expectancy, which are objective measurements. The measurement of social support is calculated from the binary response to the Gallup World Poll question: "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need, or not?" The question is highly subjective and one's definition of terms such as "trouble," "friends you can count on" and "whenever you need" may vary within different cultures and social circumstances. For example, in Asian cultures people tend to be more reserved about their opinions and personal feelings, individuals are confronted with their roles in the social hierarchy. Japanese culture emphasises the concept of "Omoiyari" (altruistic sensitivity), which promotes empathy and social responsibility in Japanese society. However, when taken to an extreme, some individuals decide to not "trouble" others to ensure they will not be "troubled" in the future. [44] Furthermore, in some parts of the world, society may be based on favouritism, asking for a favour may require a return in favour in the future, so people may be less inclined to seek help from friends and relatives. Therefore, the influence of social support on mental health may vary within different cultures and societies.

Likewise, corruption, generosity, and freedom to make choices are also derived from binary responses to one or two GWP survey questions.[8] These measures could be more representative of well-being and have greater relevance to mental health if it is formulated from a series of well-defined question answered using a numerical scale.

Perhaps this also explains the weak or no correlation in these between subjective measures and mental health prevalence compared to the moderate correlation seen in GDP per capita and life expectancy.

Cultural influences on mental health and diagnostic standardisation

Around 85% of the world's population lives in middle and low-income countries - [45] mental diseases accounts for 8.8% and 16.6% of the total burden of disease in middle and low-income countries respectively. [46] Middle and low-income countries are more economically vulnerable compared to high-income nations, so their residents are more likely to be exposed to financial stressors including hunger, job loss, and inability to cover healthcare fees, which increases their risk of mental health diseases. These factors may not be fully represented in the WHO estimations for mental health and the WHR.

The diagnosis of depression and anxiety disorders relies heavily on questionnaires and the clinical experience of the psychiatrist. Although guidance such as ICD-10 and DSM-5 is widely used, there is no internationally recognised "gold standard" in diagnosing anxiety and depression. For example, alongside the use of ICD and DSM criteria, China also uses CCMD-3 (Chinese Classification of Mental Disorders) to reach a diagnosis. Interestingly, the CCMD-3 also included conditions such as "Qigong Deviation" (defined as the perception of uncontrolled "Qi" around the body, which also presents with insomnia symptoms), and mental disorders caused by superstitions (which can also affect the patient's cognitive functions). [47] A systematic review assessing the usage of mental health clinical practice guidelines in Japan showed that there has been little research into the implementation, barriers, and dissemination of the guidelines in Japan, [48] suggesting a mixture of mental health guidelines may have been used.

The problem with questionnaires such as PHQ-9 and GAD-7 is individuals from different cultural and social backgrounds tend to report their symptoms differently. For example, because Asian traditions view the body and the mind as unitary rather than dualistic, Asian patients are more likely to focus on their somatic symptoms and do not acknowledge emotional symptoms. [49] These findings were also supported by a series of studies on Hong Kong patients. Although patients were entirely aware of the emotional difficulties and stresses rooted in social relationships that can result in their physical and mental symptoms. Most patients selectively present their symptoms and tend to only target somatic symptoms in healthcare settings. [50, 51] Furthermore, studies showed that Asian American patients have a lower utilisation rate of mental health services because they do not approach healthcare services until later stages of the help-seeking process. Asians with Schizophrenia were contained within the family or communities and generally did not encounter mental health services until three years

after the onset of psychotic symptoms. In comparison, their Caucasian and African American counterparts entered the mental health system within an average of one and one and half years respectively after the onset of symptoms. [52] Another study also found that students with Asian ancestry on US campuses were less like to use mental health services compared to students of European origin. [53] These complications from cultural influences are likely to result in underdiagnosis depending on cultural backgrounds.

Unlike in Western countries, anxiety and depression can be unfamiliar terms for a medical condition. For example, in China, depression is labelled “shen jing shuai ruo” (neurasthenia). In India, “ghabrahat” (peculiar restlessness), and “pelo y tata” (heart too much) in Botswana. [54] Similarly, in Zimbabwe, many depressed individuals assign their symptoms to supernatural causes, overthinking, “deep sadness” or social stressors. [55] Furthermore, in Zimbabwe, patients tend to move to traditional healthcare systems after consultation with primary care providers, only a few turns to a mental health professional. The primary health practitioners and traditional healers typically prescribe non-specific treatments such as analgesics, hypnotics, or vitamins for their somatic symptoms, limited numbers of patients are recognised for their psychiatric conditions and are transferred to mental health workers for a better outcome. [54] These practices due to cultural and social norms consequently lead to an underdiagnosis and undertreatment of mental diseases.

Another factor that leads to the underdiagnosis of mental disorders is social stigma. Studies found that Asian cultural norms do not recognise the importance of mental disorders.[56] Furthermore, people from Eastern cultures reported that being mentally ill was shameful [57], and they have less favourable help-seeking attitude toward mental health support and lower levels of interpersonal openness compared to their European American counterparts. [58] Research suggests there is greater stigma associated with depressive disorders in Eastern nations, this partly stems from the lack of economic contributions by the depressed individuals in the family, which further exacerbates their depression. [59] Moreover, in countries with more dominant mental health stigma beliefs, the likelihood of patients receiving mental health help from trained professionals is reduced, and individuals also refrain from approaching general practitioners regardless of their own stigma beliefs. [60]

In summary, mental illnesses are complex and their development is heavily influenced by cultural, social, economic, and political circumstances. Although ICD-10 and DSM-5 guidelines are acknowledged by mental health professionals globally, there is much regional variation in criteria and clinical practices when diagnosing mental illnesses. This complexity makes it extremely difficult to provide an accurate estimation of cases of depression and anxiety disorders on a global scale. WHO estimates are unlikely to be representative of the actual mental health burden worldwide. Consequently, the relationship between “happiness” and depression and anxiety may not have been fully addressed.

Conclusion

In conclusion, this review has provided an insight into the relationship between “happiness” and the prevalence levels of anxiety and depression. Contrary to common preconceptions - “happier” countries have lower levels of depression and anxiety disorders. The statistical analysis showed no linear association between a country’s world happiness index scores and its depression and anxiety prevalence. Nevertheless, positive Pearson correlations were identified between the explanatory factors: GDP per capita, healthy life expectations at birth, social support, and the prevalence of depression and anxiety.

However, these findings do not explain the relationship between subjective wellbeing and mental illnesses. There are several confounding factors behind these correlations, such as inequality of income due to the modernisation process, increased recognition of late-onset anxiety and depression disorders, and the survey design of the Gallup World Poll. But the most important drawback of this epidemiological study is the inability to compare mental health statistics. The WHO global mental health estimates were not a comprehensive estimate of the true mental health burden. The true cases of depression and anxiety are underestimated due to cultural influence and the lack of a global “gold standard” in diagnosis.

All in all, both the topics of mental health and the concept of happiness are convoluted in nature. The two topics have many overlapping influencing factors, but no direct correlation can be observed between WHI scores and the prevalence of depression and anxiety levels at the country level. Further research is required before the application of WHI in psychiatric and public health studies.

Appendix:

Table 1 – Pearson’s correlation coefficient between depression prevalence and GDP per capita, Life expectancy and Social support.

Depression Prevalence	r	r ²	p=	n=
GDP per capita	0.579	0.335	0.00	150
Life expectancy	0.553	0.306	0.00	150
Social Support	0.411	0.169	0.00	150

Table 2 – Pearson’s correlation coefficient between anxiety prevalence and GDP per capita, Life expectancy and Social support.

Anxiety Prevalence	r	r ²	p=	n=
GDP per capita	0.507	0.257	0.00	150
Life expectancy	0.539	0.291	0.00	150
Social Support	0.366	0.134	0.00	150

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