

The Correlation Between Mental Health, Physical Health, Years of Life Lost, And Lifestyle Factors: A Review

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This paper critically examines the interplay between mental health, physical health, years of life lost, and various lifestyle factors, with a particular focus on excessive drinking, physical inactivity, food intake, access to exercise opportunities, and obesity. The relationship between mental and physical health has been increasingly recognized as an essential aspect of overall well-being. This study examines existing literature from diverse disciplines, encompassing psychology, epidemiology, public health, and social sciences, to investigate the complex connections among these factors. The first section of this review consolidates evidence demonstrating the link between mental health and physical health. By reviewing independent studies that explore the impact of lifestyle factors such as alcohol consumption on mental health and the detrimental effects of excessive alcohol consumption as well as sedentary behavior, unhealthy food intake, limited access to exercise opportunities, and obesity and victimization on individuals well-being. Additionally, this study explores the potential mechanisms through which these lifestyle factors impact both mental and physical health. Furthermore, this study investigates the cumulative effect of these lifestyle factors on years of life lost. By collating available data, the potential implications of unhealthy lifestyle choices on life expectancy and overall health span is highlighted. This review also examines existing interventions and policies aimed at addressing mental health issues, physical health conditions, and lifestyle-related risk factors as well as assess the effectiveness of these interventions and identifies gaps for future research. There are however certain limitations when it comes to this, for instance when it comes to recording the number of mentally or physically unhealthy days, this can only accurately be done if people actually visit the doctor or report their issues. In conclusion, this review paper underscores the complex relationship between mental health, physical health, years of life lost, and lifestyle factors. Recognizing these connections is essential for the development of comprehensive strategies to promote overall mental and physical health and well-being, across age groups and geographies.

Introduction

In recent times, the relation between one's lifestyle choices and their impact on health—both mental and physical—has become an important area of scientific investigation. The burden of disease and premature mortality arising from mental and physical health issues has prompted the medical research and healthcare industry to delve deeper into the determinants of well-being and life expectancy.

The following research aims to ascertain the real effect a person's lifestyle factors have on their mental, physical health and the number of potential years of life he or she might be losing to these factors. This research aims to shine light on areas that can help individuals better their overall health and even improve their life expectancy.

“In 2019, nearly a billion people – including 14% of the world's adolescents – were living with a mental disorder. Suicide accounted for more than 1 in 100 deaths and 58% of suicides occurred before age 50. Mental disorders are the leading cause of disability, causing 1 in 6 years lived with disability. People with severe mental health conditions die on average 10

to 20 years earlier than the general population, mostly due to preventable physical diseases. Childhood sexual abuse and bullying victimization are major causes of depression. Social and economic inequalities, public health emergencies, war, and the climate crisis are among the global, structural threats to mental health. Depression and anxiety went up by more than 25% in the first year of the pandemic alone”¹.

Literature Review

Tembo et. al., (2017)² conducted a study employing a quantitative cross-sectional design, utilizing data collected in 2014 as part of the Youth Alcohol Project. The initial sample for this research included 6000 undergraduate students, with a subsequent refinement to include only those falling within the age range of 18 to 24. The final dataset consisted of 2518 undergraduate students who were all enrolled at Curtin University. These students were invited to participate in a survey, with an additional 628 students surveyed face to face. Notably, a significant proportion of the participants (44%) self-reported consuming alcohol at hazardous or harmful levels.

Pia Mäkelä (2015)³ used face to face interviews to conduct a study on the Finnish Population. The relationship between alcohol and mental health was the target of this study. The results show that drinking past a certain amount or hazardous drinking can negatively impact mental health. The study concludes that alcohol consumption should be monitored and restricted to a few occasions and hazardous or binge drinking should be avoided completely.

Liu et al., (2022)⁴ analyzed 430,016 participants (78.8% non drinkers, 7.1% regular drinkers and 14% modest drinkers) and conducted a study correlating modest drinking with life expectancy and mortality risks, aiming to balance the risks and benefits of modest drinking. Further analysis was also done by classifying the drinkers as smokers and non smokers to not confuse the effects of smoking and drinking. This paper concludes that little drinking could be better than none, however drinking beyond a modest amount can lead to a loss of life expectancy of about 7-10 years.

Van Vuuren et al., (2019)⁵ and Veenstra conducted a study to examine the association between obesity and mental health problems among adolescents and to determine if victimization plays a mediating role. The data used in this study is self reported data, objectively measured body mass index data was used which was obtained from three cohorts. This paper concludes that being overweight or obese is significantly associated with mental health problems in adolescents and that being a victim of bullying plays a role in this association.

Chang SH et al., (2013)⁶ conducted a study to examine the relationship between the years of life lost and ORD's (Obesity related diseases) in non-smoking adults living in the United States. Obesity was classified into class I, class II and class III. The study found that adults who belonged to overweight and class I obese classifications had lower mortality rates, while adults who belonged to underweight, class II and III obese classifications had higher mortality rates than normal-weight people, other things being equal.

Firth J et al., (2020)⁷ examined the relationship between a person's diet and their mood or mental health. The study found that adherence to a healthy or Mediterranean diet which consists of a high consumption of fruits, vegetables, nuts and legumes; moderate consumption of poultry and dairy products and an occasional consumption of red meat is associated with a reduced risk of depression.

Harris (2018)⁸ analyzed data from a large representative sample size and examined the relationship between physical inactivity and mental wellbeing. The analysis revealed a substantial and statistically significant difference between participants who reported 0 days of physical activity in the previous week, compared to those who reported all other activity levels. There was a statistically significant increase in mental wellbeing from baseline (pre-intervention) to follow-up (post-intervention). Furthermore, the increase in mental wellbeing was significantly greater for

those reported 0 days of physical activity pre-intervention when compared to all other activity groups. Additionally, a positive correlation was found between change in physical activity and change in mental wellbeing from baseline to follow-up.

Janssen et al., (2013)⁹ examined the relationship between leisure time physical activity and Years of life gained in the United States. The study used data from the National Health and Nutrition Examination Survey, National Health Interview Study mortality linkage, and US Life Tables. Meeting the physically active guideline of 150 minutes per week of moderate to vigorous physical activity potentially increases life expectancy by 1.3 to 5.5 years.

Lee et al., (2016)¹⁰ examined the relationship between sports facility accessibility and physical activity among Korean adults. A total of 201,723 participants were included in this study. It is observed that participants with easy access to sports facilities participated in physical activity more often than those without easy access. More physical activity was generally observed if participants had a history of depression or if participants belong to the white-collar or urban subgroups. It is also suggested that the distance required of an individual to travel to a sports facility affects sports facility usage. Therefore, easy access to sports facilities may act as a motivator to encourage an individual to participate in physical activity.

Mental Health as an Overlooked Issue

Mental health is an extremely overlooked issue for instance The Global Burden of Disease study, conducted by the Institute for Health Metrics and Evaluation (IHME), consistently highlights mental health as a significant contributor to the global burden of disease. The biggest contributor to mental health being overlooked is Stigma, most people are ashamed and embarrassed to share such issues. The Lack of awareness when it comes to Mental health paired with its Invisible nature often causes Mental health issues to be completely overlooked. Many people also tend to completely neglect their Mental health, which in turn ends up adversely affecting their lives. Mental health needs to be looked into further, educational institutes should integrate mental health discussions into their classes and overall public awareness about mental health and its potential issues needs to be increased.

Food Environment Index: The food environment index is a measure of the Index of factors that contribute to a healthy food environment, from 0 (worst) to 10 (best). This measure accounts for both proximity to health foods and income.

1 Methodology

The County Health Rankings is the data set to perform the analysis for this paper. This measures the health of nearly all counties

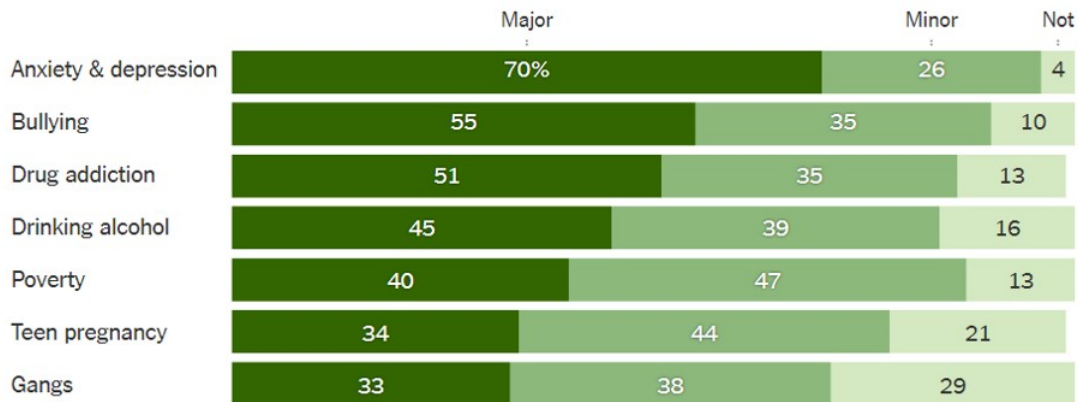


Fig. 1 What percentage of teenagers see problems like anxiety, bullying, drug addiction and gangs as either major or minor among their peers?¹

in the nation and ranks them within states. The Rankings are compiled using county-level measures from a variety of national and state data sources. These measures are standardized and combined using scientifically-informed weights. The County Health Rankings are based on a conceptual model of population health that includes both Health Outcomes (length and quality of life) and Health Factors (determinants of health). This data makes calculating the relationship between physical, mental health, years of life lost and the selected lifestyle factors possible. First, they receive, review, and prepare data from dozens of data sources across the U.S. Then they assign weights, calculate Z scores and ultimately create composite scores based on which the rankings are done. Each row which contained no value was eliminated and the maximum number of rows for each regression in three separate files was included. An important thing to note, when such research is carried out, is that the number of unhealthy days can only be properly measured if the subjects visit doctors and report such issues, not reporting such issues could lead to slightly altered results.

Factors

Average number of mentally unhealthy days ->It is the average number of reported mentally unhealthy days per month.

Average number of physically unhealthy days ->It is the average number of reported physically unhealthy days per month.

Years of potential life lost rate ->It is the Age-adjusted years of potential life lost rate per 100,000.

% Adults with obesity ->It is the percentage of adults that report a body mass index that is greater than or equal to 30.

Food environment index ->It is an indicator of access to healthy foods with 0 being the worst and 10 being the best.

% Physically inactive ->It is the percentage of adults that report no leisure time physical activity.

% With access to exercise opportunities ->It is the percentage of the population with access to places for physical activity.

% Excessive drinking ->It is the percentage of adults that report excessive drinking.

Equations

In total, this research involved running three linear regressions. The first one aimed at finding the relationship between the five lifestyle factors and the average number of mentally unhealthy days. The second one aimed at finding the relationship between the five lifestyle factors and the average number of physically unhealthy days and finally the third one aimed at finding the relationship between the five lifestyle factors and the years of life lost rate. The equations for all the three regressions can be represented as: $a_1 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5$ where

x_1 ->% Adults with obesity

x_2 ->Food environment index

x_3 ->% Physically inactive days x_4 ->% With access to exercise opportunities

x_5 ->% Excessive drinking

Average number of mentally unhealthy days -> $5.33 + 0.016x_1 - 0.099x_2 + 0.03x_3 - 0.002x_4 - 0.05x_5 + \text{Epsilon}$

Average number of physically unhealthy days -> $4.15 - 0.02x_1 - 0.013x_2 + 0.03x_3 - 0.000091x_4 + 0.01x_5 + \text{Epsilon}$

Years of potential life lost -> $9414.889 - 44.16x_1 - 15.4x_2 + 72x_3 - 7.158x_4 - 27x_5 + \text{Epsilon}$

Factors	Minimum	Maximum
Average number of mentally unhealthy days	3.2	7.4
Average number of physically unhealthy days	2.5	7.8
Years of life lost rate	3090.4	30007.8
% Adults with obesity	16.4	51
Food environment index	0	10
% Physically inactive	12.9	51.8
% With access to exercise opportunities	0	100
% Excessive drinking	6.7	29.8

Table 1

Results

With the exception of years of life lost rate which has a kurtosis value of 4.3, every other kurtosis and skewness value falls within the -3 to 3 range. This makes the regressions performed valid.

Average number for Mentally Unhealthy Days

% Adults with obesity: We have a positive relationship between the percentage of adults with obesity and the average number of mentally unhealthy days. It is significant and it means that as the number of adults with obesity increases so do the average number of mentally unhealthy days.

Food environment index: We have a negative relationship between the food environment index and the average number of mentally unhealthy days. It is significant and means that as the overall health of the food environment increases the number of mentally unhealthy days decreases.

% Physically inactive: We have a positive relationship between the percentage of adults who are physically inactive and the average number of mentally unhealthy days. It is significant and means that as the percentage of adults who are physically inactive increase so do the average number of mentally unhealthy days.

% With access to exercise opportunities: We have a negative relationship between the percentage of adults who have access to exercise opportunities and the average number of mentally unhealthy days. It is significant and means that as the percentage of the population with access to places for physical activity increases the average number of mentally unhealthy days decrease.

% Excessive drinking: We have a negative relationship between the percentage of adults who drink excessively and the average number of mentally unhealthy days. It is significant and means that as the percentage of adults who drink exces-

sively increases the average number of mentally unhealthy days decrease.

Average number for Physically Unhealthy Days

% Adults with obesity: We have a negative relationship between the percentage of adults with obesity and the average number of physically unhealthy days. It is significant and it means that as the amount of adults with obesity increases the average number of physically unhealthy days decrease. This relationship is interesting and needs to be researched and analyzed further.

Food environment index: We have a negative relationship between the food environment index and the average number of physically unhealthy days. It is not that significant since it has a P-value of 0.36, which makes it only significant at the 64% level, but it means that as the access to healthy food increases the average number of physically unhealthy days decrease.

% Physically inactive: We have a positive relationship between the percentage of adults who are physically inactive and the average number of physically unhealthy days. It is significant and means that as the percentage of adults who are physically inactive increase so do the average number of physically unhealthy days. This is also a very strong relationship.

% With access to exercise opportunities: We have a negative relationship between the percentage of adults with access to exercise opportunities and the average number of physically unhealthy days. It is not that significant since it has a P-value of 0.15, which makes it only significant at the 85% level, but it means as the percentage of the population with access to places for physical activity increases the average number of physically inactive days decreases.

% Excessive drinking: We have a positive relationship between the percentage of adults who drink excessively and the average number of physically unhealthy days. It is significant

Factors	Kurtosis	Skewness
Average number of mentally unhealthy days	-0.41	0.14
Average number of physically unhealthy days	-0.12	0.29
Years of life lost rate	4.3	1.3
% Adults with obesity	0.92	-0.39
Food environment index	3	-1.12
% Physically inactive	0.1	0.19
% With access to exercise opportunities	-0.48	-0.29
% Excessive drinking	-0.37	0.06

Table 2 Descriptive Statistics for Factors

Dependent Factors	% Adults With Obesity	Food Environment Index	% Physically Inactive Days	% With Access to Exercise Opportunities	% Excessive Drinking
	Coefficients / Significance	Coefficients / Significance	Coefficients / Significance	Coefficients / Significance	Coefficients / Significance
Average Number of Mentally Unhealthy Days	0.016 / ***	-0.099 / ***	0.03 / ***	-0.002 / ***	-0.056 / ***
Average Number of Physically Unhealthy Days	-0.02 / ***	-0.013 / Not	0.03 / ***	-0.000091 / Not	0.01 / **
Years Of Life Lost Rate	-44.16 / **	-15.49 / Not	72 / ***	-7.15 / ***	-27 / Not

Table 3 Regression Coefficients and Significance Levels for Dependent Factors

Factors	Standard Error	Standard Deviation
Average Number of Mentally Unhealthy Days	0.012	0.68
Average Number of Physically Unhealthy Days	0.013	0.73
Years of Life Lost Rate	54.85	2881.9
% Adults With Obesity	0.078	4.308
Food Environment Index	0.02	1.12
% Physically Inactive	0.1	5.78
% With Access to Exercise Opportunities	0.43	23.8
% Excessive Drinking	0.06	3.35

Table 4 Standard Error and Standard Deviation for Various Factors

at the 95% level and means that as the percentage of adults who drink excessively increases, so do the average number of physically unhealthy days.

Years of Life Lost Rate

% Adults with obesity: We have a negative relationship between the percentage of adults with obesity and the years of life lost rate. It is significant at the 95% level, and it means that as the amount of adults with obesity increases the years of life lost rate decrease.

Food environment index: We have a negative relationship between the food environment index and the years of life lost rate. It is not at all significant since it has a P-value of 0.8, which makes it only significant at the 20% level, but it means that as the access to healthy food increases the years of life lost decrease.

% Physically inactive: We have a positive relationship between the percentage of adults who are physically inactive and the years of life lost rate. It is significant and means that as the

percentage of adults who are physically inactive increases so do the years of life lost. This is an extremely strong relationship.

% With access to exercise opportunities: We have a negative relationship between the percentage of adults with access to exercise opportunities and the years of life lost rate. It is significant and it means that as the percentage of the population with access to places for physical activity increases the years of life lost decrease.

% Excessive drinking: We have a negative relationship between the percentage of adults who drink excessively and the years of life lost rate. It is not that significant since it has a P-value of 0.2, which makes it only significant at the 80% level, but it means that as the percentage of adults who drink excessively increases the years of life lost decrease. This relationship is odd and might need to be investigated further.

When looking at the factors that affect both the average number of physically unhealthy days and the years of life lost rate it should be considered that the R square value is only 0.02 meaning that only 2% of the results can be explained by the following factors. This implies that there are further important factors,

apart from the five currently chosen, which will impact both the average number of physically unhealthy days and the years of life lost rate in a much stronger way and also in a way where a majority of the results can be explained, thereby increasing the R square value.

Discussion & Conclusion

These results show that there is a connection between most of these factors namely, Obesity, Diet, Physical inactivity, Access to exercise opportunities and Excessive drinking, with the food environment index having the strongest effect on mental health. This goes to show the benefits of healthy food and how much it truly affects one's mental health.

The first relationship shows us that as the number of adults with obesity increases so does the average number of mentally unhealthy days, this goes hand in hand with the result produced with physical inactivity which shows us that as the number of physically inactive people increases so does the average number of mentally unhealthy days. This also stays in line when we look at the relationship between the % of people with access to exercise opportunities which, shows us that as the % of people with access to exercise opportunities increases the average number of mentally unhealthy days decreases. The strongest relationship is with the Food environment index, which shows us that as the overall health of the food environment improves or increases the average number of mentally unhealthy days decreases.

Something to note when looking at the first regression is that excessive drinking has a negative effect on the average number of mentally unhealthy days meaning that as the number of adults who drink excessively increases, the average number of mentally unhealthy days decrease. This needs to be investigated further and could be based on the effects which alcohol has on one's brain. People who were completely under the influence of alcohol might not report these days as days where they felt mentally low as they were inhibited. If these people were to stop drinking entirely for a few days, it's likely that the effects of withdrawal paired with sobriety and feeling the full effects of a low mental state would have a significant negative effect on their mental health.

When we look at the second regression, we notice that the percentage of adults with obesity actually has a negative relationship with the average number of physically unhealthy days, meaning that as the number of adults with obesity increases the average number of physically unhealthy days decrease. This could be due to the fact that people who are obese are slowly trying to change, they are using more of their leisure time for physical activity and are overall trying to better themselves. This would make it such that they report less physically inactive days, thus explaining the relationship.

The percentage of adults who drink excessively also shows a negative relationship with the years of life lost rate, this re-

lationship is also intriguing as it means that as the percentage of adults who excessively drink increases the years of life lost decrease. This could also be because people who drink excessively have their predicted or calculated years of life far lower than those who do not drink excessively. This could also be due to various other factors such as the health of their organs, their living conditions as well as their genetics.

The next intriguing relationship is the one between the percentage of adults with obesity and the years of life lost rate. They have a negative relationship, meaning that as the percentage of adults with obesity increases the years of life lost decreases. The years of life lost is the difference between the predicted or calculated age for a person and their age at the time of their premature death. A possible explanation to this relationship could be that the predicted or calculated age for people who are obese is far lower than a person who is of normal weight. If they die prematurely, it would in turn reduce their years of life lost since it was already low to begin with.

Something to remember when talking about obesity is the bullying and victimization that is often associated with being overweight or obese. Being obese or excessively drinking will both affect one's mental health which will make them experience lows more frequently which is the first stepping stone to depression. This also will in turn affect one's physical health since one's mood plays a big role in whether one will get the recommended 150 minutes per week of physical activity. It's just a vicious cycle that many people go through. Most people do not realize the severity of issues like mental health, they only realize how bad it is once they go through it themselves. Having poor mental health will cause far more trouble than the person could ever anticipate, it will eat into so many aspects of their life, preventing them from enjoying life, ruining their relationships with friends and family.

That being said, drinking could potentially be beneficial if done in modest amounts and contained to one drink a day. However, if someone who is a heavy drinker tries to suddenly switch to a modest one drink a day they would find it extremely uncomfortable. In these cases, a gradual decrease should be implemented with the aim of reaching that moderate range of not crossing one drink a day.

For physical health a minimum of 150 minutes of moderate to vigorous physical activity must be done each week. Incorporating an exercise routine twice or thrice a week into their lives will make a huge improvement in a person's mental health which in turn will motivate them to exercise more. Exercising can change peoples' lives. Another way to improve one's drinking habits could simply be exercise. It is shown that exercise improves mental health. This could help with improving drinking habits in many ways: by increasing one's happiness and motivation, one could build the willpower to reduce their drinking drastically. Better mental health could also help restore relationships broken due to low mental health and this in turn could be a motivation

to stop excessively drinking.

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