

# ARE PEOPLE WHO ARE SATISFIED WITH THEIR LIVES HEALTHIER THAN THOSE WHO AREN'T?

By Nandish Verma

## Background

The effects of happiness on our longevity and well-being are well known. A lower risk of heart disease, lower risk of stroke, lower risk of hypertension, and a lower risk of developing Type II Diabetes are just a few of the known effects of happiness for our health<sup>1</sup>. Although this claim is generally accepted, I wanted to find the correlation of life satisfaction and positive health outcomes for myself. However, I am not a researcher for any medical studies aiming to learn more about the relationship between happiness and health outcomes, so the only way I can accomplish this is by analyzing data, building graphs, and testing hypotheses. Kaggle did not have any datasets suitable for this task, so the data presented in the following pages comes from the 2022 Behavioral Risk Factor Surveillance System Questionnaire.



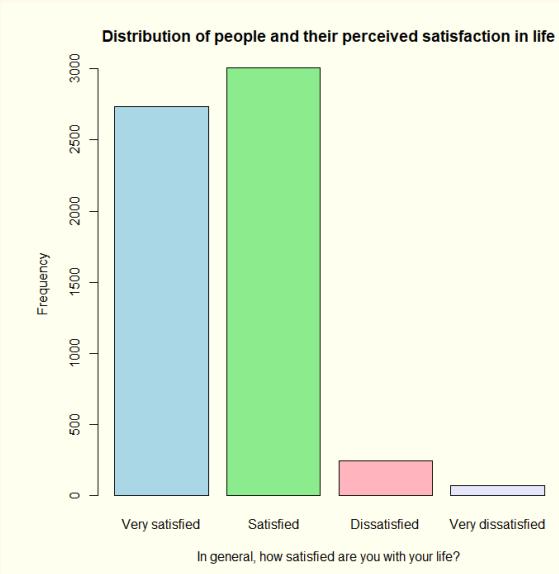
*A happy dog.*

## About the Data

The data for this blog post comes from the 2022 Behavioral Risk Factor Surveillance System(BRFSS) Questionnaire. An excerpt from the CDC's about page for BRFSS describes it as “the nation’s premier system of health-related telephone surveys that collect state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of preventive services.”<sup>2</sup> The 2022 BRFSS Questionnaire has 445,132 records dating from early 2022 to mid 2023, and has over 200 different questions for participants to answer. The BRFSS is sponsored by the CDC, and a variety of other government agencies. For this analysis, the BRFSS data is subsetted to only responses recorded by participants residing in New Jersey, leaving only 8,209 records. This analysis will primarily focus on the responses to the question “In general, how satisfied are you with your life?” in relation to responses about questions asking about participants’ physical health and mental health.

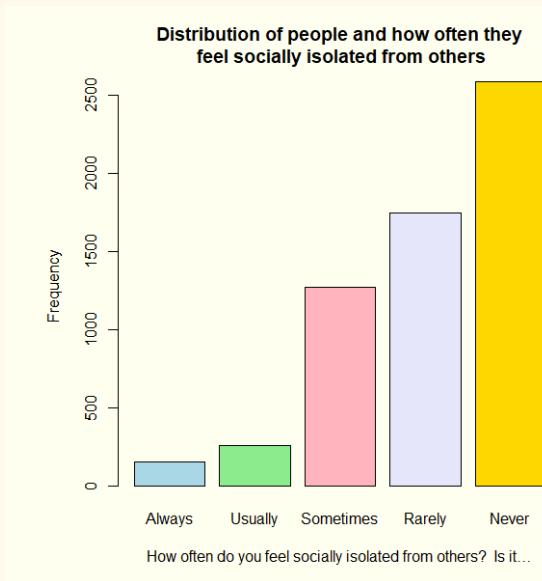
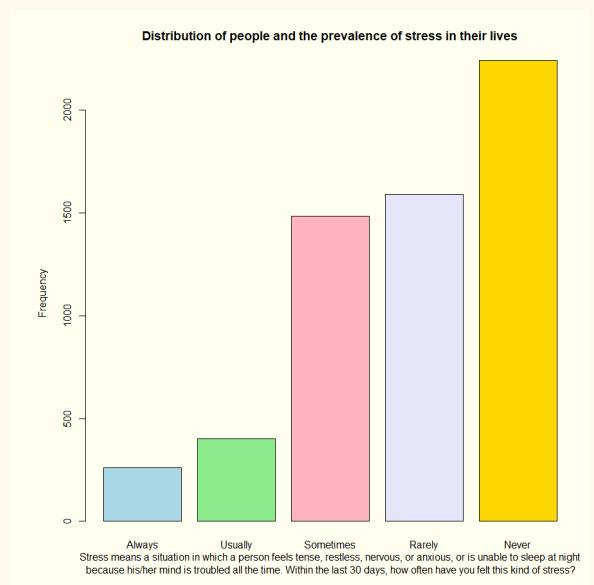
## Overview of the Data

This analysis will primarily focus on the responses to the question “In general, how satisfied are you with your life?” and on questions asking about participants’ physical health and mental health.



The bar chart on the left shows the frequency of the different responses to the question “In general, how satisfied are you with your life?” Here, we can see that over 5,000 people are satisfied with their lives, and a little over 300 people are dissatisfied with their life.

The bar chart on the right shows the frequency of the different responses to the question “Stress means a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his/her mind is troubled all the time. Within the last 30 days, how often have you felt this kind of stress?” Here we can see that over 3,000 participants dealt with little to no stress in the 30 days prior to their interview. Around 600 participants were near constantly stressed in the 30 days prior to their interview.



The bar chart on the left shows the frequency of the different responses to the question, “How often do you feel socially isolated from others?” here we can see that over 4000 participants don’t feel socially isolated from others most of the time, while over 400 participants do feel socially isolated from others most or all of the time.

From observations made in the above bar charts, we can determine that there are many more responders to the BRFSS Questionnaire who have positive outcomes when it comes to social determinants than there are responders who have negative outcomes with social determinants.

## Question 1

Unfortunately, the BRFSS Questionnaire does not have any questions inquiring literally about the happiness of a participant. Knowing that the quality of social connections can contribute heavily to a person's happiness<sup>3</sup>, I wanted to see if the responses to the question, "In general, how satisfied are you with your life?", had any correlation to the responses to the question, "How often do you feel socially isolated from others?" The director of the Harvard Study of Adult Development, Robert Waldinger, says that people who are more isolated are less happy and healthy than people who are not isolated, and he praises quality social connections as a key part of finding happiness. In the data, I expect to see that people who are satisfied with their lives will least often feel that they are socially isolated.

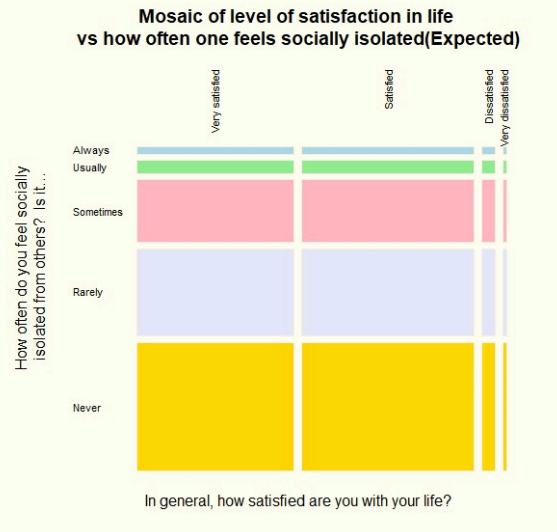


**Null Hypothesis:** There is no correlation in the responses for the questions "In general, how satisfied are you with your life?" and "How often do you feel socially isolated from others?"

**Alternative Hypothesis:** There is a correlation in the responses for the questions "In general, how satisfied are you with your life?" and "How often do you feel socially isolated from others?"

In the above mosaic plot, it is clear that the participants who have indicated they are satisfied with their lives are mostly people who seldom feel socially isolated, and we also see that people who seldom feel socially isolated are mostly satisfied with their lives. Because these are two categorical variables being compared, we must use a Chi-squared test to verify whether it is a real relationship, or just random.

The Chi-squared test produced a p-value of  $1.867314 \times 10^{-249}$ . Assuming a significance level of 0.05, we are able to reject the null hypothesis and say that there is a relationship between how satisfied with their life a person is and how often that person feels socially isolated. The chart on the right is the same mosaic plot of the responses above, with the difference being this is how the mosaic plot would be expected to look if the responses to the questions were independent of each other.



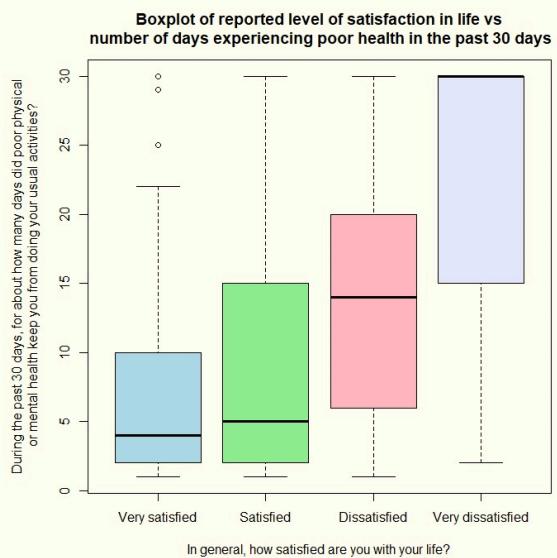
## Question 2

Although the correlation of happiness and holistic well-being is widely known, the link between self-reported happiness and self-reported life satisfaction is less clear<sup>4</sup>. Life satisfaction and happiness can have many common contributing factors, like the prevalence of social connections as we addressed in Question 1, but they are not completely comparable. Happier people spend less time in poor health<sup>1</sup>; is this true for people with greater life satisfaction?

**Null Hypothesis:** There is no difference in the mean number of days experienced in poor health among people with differing levels of satisfaction with their lives.

**Alternative Hypothesis:** People who are more satisfied with their lives spend a shorter mean number of days in poor health than those who are more dissatisfied with their lives.

The graph on the right shows that the IQR for those who are very satisfied with life is much shorter than the others, and has the smallest value for any upper quartile in the plot.



Because there are four different responses to the question, “In general, how satisfied are you with your life?” there are three comparisons being made. So, assuming a significance level of 0.05, the Bonferroni corrected significance level is 0.0167.

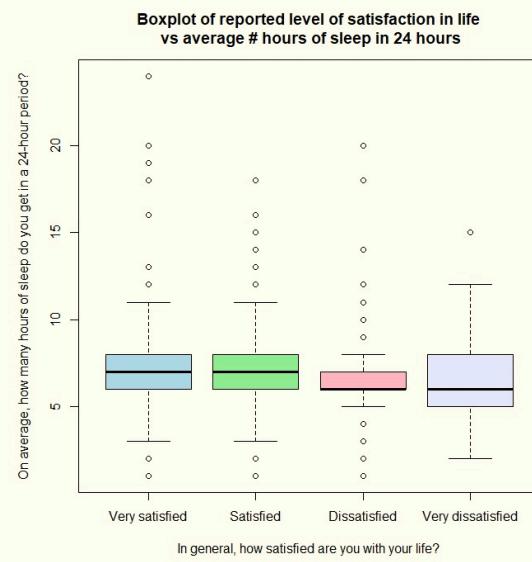
The p-value returned in the permutation test comparing the mean number of days in poor health for “Very satisfied” and “Satisfied” is  $9.791825 \times 10^{-5}$ . The p-value returned in the permutation test comparing the mean number of days in poor health for “Very satisfied” and “Dissatisfied” is  $1.373346 \times 10^{-13}$ . The p-value returned in the permutation test comparing the mean number of days in poor health for “Very satisfied” and “Very dissatisfied” is so small that R Studio will only display it as “0”. The z-score for this is 11.1 . These results are extremely statistically significant and we can reject the null. There could be any number of reasons that lead to an individual experiencing poor health a lot of the time and being dissatisfied with their life. The many contributing factors to a person’s life satisfaction and the multitude of reasons someone could be in poor health shows that although these are extremely statistically significant results, the link between life satisfaction and well-being is still unclear.

## Question 3

Being happy helps us get more quality sleep<sup>1</sup>. Is there a relation between number of hours slept per night and life satisfaction?

**Null Hypothesis:** There is no relation between mean number of hours slept in 24 hours and life satisfaction.

**Alternative Hypothesis:** People who are very satisfied with their lives sleep for a greater mean number of hours in a 24 hour period than people with worse life satisfaction.



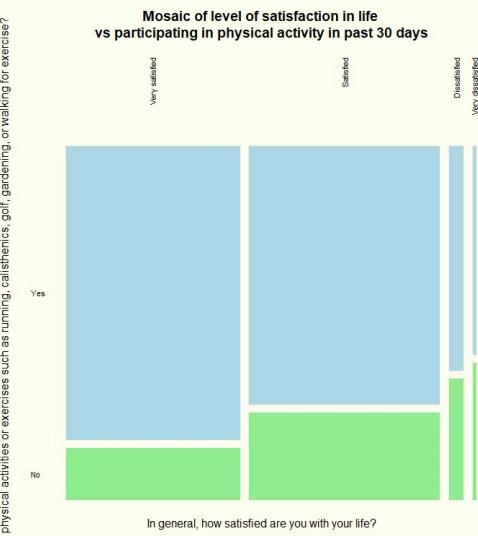
Assuming a significance level of 0.05, after applying Bonferroni correction for the three different comparisons. The p-value returned after comparing “Very satisfied” and “Satisfied” is 0.99, meaning we fail to reject the null hypothesis. The p-value returned after comparing “Very satisfied” and “Dissatisfied” is 0.99, meaning we fail to reject the null hypothesis. The p-value returned after comparing “Very satisfied” and “Very dissatisfied” is 0.97, meaning we fail to reject the null hypothesis. This finding is very surprising to me. Greater quality sleep is attributed to more happiness<sup>5</sup>, but its effect on life satisfaction seems insignificant.

## Question 4

Being happy helps us be more active<sup>1</sup>. Is there a relation between activity level and life satisfaction?

**Null Hypothesis:** There is no relation between activity level and life satisfaction.

**Alternative Hypothesis:** People with greater life satisfaction participate in physical activity more often than people with worse life satisfaction.



Assuming a significance value level of 0.05, we run Pearson’s Chi-squared test because we are comparing two categorical variables, and it returns a p-value of  $5.051895 \times 10^{-28}$ , showing extreme statistical significance, allowing us to reject the null hypothesis. Physical activity has a positive correlation with happiness, and it seems to have a positive correlation with life satisfaction, as seen in the the mosaic plot.

## Conclusion

For the most part, people who indicated they were satisfied with their lives also indicated they lived in better health and practiced healthful behaviors at a greater frequency than those who weren't. Something that surprised me is that while number of hours slept and quality of sleep has been shown to have a positive correlation to happiness, it was statistically insignificant with life satisfaction. Looking into the BRFSS Questionnaire has made me consider that while life satisfaction and happiness show similarities in how they relate to a person's health and could have common contributing factors, life satisfaction is more complicated than I initially thought, and because it is more subjective than happiness, I believe there are more discrepancies in my expectations of people's happiness and people's life satisfaction that I have not yet found.

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## Info Sources

<sup>1</sup>:<https://www.heart.org/en/university-hospitals-harrington-heart-and-vascular/how-happiness-affects-health>

<sup>2</sup>:<https://www.cdc.gov/brfss/about/index.htm>

<sup>3</sup>:[https://www.ted.com/talks/robert\\_waldinger\\_what\\_makes\\_a\\_good\\_life\\_lessons\\_from\\_the\\_longest\\_study\\_on\\_happiness/transcript](https://www.ted.com/talks/robert_waldinger_what_makes_a_good_life_lessons_from_the_longest_study_on_happiness/transcript)

<sup>4</sup>:<https://ourworldindata.org/happiness-and-life-satisfaction>

<sup>5</sup>:<https://www.apa.org/topics/sleep/deprivation-consequences>

## Data Source

[https://www.cdc.gov/brfss/annual\\_data/annual\\_2022.html](https://www.cdc.gov/brfss/annual_data/annual_2022.html)

