

Relationships Between Longevity Via Age Difference and Health Age Versus Three Critical Lifestyle Factors, Food Portion, Daily Exercise, and Sleep Hours Using Viscoplastic Energy Model of GH-Method: Math-Physical Medicine (No. 1054, VMT #452)

Gerald C Hsu*

eclairMD Foundation, USA

***Corresponding Author**

Gerald C Hsu, eclairMD Foundation, USA.

Submitted: 2024, Mar 26; Accepted: 2024, Apr 16; Published: 2024, Apr 22

Citation: Hsu, G. C. (2024). Relationships Between Longevity Via Age Difference and Health Age Versus Three Critical Lifestyle Factors, Food Portion, Daily Exercise, and Sleep Hours Using Viscoplastic Energy Model of GH-Method: Math-Physical Medicine (No. 1054, VMT #452). *J Edu Psyc Res*, 6(1), 01-06.

Abstract

Moderate food portions, consistent exercise, and sufficient sleep are crucial for health maintenance and potential lifespan extension. Statistical evidence from various epidemiological and clinical studies demonstrates a strong correlation between these three lifestyle factors and increased longevity.

The author, who avoids smoking, alcohol, and illicit drugs, and has minimal exposure to environmental hazards, acknowledges the limitations of changing his physical age, genetic makeup, or family history. Consequently, he has chosen to concentrate on modifiable lifestyle factors that can impact his lifespan. Through 15 years of his medical research work, he observed that many deaths are predominantly linked to four chronic diseases, particularly diabetes, with obesity often serving as a precursor. Unhealthy eating habits contribute to weight gain, while regular exercise is essential not only for body weight management but also for diabetes control. Additionally, adequate sleep duration and quality also play a significant role in the management of chronic diseases. Hence, he focused on these three critical factors to explore their effects on longevity.

The author developed an estimated "health age" formula:

$$\text{Health Age} = \text{Real Biological Age} * (1 + ((MI - 0.735)/0.735)/2)$$

$$\text{Age difference} = \text{health age} - \text{real age}$$

In this article, the author examined two outcomes—age discrepancy (Age Diff) and health age (H. Age)—through separate analyses, each related to three consistent lifestyle factors: food portion (Food P), daily exercise (Steps), and sleep hours (Sleep H.). To analyze these two scenarios, he employs the space-domain Viscoplastic Medicine Theory (SD-VMT) energy model, facilitating a comprehensive understanding of the effects of these three lifestyle factors on the specified medical symptom of longevity. He also selected three normalization factors, i.e. his targets for these three factors, 0.4 for food portion (40% of his food portion in 2012), 16000 walking steps per day, and 7 hours of night sleep.

In summary, two main findings emerge:

First, the total energy—represented by the enclosed area under the longevity output and its three influential inputs—differs between the Age Difference (33) and Health Age (17), attributed to the curvature variance of these two longevity curves from 2015 to 2024.

Second, despite the variance in total energy values, the energy distribution ratios between these two scenarios are quite similar. Food portion accounts for 43-45% (highest priority), walking steps for 29% (second priority), and sleep hours for 26-28% (third priority).

Key Message

The dietary to exercise ratio is 1.52 for the Age Difference scenario and 1.46 for the Health Age scenario, indicating that diet has a more significant impact on longevity than exercise, with sleep also playing a crucial but lesser role in the ranking of factors affecting longevity.



Viscoelastic Medicine Theory (VMT #452)

Relationships between longevity via age difference and health age versus three critical lifestyle factors, food portion, daily exercise, and sleep hours using viscoplastic energy model of GH-Method: math-physical medicine (No. 1054)

1. Introduction

Moderate food portions, consistent exercise, and sufficient sleep are crucial for health maintenance and potential lifespan extension. Statistical evidence from various epidemiological and clinical studies demonstrates a strong correlation between these three lifestyle factors and increased longevity.

The author, who avoids smoking, alcohol, and illicit drugs, and has minimal exposure to environmental hazards, acknowledges the limitations of changing his physical age, genetic makeup, or family history. Consequently, he has chosen to concentrate on modifiable lifestyle factors that can impact his lifespan. Through 15 years of his medical research work, he observed that many deaths are predominantly linked to four chronic diseases, particularly diabetes, with obesity often serving as a precursor. Unhealthy eating habits contribute to weight gain, while regular exercise is essential not only for body weight management but also for diabetes control. Additionally, adequate sleep duration and quality also play a significant role in the management of chronic diseases. Hence, he focused on these three critical factors to explore their effects on longevity.

The author developed an estimated "health age" formula:

$$Health\ Age = Real\ Biological\ Age * (1 + ((MI - 0.735)/0.735)/2)$$

$$Age\ difference = health\ age - real\ age$$

In this article, the author examined two outcomes—age discrepancy (Age Diff) and health age (H. Age)—through separate analyses, each related to three consistent lifestyle factors: food portion (Food P.), daily exercise (Steps), and sleep hours (Sleep H.). To analyze these two scenarios, he employs the space-domain Viscoplastic Medicine Theory (SD-VMT) energy model, facilitating a comprehensive understanding of the effects of these three lifestyle factors on the specified medical symptom of longevity. **He also selected three normalization factors, i.e. his targets for these three factors, 0.4 for food portion (40% of his food portion in 2012), 16000 walking steps per day, and 7 hours of night sleep.**

1.1. Biomedical Information

The following sections contain excerpts and concise information drawn from multiple medical articles, which have been meticulously reviewed by the author of this paper. The author has adopted this approach as an alternative to including a conventional reference list at the end of this document, with the

intention of optimizing his valuable research time. It is essential to clarify that these sections do not constitute part of the author's original contribution but have been included to aid the author in his future reviews and offer valuable insights to other readers with an interest in these subjects.

1.2. Pathophysiological Explanations of Longevity Versus Food Portion, Exercise, and Sleep Hours

Pathophysiological explanations on the relationship between longevity and factors like food portion, exercise, and sleep hours involve understanding how these elements interact with our body's biological systems and affect lifespan.

1. **Food Portion:** Overeating can lead to obesity and related health issues like heart disease, diabetes, and metabolic syndrome, which can shorten lifespan. Conversely, caloric restriction has been associated with longevity. Studies show that smaller food portions can lead to a decrease in caloric intake, improved metabolic efficiency, and reduced oxidative stress, all of which are linked to increased lifespan.
2. **Exercise:** Regular physical activity has numerous health benefits, including reduced risks of cardiovascular disease, hypertension, type 2 diabetes, and obesity. Exercise also promotes better mental health, bone density, and muscle strength. Epidemiological data consistently show a positive correlation between regular exercise and increased longevity. Physical activity enhances physiological functions and reduces the risk of chronic diseases, leading to longer and healthier lives.
3. **Sleep Hours:** Sleep is crucial for health and longevity. Both short (<6 hours per night) and long (>9 hours per night) sleep durations have been associated with increased mortality. Optimal sleep, usually 7-8 hours per night, is linked to lower risks of chronic diseases, better mental and cognitive health, and improved metabolic regulation. Sleep affects hormonal balance, immune function, and cellular repair processes, all of which play roles in aging and lifespan.

In conclusion, balanced food portions, regular exercise, and adequate sleep are vital for maintaining health and potentially extending lifespan. Statistical data supporting these findings come from various epidemiological and clinical studies, showing a clear link between these lifestyle factors and increased longevity.

1.3. MPM Background

To learn more about his developed GH-Method: math-physical medicine (MPM) methodology, readers can read the following three papers selected from his published 760+ papers.

The first paper, No. 386 (Reference 1) describes his MPM methodology in a general conceptual format. The second paper, No. 387 (Reference 2) outlines the history of his personalized diabetes research, various application tools, and the differences between biochemical medicine (BCM) approach versus the MPM approach. The third paper, No. 397 (Reference 3) depicts a general flow diagram containing ~10 key MPM research methods and different tools.

1.4. The Author's Diabetes History

The author was a severe T2D patient since 1995. He weighed 220 lb. (100 kg) at that time. By 2010, he still weighed 198 lb. with an average daily glucose of 250 mg/dL (HbA1C at 10%). During that year, his triglycerides reached 1161 (high risk for CVD and stroke) and his albumin-creatinine ratio (ACR) at 116 (high risk for chronic kidney disease). He also suffered from five cardiac episodes within a decade. In 2010, three independent physicians warned him regarding the need for kidney dialysis treatment and the future high risk of dying from his severe diabetic complications.

In 2010, he decided to self-study endocrinology with an emphasis on diabetes and food nutrition. He spent the entire year of 2014 to develop a metabolism index (MI) mathematical model. During 2015 and 2016, he developed four mathematical prediction models related to diabetes conditions: weight, PPG, fasting plasma glucose (FPG), and HbA1C (A1C). Through using his developed mathematical metabolism index (MI) model and the other four glucose prediction tools, by the end of 2016, his weight was reduced from 220 lbs. (100 kg) to 176 lbs. (89 kg), waistline from 44 inches (112 cm) to 33 inches (84 cm), average finger-piercing glucose from 250 mg/dL to 120 mg/dL, and A1C from 10% to ~6.5%. One of his major accomplishments is that he no longer takes any diabetes-related medications since 12/8/2015.

In 2017, he achieved excellent results on all fronts, especially his glucose control. However, during the pre-COVID period, including both 2018 and 2019, he traveled to ~50 international cities to attend 65+ medical conferences and made ~120 oral presentations. This hectic schedule inflicted damage to his diabetes control caused by stress, dining out frequently, post-meal exercise disruption, and jet lag, along with the overall negative metabolic impact from the irregular life patterns; therefore, his glucose control was somewhat affected during the two-year traveling period of 2018-2019.

He started his COVID-19 self-quarantined life on 1/19/2020. By 10/16/2022, his weight was further reduced to ~164 lbs. (BMI 24.22) and his A1C was at 6.0% without any medication intervention or insulin injection. In fact, with the special COVID-19 quarantine lifestyle since early 2020, not only has he written and published ~500 new research articles in various medical and engineering journals, but he has also achieved his best health conditions for the past 27 years. These achievements have resulted from his non-traveling, low-stress, and regular daily life routines. Of course, his in-depth knowledge of chronic diseases, sufficient practical lifestyle management experiences, and his own developed high-tech tools have also contributed to his excellent health improvements.

On 5/5/2018, he applied a continuous glucose monitoring (CGM) sensor device on his upper arm and checks his glucose measurements every 5 minutes for a total of 288 times each day. Furthermore, he extracted the 5-minute intervals from every 15-minute interval for a total of 96 glucose data each day stored in his computer software.

Through the author's medical research work over 40,000 hours and read over 4,000 published medical papers online in the past 13 years, he discovered and became convinced that good life habits of not smoking, moderate or no alcohol intake, avoiding illicit drugs; along with eating the right food with well-balanced nutrition, persistent exercise, having a sufficient and good quality of sleep, reducing all kinds of unnecessary stress, maintaining a regular daily life routine contribute to the risk reduction of having many diseases, including CVD, stroke, kidney problems, micro blood vessels issues, peripheral nervous system problems, and even cancers and dementia. In addition, a long-term healthy lifestyle can even "repair" some damaged internal organs, with different required time-length depending on the particular organ's cell lifespan. For example, he has "self-repaired" about 35% of his damaged pancreatic beta cells during the past 10 years.

1.5. Energy Theory

The human body and organs have around 37 trillion live cells which are composed of different organic cells that require energy infusion from glucose carried by red blood cells; and energy consumption from labor-work or exercise. When the residual energy (resulting from the plastic glucose scenario) is stored inside our bodies, it will cause different degrees of damage or influence to many of our internal organs.

According to physics, energies associated with the glucose waves are proportional to the square of the glucose amplitude. The residual energies from elevated glucoses are circulating inside the body via blood vessels which then impact all of the internal organs to cause different degrees of damage or influence, e.g. diabetic complications. Elevated glucose (hyperglycemia) causes damage to the structural integrity of blood vessels. When it combines with both hypertension (rupture of arteries) and hyperlipidemia (blockage of arteries), CVD or Stroke happens. Similarly, many other deadly diseases could result from these excessive energies which would finally shorten our lifespan. For an example, the combination of hyperglycemia and hypertension would cause micro-blood vessel's leakage in kidney systems which is one of the major cause of CKD.

The author then applied Fast Fourier Transform (FFT) operations to convert the input wave from a time domain into a frequency domain. The y-axis amplitude values in the frequency domain indicate the proportional energy levels associated with each different frequency component of input occurrence. **Both output symptom value (i.e. strain amplitude in the time domain) and output symptom fluctuation rate (i.e. the strain rate and strain frequency) are influencing the energy level (i.e. the Y-amplitude in the frequency domain).**

Currently, many people live a sedentary lifestyle and lack sufficient exercise to burn off the energy influx which causes them to become overweight or obese. Being overweight and having obesity leads to a variety of chronic diseases, particularly diabetes. In addition, many types of processed food add unnecessary ingredients and harmful chemicals that are toxic to the bodies, which lead to the development of many other deadly

diseases, such as cancers. For example, ~85% of worldwide diabetes patients are overweight, and ~75% of patients with cardiac illnesses or surgeries have diabetes conditions.

In engineering analysis, when the load is applied to the structure, it bends or twists, i.e. deform; however, when the load is removed, it will either be restored to its original shape (i.e. elastic case) or remain in a deformed shape (i.e. plastic case). In a biomedical system, the glucose level will increase after eating carbohydrates or sugar from food; therefore, the carbohydrates and sugar function as the energy supply. After having labor work or exercise, the glucose level will decrease. As a result, the exercise burns off the energy, which is similar to load removal in the engineering case. In the biomedical case, both processes of energy influx and energy dissipation take some time which is not as simple and quick as the structural load removal in the engineering case. Therefore, the age difference and 3 input behaviors are "dynamic" in nature, i.e. time-dependent. *This time-dependent nature leads to a "viscoelastic or viscoplastic" situation. For the author's case, it is "viscoplastic" since most of his biomarkers are continuously improved during the past 13-year time window.*

Time-dependent output strain and stress of (viscous input*output rate):

Hooke's law of linear elasticity is expressed as:

Strain (ϵ : epsilon)
= **Stress (σ : sigma) / Young's modulus (E)**

For biomedical glucose application, his developed linear elastic glucose theory (LEGT) is expressed as:

PPG (strain) = carbs/sugar (stress) * GH.p-Modulus (a positive number) + post-meal walking k-steps * GH.w-Modulus (a negative number)

Where GH.p-Modulus is reciprocal of Young's modulus E.

However, in viscoelasticity or viscoplasticity theory, the stress is expressed as:

Stress
= **viscosity factor (η : eta) * strain rate (d ϵ /dt)**

Where strain is expressed as Greek epsilon or ϵ .

In this article, in order to construct an "ellipse-like" diagram in a stress-strain space domain (e.g. "hysteresis loop") covering both the positive side and negative side of space, he has modified the definition of strain as follows:

Strain
= **(body weight at certain specific time instant)**

He also calculates his strain rate using the following formula:

Strain rate

= (body weight at next time instant) - (body weight at present time instant)

The risk probability % of developing into CVD, CKD, Cancer is calculated based on his developed metabolism index model (MI) in 2014. His MI value is calculated using inputs of 4 chronic conditions, i.e. weight, glucose, blood pressure, and lipids; and 6 lifestyle details, i.e. diet, drinking water, exercise, sleep, stress, and daily routines. These 10 metabolism categories further contain ~500 elements with millions of input data collected and processed since 2010. For individual deadly disease risk probability %, his mathematical model contains certain specific weighting factors for simulating certain risk percentages

2. Results

associated with different deadly diseases, such as metabolic disorder-induced CVD, stroke, kidney failure, cancers, dementia; artery damage in heart and brain, micro-vessel damage in kidney, and immunity-related infectious diseases, such as COVID death.

Some of explored deadly diseases and longevity characteristics using the *viscoplastic medicine theory (VMT)* include stress relaxation, creep, hysteresis loop, and material stiffness, damping effect *based on time-dependent stress and strain* which are different from his previous research findings using *linear elastic glucose theory (LEGT)* and *nonlinear plastic glucose theory (NPGT)*.

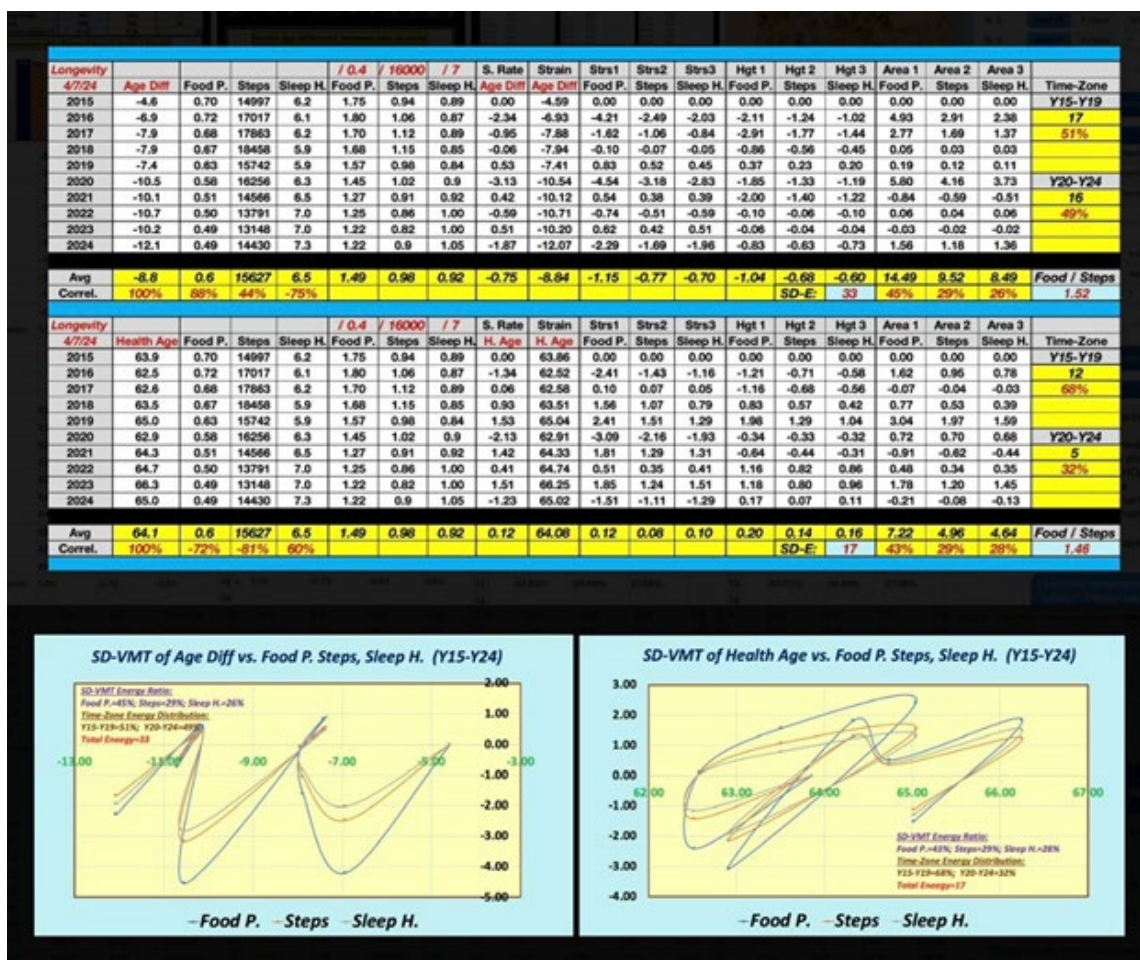


Figure 1: Data Table and SD-VMT Energy Output Diagram

3. Conclusions

In summary, two main findings emerge:

First, the total energy—represented by the enclosed area under the longevity output and its three influential inputs—differs between the Age Difference (33) and Health Age (17), attributed to the curvature variance of these two longevity curves from 2015 to 2024.

Second, despite the variance in total energy values, the energy distribution ratios between these two scenarios are quite similar. Food portion accounts for 43-45% (highest priority), walking

steps for 29% (second priority), and sleep hours for 26-28% (third priority).

Key Message

The dietary to exercise ratio is 1.52 for the Age Difference scenario and 1.46 for the Health Age scenario, indicating that diet has a more significant impact on longevity than exercise, with sleep also playing a crucial but lesser role in the ranking of factors affecting longevity.

References

For editing purposes, majority of the references in this paper,

which are self-references, have been removed for this article. Only references from other authors' published sources remain. The bibliography of the author's original self-references can be viewed at www.eclairemd.com.

Readers may use this article as long as the work is properly cited, and their use is educational and not for profit, and the author's

original work is not altered.

For reading more of the author's published VGT or FD analysis results on medical applications, please locate them through platforms for scientific research publications, such as ResearchGate, Google Scholar, etc.

Copyright: ©2024 Gerald C Hsu. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.