

Is Low Solar Energy Causing Reduction in Serotonin and Leading to the Obesity and Mental Health Crisis?

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Abstract

We are living in a historical period in respect to the deterioration in public health, as we experience the rise of the catastrophic obesity epidemic and mental health crisis in recent decades, despite the great efforts from the scientific and medical community to seek health solutions and to try to find cures to the enormous human suffering and economic costs resulting by this collapse in public health. This trend has reached such a critical level that it jeopardizes society when over 40% of the population is obese in the United States, suffering grave medical health conditions, even as the expenditure on public health is rising exponentially to over 20% of gross domestic product. This should point to a monumental failure in our fundamental understanding of basic human biology and health. This article suggests that our current Western reductionist scientific paradigm in both biology and medicine has proved impotent and failed us completely. Therefore, the current cultural health crises require a more holistic approach to human biology and health in terms of chronobiological trends. The emerging neuroscience of brain energy metabolism will be considered as a holistic model for understanding how solar cycles affect our civilization and drive our sex and growth hormones and neurotransmitters that shape both our physical and mental health.

Key Words: chronobiology, mental health, sex hormones, ketogenic diet, obesity epidemic

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Introduction

This article calls for a new, integrated perspective on human biology and health. We seek to integrate interdisciplinary realms of science, primarily how light and hormones shape our minds and medicine, in terms of a worldview that combines the holistic and reductionist

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philosophies of biology, and then to further discuss the reductionist scientific subjects of light, diet, and mental health.

The roots of Western, reductionist science is found in the European Enlightenment, in the British school of Francis Bacon's empirical philosophy. Bacon's call was to study nature in order to command it and master its processes with the goal of improving human wellbeing and health. Since that time, science has focused on organic systems as specialized objects to be studied independently of a whole. As articulated in my article on integrated chronobiology of civilization (Barzilai, 2019), this high-testosterone period of history led to a masculine philosophical view of human nature and the universe, focused on reductionist science and inductive reasoning based on empirical observation. To borrow a phrase from computing algorithms, this is a method of reduction that "divides and conquers" its parts, uplifting the human power to reason and know reality.

As testosterone levels declined into the twentieth century, a new feminine, holistic view of Mother Nature emerged that regards nature as a great force that renders humans small, insignificant, and powerless in relation to the universe. The holistic view is closer to Eastern philosophies, such as Buddhism and astrology, that focus more on change and energy, rather than order and matter. This is a more mystical view of the natural world and man as integral parts of nature, rather than commanding over it.

However, the universe and our biological organs are composed of *both* matter and energy. Matter is organically structured by the genetic information in our DNA, and energy epigenetically switches our DNA in synchrony with our environment. Our bodies are made of material organs as well as metabolic energy-processing organisms. Hence, we should reconsider our philosophy of science in relation to a yin-yang, feminine-masculine, energy-matter view of our biology and health and seek to integrate Western reductionist medicine with Eastern holistic medicine and science. The quest to transcend biological determinism requires a cognitive and philosophical revolution to transcend cognitive biases in scientific paradigms.

This article seeks to describe a new pattern of viewing human biology by which biology is seen as a holistic, complex, adaptive system composed of many different organ systems that function in a synchronized and coordinated fashion. These work together as one organism through genetic and metabolic pathways, maintaining homeostasis and order, while simultaneously adapting to our changing environment.

Cognitive bias and heterodox academy

Although some realms of science have become more holistic, such as theoretical physics (Barzilai, 2023), Western science is still mostly

reductionist, particularly in biology and medicine. However, the sharp decline in testosterone and serotonin in recent decades has led to a feminine, holistic bias in academia. Among many issues, this bias can, for example, lead some radical ecofeminists to blame "man-made climate change" and global warming on the masculine drive to command Mother Nature and exploit its resources. Furthermore, as sex hormones decline, it produces an unbalanced view, because the very drive being criticized had also spurred on the scientific and industrial revolutions since the Enlightenment that brought the enormous rise in the standard of living in the West and around the globe.

As global economic output rose exponentially over the past two centuries, the rise in CO₂ gas emissions from burning fossil fuels to power our energy-hungry economic growth is blamed for global warming. However, this views our environment from the depressive perspective of the glass half-empty. It is important to note that atmospheric gases are recycled as plants breathe the CO₂ we exhale to fuel their growth, and they, in turn, release oxygen into the atmosphere; and new estimates indicate that global plant CO₂ uptake is nearly one-third more than previously estimated (Lai *et al*, 2024). This trend in environmental hysteria suggests that the decline in sex and growth hormones due to low solar energy trends is causing an unbalanced view of our earth sciences and climate science in this deeply politically polarized ecomovement.

Biases such as this highlight the need for a heterodox academy that is dedicated to considering all sides of an argument to promote objective scientific understanding, in which scholars need not fear being shamed or "cancelled" based on their challenges of academic orthodoxy. Integrating the holistic versus reductionist conflicts in scientific orthodoxies requires rising above inherent inductive biases in our perception of reality. In the age of artificial intelligence and advances in cognitive neuroscience, this will enable us to better adapt to our changing environment amid climate change in a period of a grand solar minimum.

Human health affected by the coming grand solar minimum

There are many pernicious health trends in Western society, such as obesity and depression, to name only two. This article asserts that these and other health problems are directly related to the decline in solar activity into a grand solar minimum period in the twenty-first century (Zharkova, 2020) that is adversely affecting our public health. This trend of reduced solar activity means a decline in sex and growth hormone levels that cause our chronobiological clocks to prepare our bodies and minds for a dark winter period. This leads to a more depressed and passive mindset and subsequent weight gain—similar to bears preparing for the coming winter hibernation.

This decline in sex and energy hormones causing the obesity and mental health crisis affects particularly women, who have lower basic testosterone and serotonin levels and hence, suffer more from depression. Sramek, Murphy, and Cutler (2016) found that almost twice as many women struggle with various forms of depression than men, with more difficult symptoms and longer and more frequent episodes. Further, “Depressed females generally experience greater weight gain, anxiety, and physical manifestations of their disease than depressed men”. Research also indicates that women experience a lower locus of control—their sense that they can control life’s circumstances—than men, and this correlates with their increased incidence of mental health concerns (Awaworyi, 2020).

Research has identified connections between depression and appetite increase that may lead to weight gain and obesity in the mechanism of 5-HT serotonin (Conde, 2023). Decreased 5-HT not only exacerbates mood disorders, but also increases appetite and food intake. Furthermore, obesity itself can disrupt 5-HT pathways, compounding the problematic cycle. In addition to this phenomenon, the modern Western diet, which is heavy in fructose, triggers an exaggerated metabolic response that evolved as a crisis coping strategy. Johnson *et al.* (2023) proposed “the fructose survival hypothesis,” in which “hunger, thirst, foraging, weight gain, fat accumulation, insulin resistance, systemic inflammation and increased blood pressure” are set into motion by eating fructose. This response would have evolved to be a short-term strategy, such as mammals preparing for winter hibernation; however, our high sugar diet compels this process to be constant in many, leading to epidemic obesity and its concurrent diseases, including depression (Johnson *et al.*, 2023).

Diet Wars

The efforts to attend to the obesity epidemic have led to debates about diets. There is the female-oriented, Mother Nature worship approach—similar to the Eastern religions of Hinduism—of vegan and vegetarian, anti-animal-meat diets. In contrast, there is the high-energy, high-cholesterol, traditional Western diet, based on animal meat and fat that empowers the human body and large brain that has evolved to require high levels of energy consumption to drive the rise the rational man.

Humans reproduce more than other hominoids, with larger infants who require longer to develop independence; the human brain is larger, and humans live longer lives. In a study comparing humans to gorillas, chimps, and other hominoids regarding metabolic rates, it was shown that humans evolved with a higher metabolic rate as well as greater body fat, both conditions that support “metabolically costly traits” (Pontzer *et al.*, 2016).

There is a commonly held misnomer that high fat diet leads to weight gain. However, the complex human brain needs plenty of good fat to develop and function. In the low solar energy, dark winter period of the 1920s, "Women dieted...to look good in the more revealing, fashionable clothes... Women's magazines regularly featured diet columns, diets, and recipes... educated dieters knew that fat grams had nine calories each, whereas protein and carbohydrate grams had only four, low calorie was for all practical purposes low fat" (La Berge, 2008). In the 1970s, also a dark-winter period, there was rising hysteria against fat, leading to a decline in dietary fats. Concurrent with that trend, the use of high-fructose corn syrup in our processed food industry and government public dietary recommendations may have contributed to the obesity epidemic (La Berge, 2008).

In opposition to the mainstream bias against high fat diets during these low solar periods, including today, there also arose a high-energy counter reaction seeking to assist those who suffered severely from the low-energy diet—from obesity and mental health disorders. In fact, as early as the 1920s, doctors proposed the "ketogenic," high-fat diet as a cure for epilepsy (Wheless, 2008). In the 1970s, The "Paleo" (or Stone Age) Diet was introduced as a countertrend to the vegetarian diet associated with popular, Eastern, New-Age spirituality in the West (History Timelines, 2024). The popularity of this diet grew in the first decade of the twenty-first century into a significant trend.

Dark winter hibernation, low energy bias and aversion of light

The anti-energy cultural trend in social mood is affecting our metabolism, mental health, and even economic de-industrialization in the West as we are becoming more dependent on importing products from the East. This social mood has also caused severe changes in our indoor lightening environment, which in turn, affects our health. Many governments in the West have legislated against traditional lighting with mandates for blue-light LED lighting to "save energy." This risks human metabolism and exacerbates metabolic disorders and mental health issues, which may be particularly severe in the northern hemisphere that suffers most from dark winter conditions during the grand solar minimum.

However, there are a few courageous scientists willing to challenge the dogma against light in our academic culture, publishing research on the reduction of red light and advocacy of more blue light. Blue light exposure reduces energy production in our cell biology. Powner and Jeffery (2024), used glucose tolerance tests on 30 participants following 15 minutes of red light exposure to measure blood glucose levels. They reported an immediate reduction of almost 28%. These findings suggest that the infra-red and red light that warms our environment increases cell metabolic rates and reduces

fluctuating blood sugar levels, which could help to reduce diabetes and obesity (Powner and Jeffery, 2024). Other research has shown that light exposure before sleep with non-LED lighting has positive effects such as “significantly decreased energy expenditure, core body temperature, and increased fat oxidation indicating fewer negative health consequences compared with after nighttime exposure to LEDs” (Ishihara *et al.*, 2021).

Holistic theories of mind

In order to more thoroughly understand—and ultimately find solutions for—these physical and mental health concerns, we need to understand how the brain functions in light of the most current research. In recent years, the holistic, unifying principles of *free energy* and *entropy*, proposed by Karl Friston in 2006, have emerged as a fundamental theoretical framework in neuroscience to explain the human brain and cognition. In 2014, furthering this theme, Carhart-Harris *et al.* published their research about how altering brain energy states can mediate mental states. They proposed that mind-altering psychedelic drugs can be used to study this relationship. Carhart-Harris and Nutt (2017) reported that the two serotonin receptors, 5-HT1AR and 5-HT2AR, mediate the phase transition of consciousness between the brain state involved with “flexible coping” when functioning under normal stress levels, and the more primary state of entropy, designed to adapt to extreme stress in reaction to adverse environments. This view of the mind based on energy states of order versus chaos can inform us about how our perceptions of reality are shaped.

In conjunction with these emerging concepts about brain energy, Harvard psychiatrist, Christopher M. Palmer (2022) published the book *Brain Energy: A Revolutionary Breakthrough in Understanding Mental Health and Improving Treatment for Anxiety, Depression, OCD, PTSD, and More*. In his writing, he provides a unified theory of mental illness, based on brain metabolic energy, presenting decades of research that suggest mental disorders are based on *metabolic disorder*. Palmer argues that metabolic dysfunction is not only connected to physical health conditions, such as diabetes, heart disease, epilepsy, Alzheimer’s and other illnesses, there is also strong linkage between metabolism and genetic expression, hormone and neurotransmitter regulation, sleep quality, and stress. These are all critical factors, including trauma, that affect people’s mental health.

Lower testosterone levels and the transgender trend

One area of hormone dysregulation that could be accounted for by metabolic disorder is the decline in testosterone (T) and sperm counts in men during recent decades, which has been widely documented.

This correlates with the decline in solar activity in the same time period. Utilizing data from long-term studies that looked at serum testosterone levels in American men between 1987 and 2005, Travison *et al.* (2008) reported a drop in total testosterone by 20% in those years and close to a 50% drop in free testosterone. Similar studies in Denmark and Finland (Perheentupa *et al.*, 2007) conclude similar decreases, calling such declines “alarming,” particularly from an evolutionary standpoint. Lokeshwara *et al.*, (2021) reported that even among young adult men in the United States ($N = 4025$), T levels were lower in the period 2011–2016 than in 1999–2000.

In addition to direct measurement of T levels, another indication of collapsing testosterone are numerous studies that show significant decreases in semen quality as measured by sperm counts and semen volume. In a meta-analysis of the literature, Levine *et al.* (2023) found that from 1973 to 2018, the mean sperm count across all continents dropped by 51.6%, with a more than doubled rate of decline in the twenty-first century compared to the late twentieth century.

Lower testosterone leads to lower levels of serotonin and diminished dopamine, causing anxiety and depression and creating a mindset more prone to passivity and fear as well as the rise of violence in society. Moreover, this disruption of sex hormones correlates directly with the rise of the transgender trend in the twentieth century, altering social norms and the sexual organization of society. In 2012, the American Psychiatric Association redefined transgender from a mental disorder to a state of emotional distress caused by gender identity.

However, changes of social and medical definitions have not changed the fundamental nature of human biology. The current low-energy environment that produces low sex hormones leads to acute depression and suicidal behavior, with suicide attempts at 40% among youths identifying as transgender (Austin, 2022). Academic research psychologists lean toward the bias of blaming this on society, citing such concerns as self-reported “microaggressions” rather than investigating potential biological factors.

Effects of low-energy mitochondria

Reduced solar energy affecting the brain’s energy can lead to changes in cell mitochondria. This energy center of our cells is crucial in creating and monitoring neurotransmitters, such as serotonin and dopamine as well as hormones, such as cortisol, estrogen, testosterone, and progesterone. Bressan and Kramer (2021), analyzing extensive current research, reported that low energy in mitochondria in a fetus can lead to development of subsequent mental illness. “Mitochondria take center stage in steadying or upsetting the precarious balance on which our mental health is built”. The developing brain experiences a “battle of the sexes” over energy and

resource dominance between the male and female gene expression, whereby a psychosis-spectrum disorder is caused by excess maternal stimulus and autism-spectrum conditions are caused by greater paternal input. When the mitochondria are dysfunctional and imbalanced, the incidence of mental health issues increases.

Other research suggests that low-energy production in mitochondria is due to a deficiency in the amino acid derivative L-carnitine, which is mostly consumed in animal meat. This may be a factor in the rise in autism, as carnitine plays a critical role in energy production. It is an essential cofactor that helps transport long-chain fatty acids into the mitochondria so that they can be oxidized to produce energy. Carnitine also helps transport some toxic compounds out of the mitochondria (Demarquoy, 2019). Clearly, this corresponds to the discussion above about diet.

Conclusion

The holistic concept of brain energy metabolism has become the grand unifying theme of neuroscience and psychiatry to understand the human mind, integrating the more reductionist theories of how neurotransmitters drive brain energy waves and states of consciousness through neural networks, utilizing metabolism. This article sought to further develop this new synthesis of brain energy theory into a greater view of how energy drives the human mind, culture, and civilization. Thus, I proposed a holistic view, integrating neuroscience, psychiatry, and philosophy to the energy-based theory of mind, explaining the rising global mental health crisis over the past few decades caused by a low brain energy trend due to decline in solar energy. This has led to a general decline in sex and growth hormones and a rise in stress hormone levels. This trend is further driving a shift to low-energy, low-fat dietary social trends that reflect the overarching trend of decline in free energy, affecting our neurobiology and overall metabolic health.

A better understanding and novel integration of these ideas offers true hope for more effective ways to address mental and physical maladies outside of the reductionist medical/pharmaceutical paradigm. These could include changes in diet, and sleep and stress management (Palmer, 2022). However, the *zeitgeist* is not necessarily aligned with such possibilities, because the academic culture that underpins the social environment in which researchers work and publish is saturated with a contrary mindset. Likewise, the different perspectives driven by the holistic/reductionist paradigms shape political polarization in the health and medicine debate. *The Journal of Health Policy, Politics and Law* (June, 2024) published a special issue to look at such polarization in the United States, examining how health care laws are debated in an increasingly polarized environment.

Partisanship drives notable differences in how health care is legislated and implemented from state to state and region to region.

However, for the pursuit of science in medicine and health, the yin-yang divide should be evaded for a better understanding through interdisciplinary integration of the different paradigms. Hence, we should seek to understand the power of the sun to drive our civilization and heal its diseases. We have proposed a challenging new approach to tackle the current trends in the course of history that require a new frame of mind to transcend our evolved biological limitations and psychological biases. Indeed, this may be more possible than ever, considering the great developments of modern science, in the face of the tough environmental conditions we may face in the twenty-first century due to the grand solar minimum affecting our planet.

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