

**Sylvia R. Karasu M.D.**

The Gravity of Weight

Havoc with Circadian Rhythms: "Light Pollution" and Weight

God said, "Let there be light," but not so much!

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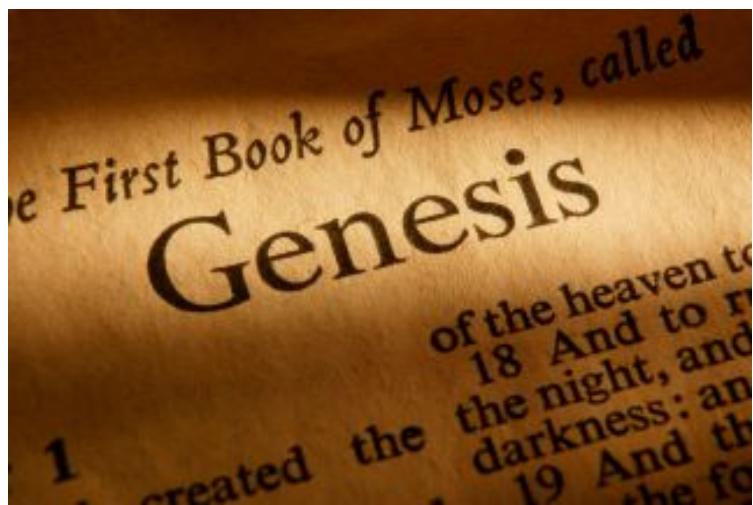


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How do environmental factors contribute to the increase in overweight and obesity in recent years? Most people focus on the fact that we have too much readily available food laden with addictive concoctions of fat, sugar, and salt. Furthermore, over time, portion size has increased so substantially that plates that were once around eight or nine inches have morphed into elliptical serving plate sizes of 12 or more inches, so much so that we have come to suffer from "portion distortion," as Brian Wansink and his colleagues have described. In other words, we no longer have appropriate "consumer norms" of what constitutes a single serving size. In his book, *The 9-Inch Diet*, for example, advertising executive Alex Bogusky tells how Americans, so used to buying super-sizes of everything, thought they were

buying individual drinking glasses when they were actually purchasing flower vases from the company Ikea!

We are also more likely to live in temperature-controlled environments such that we expend fewer calories to maintain our body temperature than we had before we had heating and air conditioning. Other researchers focus on exposure to environmentally toxic chemicals, the so-called "endocrine disruptors," that are found in our plastic food and beverage containers or even our shampoos and nail polish that may be contributory to weight gain.



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And of course, we are expending far fewer calories in our activities of daily living in a world where we have automated stairs, automobiles, televisions, and even energy-saving devices like washer-dryers and dishwashers than did our nomadic ancestors. It is estimated that these Stone Agers used about 1300 calories a day in this kind of physical activity where most of us, in comparison, are much more sedentary and on average, use only 550 calories per day. Even the use of email and instant messaging rather than walking to a colleague's office, may contribute to a slow

incremental creep of weight gain over time.

Along those lines, though, researchers believe that it may not be the sedentary lifestyle exclusively that devices like computers or television creates that are responsible for our increasing weight. It may be differences in light exposure that they and other modern devices, particularly in our 24/7 world, produce. Laura Fonken and her colleagues, for example, in a recent article in the *Proceedings of the National Academy of Sciences*, have suggested that over the years, our industrial societies have exposed us to nighttime lighting in all forms that may be playing havoc with our circadian rhythms and consequently our metabolic systems.

Circadian rhythms are the natural built-in biological clocks that are present in all light-sensitive organisms, from the lowly fruitfly to human beings. We now know that many cells and organ systems in the body can actually "sense" time. And many, if not most, of our hormones, such as the stress hormone cortisol, are secreted in a diurnal variation. Our biological rhythms are primarily synchronized by the natural light of the sun, but other environmental signals, including the timing of food intake or even the kinds of foods we eat, can affect these rhythms. Experiments have even demonstrated that drug-seeking behavior in rats can be affected by circadian rhythms such that cocaine cravings vary over 24 hours and cravings may last longer when attempts at extinction are carried out at certain times than others. Anecdotally, at least, the strength of cravings in humans can also vary over the course of a day.

Disorders of circadian rhythms can be caused experimentally, but the most common disorder is the one we know as "jet lag," also known as "circadian misalignment," a syndrome manifested by sleep disruption (including insomnia and/or excessive sleepiness) and other symptoms of malaise, due to a mismatch between a person's current environment and his or her usual sleep-wake pattern. The term "jet lag" specifically refers to a transient and time-limited syndrome brought on by jet travel across different time zones, but it can be used metaphorically for any shift in circadian rhythms. When there is a mismatch between a person's biological clock and his or her environment, we can speak of "social jet lag." Social jet

lag is commonly seen in adolescents who stay awake all night and sleep during the day. In its more chronic and insidious form, it is seen in those shift workers who work night after night. These workers are more prone to metabolic disturbances, including obesity and overt diabetes, and there have even been reports of increased substance abuse among them. Interestingly, people who suffer from the night-eating syndrome, in which they tend to consume most of their daily caloric intake after dinner, tend toward overweight and even obesity.

The researchers Fonken and her colleagues, working with mice, found that even small changes in the magnitude and timing of exposure to light led to weight gain and metabolic abnormalities in their experimental animals. They suggest that their findings may have relevance to humans: seemingly "innocuous" environmental changes in exposure to light at night—"light pollution," as they call it, such as by prolonged use of computers or even television—may also lead to changes in daily patterns of food intake and may be one additional environmental factor to consider in our proneness toward weight gain. So when God uttered his first words in *Genesis*, "Let there be light," perhaps He did not mean so much!



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About the Author



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In Print: *The Gravity of Weight: A Clinical Guide to Weight Loss and Maintenance*

Online: my own website

