

Study Brief:

Can we estimate the impact of modern technology on physical activity?

More than 5 million people around the world die from causes associated with a lack of physical activity. In a study recently published in *BMJ Open Sport & Exercise Medicine*, researchers with the UC San Diego Wertheim School of Public Health used physical activity data collected as part of a survey of agricultural workers in rural Malawi, whose lives are minimally affected by technology, and compared it to lifestyles of urban Americans. In this paper, the research team, in partnership with the World Bank, sought to estimate the impacts of technology-dominated lifestyles on sedentary time and physical activity.

Overview

The original purpose of the World Bank study in Malawi was to determine whether the agricultural workers grow enough food to support their physical activity-intensive lifestyles. For this paper we compared the Malawi results to those of urban residents of the United States who participated in prior studies.

The use of technology dominates the daily lives of most Americans. Transportation is dominated by cars, trucks, and other motorized devices. Work for many is centered around computers, industrial machines, power tools, and farm equipment. Leisure time is increasingly shifting to electronic screens. Most household chores are done by labor-saving devices and even robots. All of these technologies have reduced the need for physical activity.

It is reasonable to expect these technological developments have substantially reduced the physical activity of people in the United States and other high-income nations, compared to past centuries. This is an important question to answer because inadequate physical activity increases risk for most of the leading diseases and is responsible for over 5 million deaths annually worldwide.

With mechanical and electronic technologies being available worldwide, is it possible to find populations which are virtually untouched by them? If so, assessing physical activity of people living without technology and comparing results to people with broad access to multiple technologies could provide an estimate of the potential impact of technology on physical activity. A recent study did just that.

Methods

This study recruited farmers in the rural **Zomba and Ntcheu districts** of Malawi, a country in Southeast Africa. **Nearly all of the sampled farmers lacked electricity at home and did not own motorized vehicles.** Thus, their daily lifestyles are little touched by technologies, possibly providing examples of physical activity patterns that were much more common prior to the industrial revolution. The Malawi sample of 414 working age adults (15-85 years old) was compared to a US sample of 3258 of urban and suburban residents of the same age range measured in previous studies. The US sample relied daily on electronic devices, cars, and other technologies.

An important element of the study was the use of common methods for collecting and scoring physical activity data in both countries. Small electronic accelerometers were worn on a belt around the waist during waking hours for several days. Total days of monitoring (6.6 for Malawi, 6.3 for the US) and total hours of monitoring per day (14.2

for Malawi, 13.6 for the US) were similar across the samples and across the age range. Each minute of wearing time was classified into one of 5 intensity categories that were summarized as average minutes per day for each participant.

Results

The figure below shows substantial differences in physical activity and sedentary time across the Malawi and US samples. The biggest difference is that US participants spent 2 hours more per day than the Malawi residents being sedentary.

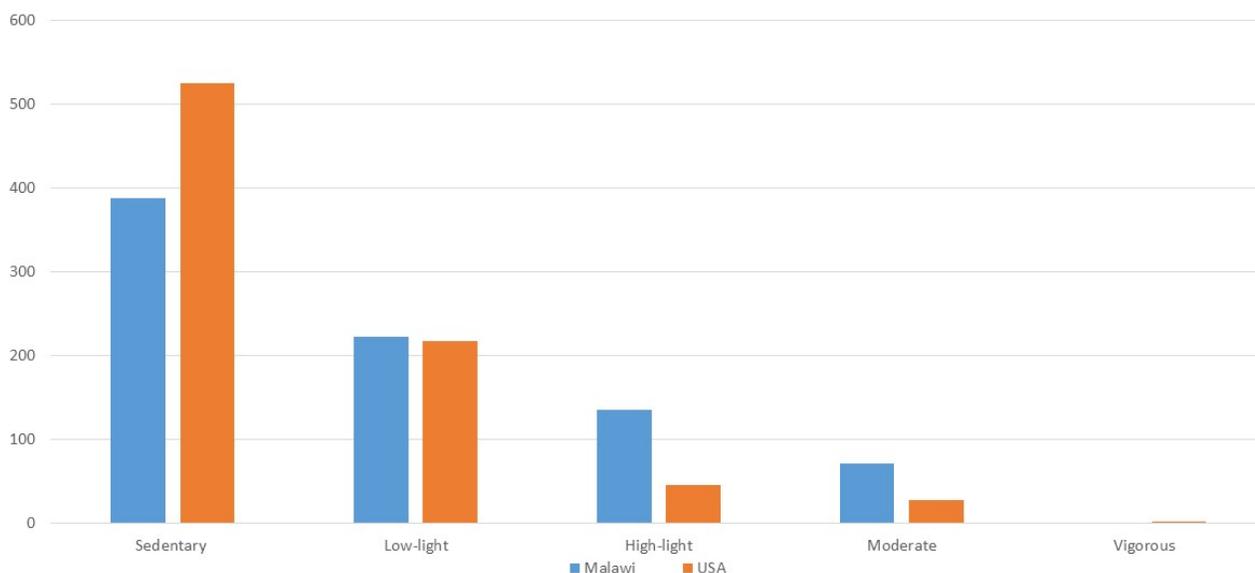
Both groups spent a substantial amount of time (about 3.5 hours) in low-light activities which would involve moving slowly or moving just a few seconds at a time. Malawians spent about 90 more minutes per day in high-light activity than Americans, which could include slow walking and activities such as hoeing fields that include slow leg movements but use of arms and hands.

Malawians spent almost triple the time in moderate physical activity compared to Americans. Moderate intensity includes brisk walking and activities of similar intensity. Moderate intensity activities are recommended for meeting physical activity guidelines.

Vigorous physical activity, such as jogging or dancing, was rare in both groups; only 1-2 minutes during the average day.

The percent of each group roughly meeting the US and World Health Organization physical activity guidelines was computed, using a definition of 30 minutes of moderate-to-vigorous physical activity per average day. The guideline was achieved by 94% of the Malawi sample but only 55% of the US sample.

Physical Activity and Sedentary Minutes per Day in Malawi and USA Samples



Conclusions

Almost all rural Malawians in this sample are physically active enough to protect health, compared to just over half of urban and suburban Americans. Malawians were sedentary 2 hours per day less than Americans, providing additional health benefits. Thus, the daily activity patterns of Malawians are considered much healthier than those of Americans. However, the results may have a different meaning in Malawi where hard work in predominantly subsistence and non-mechanized agriculture on family farms is essential for household food security. It is not clear whether they produce enough food to support their activity-intensive lifestyles.

We speculate the lifestyle of these rural farmers in Malawi who do not have access to electricity at home, motorized vehicles, or powered farm equipment is similar to the physical activity patterns of pre-industrial revolution populations. Their daily patterns might reflect a healthy level of physical activity that was much more common throughout most of human history.

The large differences in sedentary time and physical activity may provide an estimate of how much the recent dramatic shifts toward urban, technology-centric lifestyles have disrupted historical activity patterns and put health at risk.

The observation that virtually all but the oldest rural Malawians are meeting physical activity guidelines provides some confidence in the guidelines because it is clearly possible for populations to meet the guidelines. The extensive amount of “high-light” activity found in Malawi is intriguing because recent studies report activities at this intensity have health benefits.

The mechanization, motorization, and computerization of modern life may have profoundly changed patterns of daily activity for the worse, but these changes have been difficult to quantify previously.

Citation of the original paper

Pratt, M., Sallis, J.F., Cain, K.L., Conway, T.L., Lopez, A.P., Zezza, A., Spoon, C., Geremia, C., Gaddis, I., Amankwah, A., Friedman, J., and Kilic, T. (2020). Physical activity and sedentary time in a rural adult population in Malawi compared with an age-matched U.S. urban population. *BMJ Open Sport and Exercise Medicine*, e000812. DOI:10.1136/bmjsem-2020-000812.

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