

Sitting and diabetes in older adults: Does timing matter?

June 21 2018, by John Bellettiere, Andrea Lacroix And Matthew Mclaughlin



Credit: AI-generated image ([disclaimer](#))

Adults are sitting more than ever, and few pay attention to how they sit throughout the day.

Take a moment to think about all the reasons we sit. First off, you're

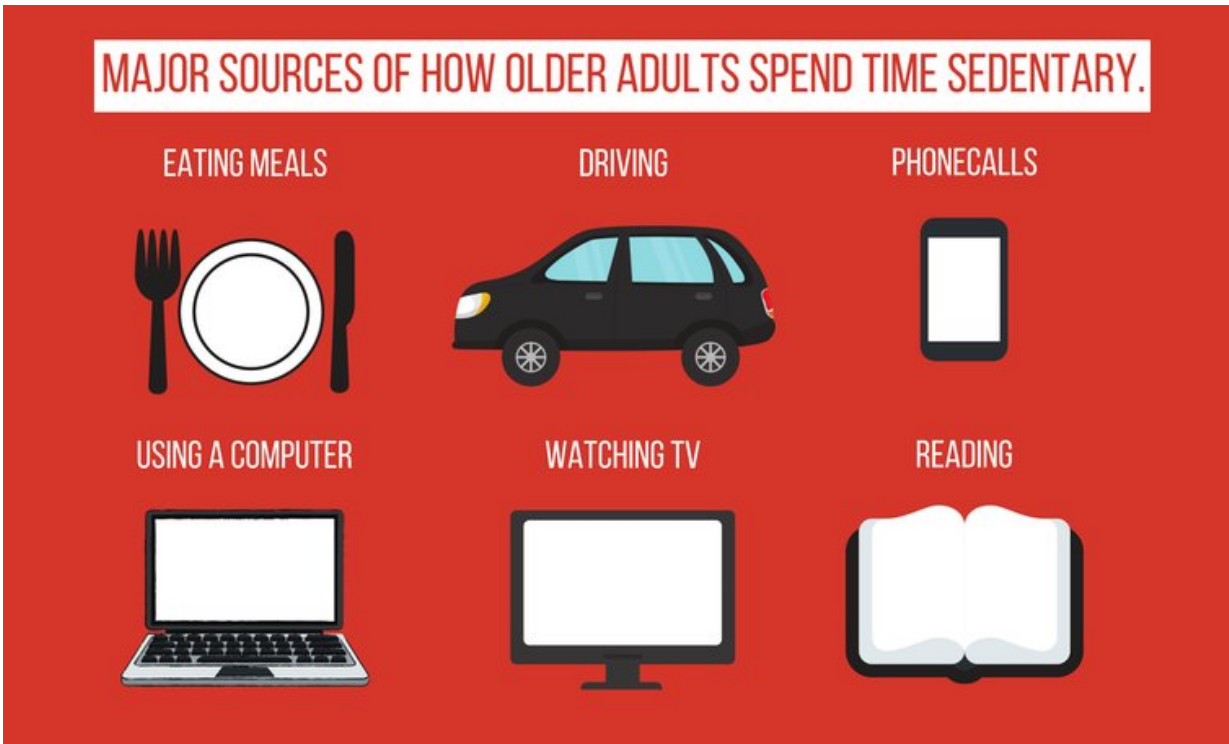
probably sitting while reading this. Some of the [most common sitting activities](#) include eating meals; driving; talking on the phone; using a computer, television, or small device; and reading. Now take another moment to think about all the sitting done across your lifetime.

The fact is, the amount of time spent sitting has increased over time. And with innovations such as Alexa, delivered groceries, and pre-made meal services, we expect many [older adults](#) will sit longer, and will do it more often. As of today, the [average older adult spends between](#) 56 percent and 86 percent of their waking day sedentary. That's a lot of sitting.

Our research team studies healthy aging and is interested in how sitting too much might contribute to [heart disease](#) and diabetes. [Our recent study](#) suggests that the way older [adults](#) accumulate their sitting time might be important for aging without diabetes.

What happens while sitting?

When you sit for long periods without getting up, the large [weight-bearing muscles of the legs](#) remain dormant. With no action, these muscles are unable to efficiently use the [sugars and fats](#) that float around in your blood—and in theory, this could lead to weight gain and [metabolic diseases](#) such as diabetes.



Older Americans spend a lot of time sitting. Credit: Matthew Mclaughlin/Figshare, CC BY-SA

At the same time, reduced blood flow in your arteries leads to hostile conditions that promote injury to the [blood vessel walls](#). Over a lifetime, this injury likely contributes to [heart disease](#) and to peripheral artery disease. Furthermore, when your leg muscles remain shut off for long periods, blood collects in your veins which leads to an increased risk for blood clots, or deep venous thrombosis. Standing up and moving around can stop these processes, but all too often, we just keep sitting.

Sitting patterns

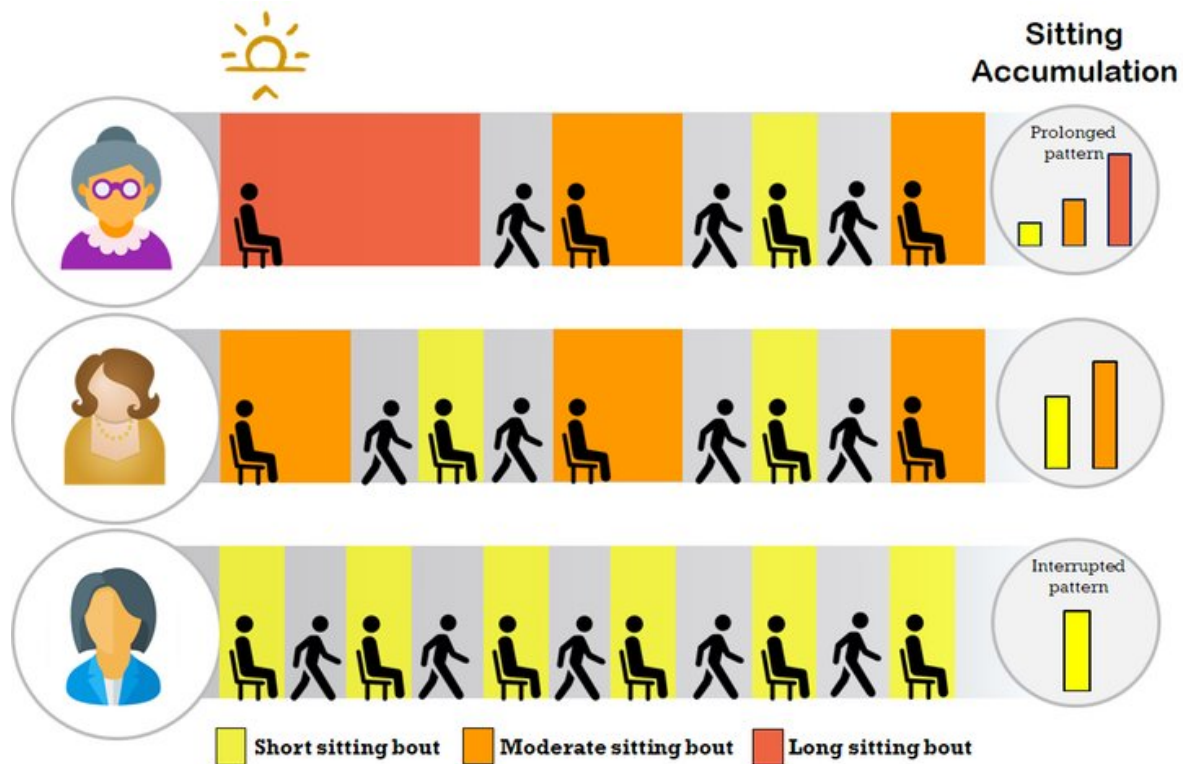
Sitting patterns describe how people sit throughout the day. Some people commonly sit for long periods at a time, rarely getting up. They are said

to have prolonged sitting patterns. Others rarely sit still. They regularly get up after sitting for just short periods. These sitters are said to have interrupted sitting patterns. Where do you fit on the sitting [pattern](#) spectrum?

Are sitting patterns important for metabolic health?

Emerging evidence suggests yes. From observational studies, we learned that adults with prolonged sitting patterns had [larger waistlines](#), [higher BMI](#), and in their blood had [less good fats](#), [more bad fats](#), and [higher levels of sugar](#) compared to adults with interrupted sitting patterns.

To test whether problems with fat and sugar metabolism were being caused by sitting patterns, [researchers](#) around the world conducted experiments. They brought adults into a laboratory at least two times each, having them sit continuously for about eight hours (an extreme prolonged pattern. On the second day, the participants were asked to get up every 20-30 minutes (a highly interrupted pattern). The interruptions lasted for two to five minutes and included standing still, light walking, simple resistance exercises or moderate-intensity walking, depending on the study.



Sitting can be accumulated in different patterns. Credit: John Bellettiere/figshare.com, CC BY-SA

When [researchers](#) synthesized evidence from most of the laboratory studies, the results were clear. On days with prolonged patterns, our [bodies are not](#) able to [metabolize fats or sugar](#) as well as they are on days with interrupted patterns. [Blood pressure](#) and [fatigue](#) were also higher on days with prolonged sitting compared to days with interrupted patterns.

These groundbreaking laboratory studies provided strong evidence that sitting patterns had an immediate effect on how the body processes fats and sugar, otherwise known as metabolism. This led to the idea that prolonged sitting patterns over a lifetime could contribute to metabolic diseases such as diabetes in later life. Since diabetes can take a long time

to develop, this question cannot be feasibly tested in a laboratory. Instead, we turned to an observational study of the population to help answer the question.

Are sitting patterns related to diabetes?

[We recruited](#) over 6,000 women aged 65-99 from the [Women's Health Initiative](#) and measured their sedentary patterns for seven days using research-grade activity monitors. We also had over 20 years of detailed health records, which included information on whether the women had ever been diagnosed by a physician with diabetes.

As expected, the group with the most prolonged sedentary patterns had the most women with diabetes. The group with the most interrupted patterns had the fewest women with diabetes.

We used advanced statistical procedures to account for differences in other factors such as dietary habits, physical activity, medication use, weight, age, alcohol and cigarette use, and overall health, giving us more confidence that the sitting patterns were in fact driving the findings. We should caution, however, that since we did not measure sitting patterns before the women were first diagnosed with diabetes, we do not know whether the sitting patterns contributed to diabetes or whether the diabetes changed their sitting patterns. We ran additional statistical tests to try to untangle that, which indicated that sitting patterns contributed to diabetes. However, additional studies specifically suited to answer the question of causation are needed.

- 1**
 - All adults, and particularly those with type 2 diabetes, should decrease the **amount** of time spent in daily sedentary behavior
- 2**
 - Prolonged sitting should be **interrupted** with bouts of light activity every 30 min for blood glucose benefits, at least in adults with type 2 diabetes.
- 3**
 - The above two recommendations are additional to, and not a replacement for, increased structured exercise and incidental movement.

Recommendations from the American Diabetes Association. Credit: Matthew Mclaughlin/figshare.com, CC BY-SA

While this was the first study of sedentary patterns and diabetes exclusively in older adults, our results were remarkably similar to recent findings in a younger cohort. Researchers from the Netherlands studied 2,500 adults ages 40-75 and found that [prolonged sitting patterns were associated with Type 2 diabetes and with metabolic syndrome.](#)

Conclusions and words of advice

Based on the findings from our study and those of the Dutch researchers, when viewed with the earlier epidemiologic data and findings from the

laboratory experiments, it seems that sitting patterns may contribute to the growing international diabetes [epidemic](#).

With that said, as with all science, these first few studies are only the beginning of the story. Much more work lies ahead. For the time being, there is a possibility that changing your sitting patterns might provide protection against [diabetes](#), especially if long sitting bouts were always broken with light activity or even better, [moderate-intensity activity](#), as [recommended](#) by the American Diabetes Association.

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