



**McMillan, K A and Kirk, A and Hewitt, A and Paing, A C and Chastin, S F M and Collier, A and MacRury, S (2018) Sedentary time and sedentary bout duration and waking glucose in adults with Type 2 diabetes. In: Diabetes UK Annual Professional Conference, 2018-03-14 - 2018-03-16, London ExCEL. ,**

This version is available at <https://strathprints.strath.ac.uk/64701/>

**Strathprints** is designed to allow users to access the research output of the University of Strathclyde. Unless otherwise explicitly stated on the manuscript, Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Please check the manuscript for details of any other licences that may have been applied. You may not engage in further distribution of the material for any profitmaking activities or any commercial gain. You may freely distribute both the url (<https://strathprints.strath.ac.uk/>) and the content of this paper for research or private study, educational, or not-for-profit purposes without prior permission or charge.

Any correspondence concerning this service should be sent to the Strathprints administrator: [strathprints@strath.ac.uk](mailto:strathprints@strath.ac.uk)

The Strathprints institutional repository (<https://strathprints.strath.ac.uk>) is a digital archive of University of Strathclyde research outputs. It has been developed to disseminate open access research outputs, expose data about those outputs, and enable the management and persistent access to Strathclyde's intellectual output.

# Sedentary Time and Sedentary Bout Duration and Waking Glucose in Adults with Type 2 diabetes

K A McMillan<sup>1</sup>; A Kirk<sup>1</sup>; A Hewitt<sup>1</sup>; A C Paing<sup>2</sup>; S F M Chastin<sup>2</sup>; A Collier<sup>2</sup>;  
S MacRury<sup>3</sup>

<sup>1</sup> School of Psychological Sciences & Health, University of Strathclyde, Glasgow, Scotland, G1 1QE

<sup>2</sup> School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, Scotland, G4 0BA

<sup>3</sup> Highland Diabetes Institute, University of Highlands and Islands, Inverness, Scotland, IV2 3JH

## Background

- People with Type 2 diabetes spend a significantly ( $p < 0.01$ ) higher proportion of their waking day sedentary than those without diabetes [1].
- Leading an active lifestyle is a recognised and recommended method of improving glucose in those with Type 2 diabetes [2].
- Studies have examined the relationship between objectively measured physical activity and sedentary behaviour and continuously measured glucose in a lab setting<sup>[3]</sup> but not in a freelifving setting.

## Aims

To explore the relationship between physical activity and sedentary behaviour with wake time mean glucose and glucose variability in adults with Type 2 diabetes using objective continuous measurement in a free living setting.

## Methods

- The study was of exploratory design using objective, continuous measurements in a freelifving setting.
- Sedentary behaviour and physical activity were measured using the activPAL accelerometer attached on the participants' right thigh.
- Glucose was measured through the interstitial fluid using the FreeStyle Libre flash continuous glucose monitor.



- The study was conducted over two visits.
- Participants were asked to go about their normal daily living for **3-14 days** whilst wearing the devices. Participants completed sleep, medication and food diaries.

## Data Analysis

- Per day, the average proportion (% of time) of the waking day spent sitting/lying, standing and stepping were calculated using the summary output file from the activPAL.
- Number of sedentary bouts and sedentary bout duration were calculated using the events output file from the activPAL.
- To examine the relationship between overall proportion of physical activity and sedentary behaviour, by day (including sedentary bout duration), with mean daily glucose and glucose variability, correlation analysis was conducted.
- However, individual regression analysis was used to explore the **individual** nature of these relationships.

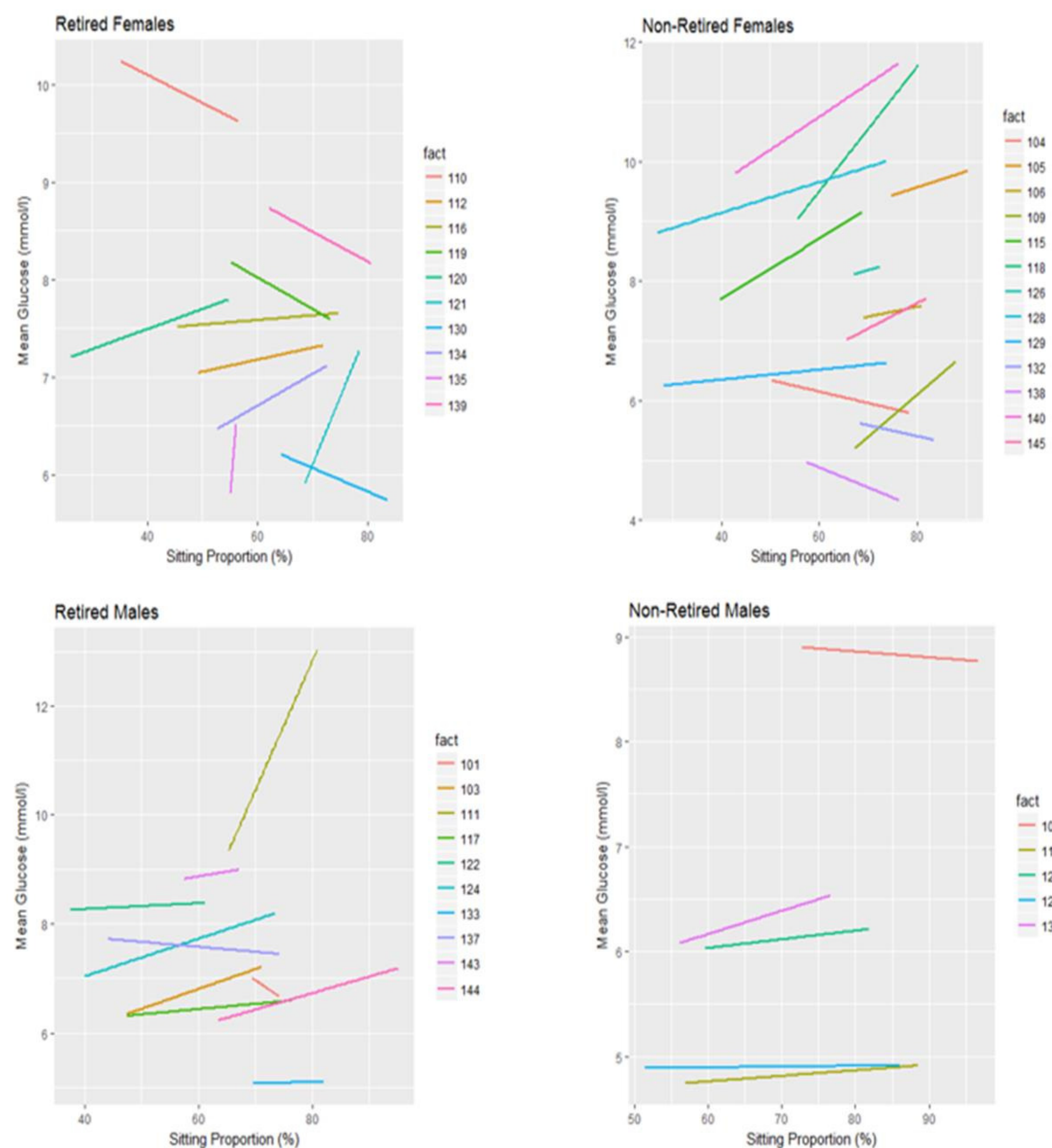
## Results

- 38 participants with Type 2 diabetes (mean age  $62.38 \pm 10.38$  yrs, mean BMI  $29.85 \pm 6.64$  kg/m<sup>2</sup>) managed with diet and medication (not insulin) were recruited.
- On average, participants spent 64.32% of their day sedentary, 44.80% of sedentary bouts identified were 30-60 minutes in duration and 23.64% were >60 minutes long.

## Results

- Mean glucose was negatively ( $r = -0.15$ ,  $p < 0.05$ ) associated with sedentary time but not sedentary bout duration.
- Glucose range ( $r = 0.43$ ,  $p < 0.05$ ) and glucose coefficient of variation ( $r = 0.22$ ,  $p < 0.05$ ) both positively correlated with sedentary bout duration.
- Sedentary time was negatively ( $r = -0.24$ ,  $p < 0.05$ ) associated with glucose CONGA.
- Individual regression analysis showed increased sitting time is associated with increased mean glucose in 28 of the participants, with a negative association being shown in 10 of the participants.

Figure 1. Illustration of individual relationship between daily sitting proportion and mean glucose in retired and non-retired males and females



## Conclusions

- In analysis of the whole group, increased sedentary time is associated with decreased mean glucose and increased glucose variability.
- **However, individual regression analysis identified a different relationship pattern with the majority of participants (n=28/38)** showing increased sitting time to be associated with increased mean daily glucose.
- This finding highlights the importance of conducting individual analysis when exploring the relationship between behaviour and health outcomes using continuous objective methods of measurement.
- Future analysis should explore the impact of food intake and medication as confounding variables within this analysis.

## References

- <sup>1</sup>van der Berg et al., (2016). Associations of total amount and patterns of sedentary behaviour with type 2 diabetes and the metabolic syndrome: The Maastricht Study. *Diabetologia*, 59(4), 709-718.
- <sup>2</sup>Colberg et al., (2016). Physical activity/ exercise and Diabetes: A position statement of the American Diabetes Association. *Diabetes Care*, 39:2065-2079.
- <sup>3</sup>Dempsey et al., (2016). Benefits for type 2 diabetes of interrupting prolonged sitting with brief bouts of light walking or simple resistance activities. *Diabetes Care*, 39(6):964-72.