

ASSOCIATIONS BETWEEN SCREEN TIME AND GLYCEMIC CONTROL IN ADULTS WITH AND WITHOUT TYPE 2 DIABETES

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Abstract

PURPOSE: To assess the associations between screen time (ST) and glycemic control, as measured by glycated hemoglobin levels (HbA1c), in middle-aged to older adults with and without type 2 diabetes. **METHODS:** adults (mean±SD: age: 49.1±18.4y; 70.8) participated in the study. Screen time was subjectively measured through an 18-item screen-time questionnaire. Total sedentary time was subjectively measured using the Sedentary Behavior Questionnaire. A finger stick blood draw was completed to measure HbA1c. Participants then completed a food frequency questionnaire online using the NIH Diet History Questionnaire III. Pearson correlation analyses were used to assess the simple and partial associations among the variables while controlling for age, sex, and dietary carbohydrates. **RESULTS:** The majority of participants were non-Hispanic white (88%), non-smokers (88%) and had family history of Type 2 diabetes (46%). On average, participants spent 509.6 ±160.9 min·d⁻¹ in sedentary behavior (SB; 53% of the waking day). Of this time, 444.8 ± 156.9 min·d⁻¹ were spent on a screen. Participants engaged in background screen time 135.7 ±149.09 min·d⁻¹. Significant positive correlations (p<0.05) were found between HbA1c and total SB (r= 0.615), and ST (r=0.578), and Background ST (r= 0.572). **CONCLUSIONS:** Participants spend large amounts of their day engaged in sedentary behavior, which is consistent with national data. Moreover, of this time spent in sedentary behavior, the majority is spent looking at a screen. Our preliminary findings suggest that increased screen time is associated with higher HbA1c and risk of type 2 diabetes.

Background

Screen-based sedentary behaviors, such as smartphone and tablet use, have significantly increased in recent years. Engaging in screen time has been shown to promote unhealthy behaviors, such as snacking, and has been linked to an increased risk for chronic diseases, such as cardiovascular disease and diabetes (Wang, Li, & Fan, 2019). To reduce these health impacts, researchers have focused their studies on how individuals with type 2 diabetes are able to control glycemic levels through regular physical activity. What researchers are discovering is that a lack of physical activity and increases in total sedentary behavior are associated with higher amounts of time spent on a screen, which may impact glycemic control (O'Brien, Issartel, & Belton, 2018). Although there is a paucity of data on this topic, new research is emerging and demonstrating a relationship between screen time and glycemic control, but much is still unknown. The findings from this study will help bridge the literature gap regarding screen time and its role in an individual's level of sedentary behavior and their glycemic control.

Purpose

To investigate associations between screen time and glycemic control in adults with and without type 2 diabetes.



Methods

Participants were adults aged ≥ 18 years with and without type 2 diabetes

Exclusion criteria: irritable bowel syndrome, Crohn's, ulcerative colitis, celiac disease, colon cancer, multiple sclerosis, Parkinson's disease, Alzheimer's disease, type 1 diabetes, or currently pregnant or breast feeding.

Measurements:

- Visit 1
 - Self-Reported Questionnaires:
 - Health History Questionnaire
 - Sedentary Behavior Questionnaire
 - Estimates and totals amount of sedentary behavior spent over multiple activities.
 - Screen Time Questionnaire
 - Quantifies the use of modern screen-based devices.
 - International Physical Activity Questionnaire (IPAQ)
 - Used to obtain comparable data on health-related physical activities at work, home and leisure.
 - Height, weight.
 - Finger stick blood draw assessing hemoglobin A1c
 - Food frequency questionnaire using the NIH Diet History Questionnaire III
- Analysis: Pearson correlation analyses were used to assess the simple and partial associations among the variables while controlling for age, sex, and dietary carbohydrates.

Results

A total of 24 adults participated in the study, 7 men and 17 women. Three (13%) participants had type 2 diabetes and 11 (46%) had a family history of type 2 diabetes.

TABLE 1. Descriptive statistics for the sample

VARIABLE	MEAN ± SD	RANGE
Age (y)	49.1 ± 18.4	21.0-79.0
BMI (kg/m ²)	30.5 ± 7.6	14.5-56.9
Sedentary Behavior (min·d ⁻¹)	509.6 ± 160.9	250.7-882.9
Screen Time (min·d ⁻¹)	444.8 ± 156.9	120.0-660.0
Background Screen Time (min·d ⁻¹)	135.7 ± 149.0	0-720.0
Leisure PA (MET min·d ⁻¹)	189.2 ± 150.6	0-478.3
HbA1c (%)	5.6 ± 0.8	4.9-8.2
Glucose (mg·dL ⁻¹)	102.5 ± 37.4	77-268
Energy Intake (kcal)	1794.3 ± 731.9	712.4-3572.1
Total Carbohydrates (g)	187.2 ± 90.2	75.9-362.4
Total Fats (g)	78.7 ± 33.8	27.4-170.9
Total Protein (g)	77.9 ± 31.7	26.1-162.6

BMI, body mass index; PA, physical activity; HbA1c, glycated hemoglobin

Results cont.

TABLE 2. Partial correlations between sedentary behavior, screen time and markers of glycemic control.

VARIABLE	HbA1c (%)	Glucose (mg/dL)
Sedentary Behavior (min·d ⁻¹)	0.615*	0.740*
Screen Time (min·d ⁻¹)	0.578*	0.520*
Background Screen (min·d ⁻¹)	0.572*	0.782*

*p<0.05 controlling for age, sex, and carbohydrate intake; HbA1c, glycated hemoglobin

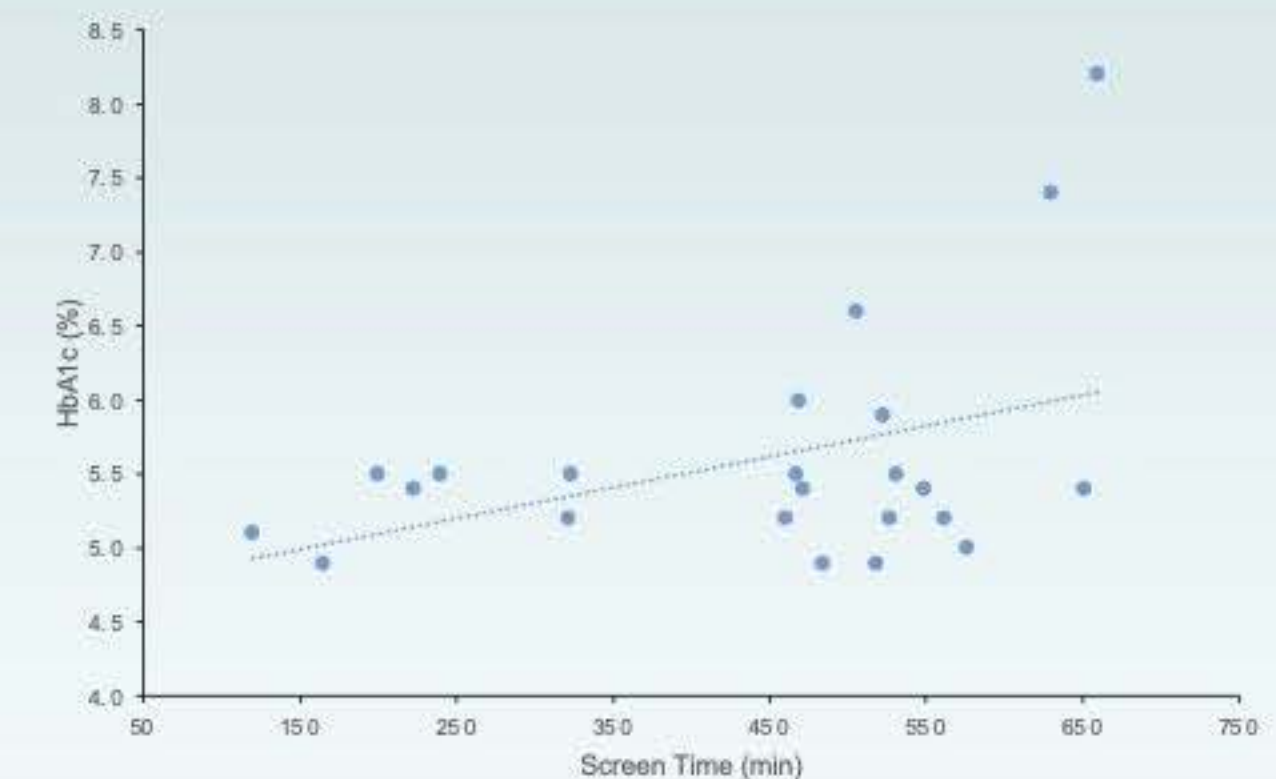


FIGURE 1. Correlation between screen time and HbA1c

Discussion

- Participants spent the majority of their waking day engaged in sedentary behavior, which is consistent with national data.
- The majority of time engaged in sedentary behavior is spent looking at a screen.
- On average, most of an individual's total screen time was spent on a computer/laptop.
- Our preliminary findings suggest that screen time is associated with glycemic control and risk of type 2 diabetes.
- Further research is needed to develop successful interventions to reduce screen time and sedentary behavior in adults.