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Title: A feasibility study to examine whether time spent outdoors during the summer affects acute daily blood glucose and steps

Background: Physical activity has been positively associated with glycemic control in persons with type 2 diabetes (T2D) while exposures to extreme heat have been negatively associated with glycemic control. This study investigated whether it would be feasible to detect small changes in glycemic control related to these environmental exposures.

Methods: In the summer of 2017, women participants with T2D who reported measuring fasting blood glucose daily in rural West Central Alabama and urban Birmingham, AL (N=46) wore an iBUTTON temperature monitor and pedometer. They recorded their fasting blood glucose daily in a log. They went about their normal activities for 2 days (baseline) and were asked to add 30 minutes of time outdoors during days 3-7 (intervention). T-tests and linear mixed effects models tested whether blood glucose values decreased during intervention days, whether steps as measured by pedometer and temperature exposure increased during intervention days.

Results: According to the self-reported daily logs, participants were compliant on 76.1% of intervention days (n=175 person-days). When examining only compliant days, participants did not take significantly more steps (3983 compared to 3960, p-value=0.99) nor were they exposed to higher temperatures (25.9 compared to 26.1, p-value= 0.29) on intervention days compared to baseline days. However, fasting glucose was significantly lower on intervention versus baseline days (133 compared to 141, p-value 0.05). In linear mixed effects models, fasting glucose was positively associated with steps on the same day; however, neither steps nor temperature exposure were significantly associated with fasting glucose on the following day.

Conclusions: The present study suggests spending an additional 30 minutes outdoors may not improve physical activity as measured by steps or increase average temperature exposure. Although participants received two check-in phone calls, barriers to spending time outdoors may have resulted in noncompliance with the study design.