ActiGraph-Measured Breaks in Sedentary Behavior; Are They Real Transitions From Sitting to Standing?

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Previous publications have shown a link between free-living ActiGraph accelerometer-measured breaks in sedentary behavior (BREAKS) and various markers of cardio-metabolic health. To our knowledge, there is limited evidence supporting the validity of ActiGraph-measured BREAKS. A true BREAK has been defined as a transition from sitting to standing. However, the measurement of sedentary behavior by the ActiGraph relies on a lack of movement (usually <100 counts/min) without any indication of body posture and a BREAK has been defined as a transition from <100 to ≥100 activity counts/min. **PURPOSE:** To evaluate the accuracy of the number and time of BREAKS measured by the ActiGraph. **METHODS:** The activPAL served as the criterion measure since it has been shown to accurately measure BREAKS using the manufacturer's proprietary algorithm that determines a transition from sitting (or lying) to upright behaviors. A total of 15 participants wore both an ActiGraph GT3X+ at the waist and an activPAL on the right thigh for 7 consecutive days (24 h/day - removing them only when in contact with water). This analysis focused on data collected between 7am and 10pm only. Two participants' data were excluded due to a lack of compliance with the study protocol. ActivPAL and ActiGraph BREAKS were determined. Data from both devices were matched on minute-by-minute timestamps while also applying a 3-min allowance window to account for known clock drift. Dependent t-tests were used to infer statistical significance between ActiGraph and activPAL BREAK count estimates. **RESULTS:** The activPAL detected 39±11 BREAKS/day (mean±SD) while the ActiGraph detected 74±15 BREAKS/day ($p<0.001$). On average, the ActiGraph detected 67% of the activPAL BREAKS while 65% of the ActiGraph-measured BREAKS did not correspond with activPAL BREAKS. Fifty-two percent of those non-corresponding ActiGraph-determined BREAKS, occurred when the activPAL indicated that the participant was sitting, 42% when standing, and 6% when transitioning from standing to sitting. **CONCLUSION:** The ActiGraph detected a significantly higher number of BREAKS when compared to the activPAL and 65% of its detected BREAKS did not correspond to posture-based definitions of BREAKS in free-living. For the most part, ActiGraph BREAKS do not correspond to sit-stand transitions.