**Appendix 2.**

***Full Description of Measurement Error Modeling Methods and Assumptions***

Ideally, we would want to assess the level of agreement between the true, but unobserved, hours of time spent in active and sedentary behaviors estimated by the PDR and ActiGraph (AG) on a given day. Specifically, we would inquire about the relationships between and , and between and , where , , and are the hours individual i spent in sedentary behaviors on day j in truth, as estimated by the PDR, and as estimated by the AG. Similarly, we would inquire about the relationships between and , and between and , where , , and  are the hours spent in active behavior in truth, and as estimated by the PDR and AG.

These relationships of interest, between the truth and test instruments, could be estimated by fitting the following sets of equations. We assume only the activPAL to be unbiased,



where the general superscript T can be replaced by either PDR or AG, is the person-specific bias, and are the random errors for the test instrument and activPAL, and are the usual hours spent in each behavior, and is the day-to-day variability. Person-specific bias for the PDR () quantifies the degree to which individuals consistently over- or under-report their behavior. We further assume that ,, , and  are independent and normally distributed with variances ,,, and  respectively.



Fitting these models would require estimates for all parameters, including, , var(Si), and var(Ti). However, given the modest sample size for each gender and age group, the need to estimate all parameters induces a comparatively large variance of. Therefore, coupled with evidence that the activPAL has little error, we chose to make the assumption that , allowing us to replace the equations above with



Estimates ofmay be slightly biased toward the null, but the reduction in their variance should improve their overall accuracy. Therefore, our discussion of measurement “error” is phrased in terms of the difference between the measurements from the test instruments and the activPAL.