

Supplemental Figure 1. Bland-Altman plots depicting error scores (indirect calorimetry minus prediction equation) for (A) Actical single regression equation, (B) Actigraph Nichols VO₂ equation, (C) Actigraph Freedson MET equation, (D) Actigraph Yngve overground walking equation, (E) Actigraph Yngve Treadmill walking equation, (F) Actigraph Hendelman walking equation, (G) Actigraph Leenders equation, (H) Actigraph Heil equation, (I) Actigraph Hendelman lifestyle equation, (J) Actigraph Brooks overground walk kcal with body mass equation, (K) Actigraph Brooks overground walk METs with body mass equation, (L) Actigraph Brooks overground walk MET equation, (M) Actigraph Brooks overground walk kcal equation. Solid line represents mean difference, and dashed lines represent 95% prediction intervals of the individual error scores. Values below zero represent over-estimation and values above zero represent underestimation versus the criterion.

Online Supporting Material

Supplemental Table 1: Mean (SD) MET values for the Cosmed K4b², 2 Actical equations, and AMP-331 during 18 structured activities.

	Measured METs	Actical Single Regression equation	Actical 2- Regression equation	AMP-331
Lying	0.93 (0.22)	0.97 (0.02)	0.97 (0.02)	1.50 (0.03)*
Computer Work	1.02 (0.20)	0.91 (0.3)	0.91 (0.03)	1.50 (0.03)
Standing	1.19 (0.26)	0.90 (0.00)	0.9 (0.00)	1.51 (0.04)*
Filing papers	1.59 (0.32)	1.02 (0.28)*	1.02 (0.28)*	1.53 (0.08)
Washing Dishes	2.08 (0.27)	1.03 (0.18)*	1.03 (0.18)*	1.51 (0.06)*
Washing windows	3.01 (0.54)	2.01 (0.50)*	2.03 (0.54)*	1.75 (0.31)*
Slow Walk (avg. 81 m·min ⁻¹)	3.49 (0.69)	4.35 (0.33)*	4.28 (0.29)*	3.33 (0.48)
Vacuum	3.57 (0.51)	2.45 (0.43)*	2.42 (0.44)*	2.68 (0.39)*
Sweep/mop	3.57 (0.65)	2.37 (0.51)*	2.41 (0.58)*	2.39 (0.42)*
Raking grass/leaves	4.07 (0.85)	2.97 (0.48)*	3.31 (0.74)*	2.70 (0.36)*
Fast Walk (avg. 103 m·min ⁻¹)	4.42 (0.95)	5.21 (0.41)*	5.10 (0.40)*	4.57 (0.98)
Stationary Cycling (avg. 99 watts)	6.13 (1.53)	1.88 (0.93)*	1.95 (1.08)*	2.14 (0.67)*
Lawn Mowing	6.14 (0.76)	3.91 (0.35)*	4.22 (0.32)*	2.88 (0.19)*
Ascending/Descending Stairs	6.40 (0.77)	4.35 (0.23)*	4.26 (0.22)*	2.83 (0.04)*
Racquetball	6.81 (1.38)	4.34 (0.31)*	4.30 (0.27)*	3.00 (0.03)*
Basketball	7.94 (1.05)	5.13 (0.37)*	5.03 (0.37)*	3.12 (0.15)*
Slow Run (avg. 159 m·min ⁻¹)	8.65 (1.32)	8.71 (0.63)	8.54 (0.62)	5.11 (1.40)*
Fast Run (avg. 189 m·min ⁻¹)	10.25 (1.74)	9.23 (0.72)*	9.04 (0.71)*	5.65 (1.56)*
Average for all activities	4.51 (2.85)	3.43 (2.48)*	3.43 (2.43)*	2.78 (1.38)*

* Significantly different from Cosmed K4b² (P < 0.05); avg. = average.

Supplemental Table 2: Mean (SD) MET values for the Cosmed K4b², 3 Actigraph kcal equations (Freedson et al. kcal equation, and 2 Brooks et al. kcal equations), and 2 Actigraph lifestyle equations (Swartz et al. and Hendelman et al.).

	Measured METs	Actigraph Freedson Kcal equation	Actigraph Brooks kcal	Actigraph Brooks kcal with BM	Actigraph Swartz equation	Actigraph Hendelman Lifestyle equation
Lying	0.93 (0.22)	1.86 (1.42)*	2.85 (0.65)*	2.41 (0.15)*	2.61 (0.00)*	2.92 (0.00)*
Computer Work	1.02 (0.20)	1.87 (1.42)*	2.85 (0.65)*	2.41 (0.15)*	2.61 (0.01)*	2.92 (0.00)*
Standing	1.19 (0.26)	1.87 (1.42)*	2.85 (0.65)*	2.41 (0.15)*	2.61 (0.01)*	2.93 (0.01)*
Filing papers	1.59 (0.32)	1.90 (1.43)	2.86 (0.65)*	2.42 (0.16)*	2.64 (0.07)*	2.94 (0.04)*
Washing Dishes	2.08 (0.27)	1.79 (1.51)	2.94 (0.70)*	2.43 (0.17)*	2.67 (0.09)*	2.96 (0.06)*
Washing windows	3.01 (0.54)	2.03 (1.51)*	3.03 (0.71)	2.54 (0.18)*	2.88 (0.18)	3.09 (0.11)
Slow Walk (avg. 81 m·min ⁻¹)	3.49 (0.69)	4.51 (0.91)*	4.09 (0.80)	3.77 (0.30)	5.02 (0.48)*	4.36 (0.29)*
Vacuum	3.57 (0.51)	2.36 (1.38)*	3.17 (0.78)*	2.70 (0.16)*	3.15 (0.25)*	3.25 (0.15)*
Sweep/mop	3.57 (0.65)	2.26 (1.46)*	3.13 (0.74)*	2.65 (0.18)*	3.08 (0.24)*	3.20 (0.14)*
Raking grass/leaves	4.07 (0.85)	2.58 (1.33)*	3.25 (0.81)*	2.81 (0.19)*	3.34 (0.32)*	3.36 (0.19)*
Fast Walk (avg. 103 m·min ⁻¹)	4.42 (0.95)	5.91 (0.78)*	4.64 (0.94)	4.44 (0.43)	6.18 (0.57)*	5.05 (0.34)*
Stationary Cycling (avg. 99 watts)	6.13 (1.53)	2.34 (1.49)*	3.03 (0.63)*	2.64 (0.29)*	3.08 (0.56)*	3.21 (0.33)*
Lawn Mowing	6.14 (0.76)	3.66 (1.43)*	3.68 (0.78)*	3.33 (0.23)*	4.32 (0.52)*	3.94 (0.31)*
Ascending/Descending Stairs	6.40 (0.77)	4.46 (0.91)*	3.87 (0.93)*	3.66 (0.30)*	4.86 (0.46)*	4.26 (0.27)*
Racquetball	6.81 (1.38)	4.74 (1.06)*	4.15 (0.97)*	3.87 (0.52)*	5.16 (0.72)*	4.44 (0.43)*
Basketball	7.94 (1.05)	6.34 (0.93)*	4.78 (1.05)*	4.64 (0.57)*	6.52 (0.78)*	5.25 (0.46)*
Slow Run (avg. 159 m·min ⁻¹)	8.65 (1.32)	8.93 (1.44)	5.82 (1.27)*	5.89 (0.90)*	8.70 (1.04)	6.55 (0.62)*
Fast Run (avg. 189 m·min ⁻¹)	10.25 (1.74)	9.57 (2.37)*	6.08 (1.56)*	6.20 (1.33)*	9.20 (1.71)*	6.85 (1.02)*
Average for all activities	4.51 (2.85)	3.86 (2.76)*	3.73 (1.32)*	3.41 (1.26)*	4.39 (2.13)*	3.98 (1.27)*

*Significantly different from Cosmed K4b² (P < 0.05); avg. = average; BM = body mass.

Supplemental Table 3: Mean (SD) MET values for the Cosmed K4b², 9 Actigraph MET equations.

	Measured METs	Actigraph Freedson MET equation	Actigraph Hendelman Walk equation	Actigraph Heil Equation	Actigraph Leenders equation	Actigraph Yngve TM walk equation	Actigraph Yngve OG walk equation	Actigraph Nichols vo2 equation	Actigraph Brooks OG walk	Actigraph Brooks OG walk with BM
Lying	0.93 (0.22)	1.44 (0.00)*	1.60 (0.00)*	1.52 (0.21)*	2.24 (0.00)*	1.14 (0.00)	0.75 (0.00)	1.73 (0.00)*	2.32 (0.00)*	2.42 (0.26)*
Computer Work	1.02 (0.20)	1.44 (0.01)*	1.60 (0.00)*	1.53 (0.21)*	2.24 (0.00)*	1.14 (0.01)	0.75 (0.01)	1.73 (0.01)*	2.32 (0.00)*	2.42 (0.26)*
Standing	1.19 (0.26)	1.45 (0.02)*	1.61 (0.01)*	1.53 (0.21)*	2.25 (0.01)*	1.15 (0.02)	0.76 (0.02)*	1.74 (0.01)*	2.32 (0.01)*	2.43 (0.26)*
Filing papers	1.59 (0.32)	1.48 (0.08)	1.64 (0.07)	1.55 (0.23)	2.27 (0.06)*	1.18 (0.09)*	0.79 (0.09)*	1.77 (0.08)	2.34 (0.04)*	2.44 (0.24)*
Washing Dishes	2.08 (0.27)	1.51 (0.11)*	1.66 (0.09)*	1.55 (0.21)*	2.30 (0.08)	1.21 (0.11)*	0.83 (0.11)*	1.80 (0.10)	2.36 (0.05)	2.48 (0.26)*
Washing windows	3.01 (0.54)	1.76 (0.21)*	1.86 (0.17)*	1.74 (0.24)*	2.48 (0.16)*	1.46 (0.22)*	1.08 (0.22)*	2.02 (0.19)*	2.47 (0.10)*	2.59 (0.24)*
Slow Walk (avg. 81 m min ⁻¹)	3.49 (0.69)	4.24 (0.56)*	3.85 (0.45)*	3.67 (0.43)	4.35 (0.42)*	4.04 (0.58)*	3.64 (0.58)	4.29 (0.51)*	3.62 (0.26)	3.78 (0.29)
Vacuum	3.57 (0.51)	2.07 (0.29)*	2.11 (0.23)*	1.99 (0.27)*	2.72 (0.22)*	1.79 (0.30)*	1.41 (0.30)*	2.31 (0.26)*	2.62 (0.13)*	2.74 (0.27)*
Sweep/mop	3.57 (0.65)	1.99 (0.28)*	2.04 (0.22)*	1.92 (0.29)*	2.65 (0.21)*	1.70 (0.29)*	1.32 (0.29)*	2.23 (0.26)*	2.58 (0.13)*	2.70 (0.26)*
Raking grass/leaves	4.07 (0.85)	2.28 (0.37)*	2.28 (0.30)*	2.15 (0.34)*	2.88 (0.28)*	2.01 (0.39)*	1.62 (0.38)*	2.50 (0.34)*	2.71 (0.17)*	2.84 (0.28)*
Fast Walk (avg. 103 m min ⁻¹)	4.42 (0.95)	5.58 (0.66)*	4.92 (0.53)*	4.71 (0.52)	5.36 (0.50)*	5.43 (0.68)*	5.02 (0.68)*	5.51 (0.60)*	4.25 (0.31)	4.40 (0.35)
Stationary Cycling (avg. 99 watts)	6.13 (1.53)	1.99 (0.65)*	2.05 (0.52)*	1.94 (0.56)*	2.66 (0.49)*	1.71 (0.67)*	1.32 (0.67)*	2.24 (0.59)*	2.58 (0.30)*	2.68 (0.23)*
Lawn Mowing	6.14 (0.76)	3.42 (0.61)*	3.19 (0.49)*	3.02 (0.48)*	3.74 (0.46)*	3.19 (0.63)*	2.80 (0.62)*	3.54 (0.55)*	3.24 (0.28)*	3.36 (0.26)*
Ascending/Descending Stairs	6.40 (0.77)	4.05 (0.53)*	3.70 (0.42)*	3.53 (0.40)*	4.21 (0.40)*	3.84 (0.55)*	3.44 (0.55)*	4.12 (0.48)*	3.53 (0.25)*	3.64 (0.31)*
Racquetball	6.81 (1.38)	4.39 (0.84)*	3.97 (0.67)*	3.82 (0.71)*	4.47 (0.63)*	4.20 (0.87)*	3.80 (0.86)*	4.43 (0.77)*	3.70 (0.39)*	3.84 (0.47)*
Basketball	7.94 (1.05)	5.97 (0.90)*	5.24 (0.72)*	5.04 (0.73)*	5.66 (0.68)*	5.84 (0.93)*	5.42 (0.93)*	5.87 (0.82)*	4.43 (0.42)*	4.58 (0.48)*
Slow Run (avg. 159 m min ⁻¹)	8.65 (1.32)	8.49 (1.20)	7.26 (0.96)*	6.98 (1.01)*	7.56 (0.91)*	8.46 (1.25)	8.03 (1.24)	8.18 (1.10)	5.60 (0.56)*	5.76 (0.58)*
Fast Run (avg. 189 m min ⁻¹)	10.25 (1.74)	9.08 (1.98)*	7.73 (1.59)*	7.46 (1.73)*	8.01 (1.50)*	9.06 (2.06)*	8.63 (2.05)*	8.72 (1.81)*	5.88 (0.92)*	6.03 (0.95)*
Average for all activities	4.51 (2.85)	3.50 (2.47)*	3.26 (1.98)*	3.11 (1.94)*	3.80 (1.87)*	3.28 (2.57)*	2.88 (2.55)*	3.62 (2.26)*	3.28 (1.15)*	3.40 (1.18)*

* Significantly different from Cosmed K4b² (P < 0.05); avg. = average; TM = treadmill; OG = over-ground; BM = body mass

Supplemental table 4. Relationship between each prediction equation and the Cosmed K4b² for the estimation of energy expenditure for 18 different activities. All prediction equation had a significant relationship (P < 0.001)

Prediction Equation	Beta	Slope	R ²	Standard Error of the Estimate
Actical 2-regression equation	1.112	0.993	0.719	1.535
Actical single regression equation	1.185	0.971	0.717	1.539
Actigraph Nichols equation	0.812	1.026	0.656	1.695
Actigraph Freedson MET equation	1.238	0.939	0.656	1.695
Actigraph Swartz lifestyle equation	-0.245	1.088	0.656	1.695
Actigraph Yngve OG walk/run equation	1.905	0.910	0.656	1.695
Actigraph Yngve TM walk run equation	1.561	0.905	0.656	1.695
Actigraph Hendelman walk equation	0.715	1.170	0.656	1.695
Actigraph Hendelman lifestyle equation	-2.744	1.825	0.656	1.695
Actigraph Leenders equation	-0.198	1.244	0.656	1.695
Actigraph Brooks MET OG walk equation	-2.091	2.017	0.656	1.695
Actigraph Brooks MET OG walk with BM equation	-2.149	1.957	0.652	1.707
Actigraph Heil equation	0.837	1.188	0.648	1.715
Actigraph Brooks kcal OG walk with BM equation	-1.564	1.787	0.625	1.771
Actigraph Freedson kcal equation	1.656	0.752	0.530	1.983
AMP-331	0.420	1.491	0.511	2.026
Actigraph Brooks kcal OG walk equation	-0.858	1.441	0.436	2.173

TM, treadmill; OG, over-ground; BM, body mass; *significant (P < 0.001).