

Table 2: Agreement Between Predicted and Measured AEE by Diagnosis

Diagnosis	Actical ICC _(2,1) (95% CI)	Actigraph ICC _(2,1) (95% CI)		
	Puyau et. al	Corder et. al	Freedson et. al	Puyau et. al
Chronic Illness (combined)	0.40 (0.35-0.45)	0.26 (0.20-0.30)	0.32(0.30-0.40)	0.21(0.10-0.30)
CF	0.39 (0.27-0.50)	0.28 (0.14-0.40)	0.36 (0.23-0.48)	0.21(0.09-0.30)
CHD	0.43 (0.27-0.58)	0.26 (0.03-0.50)	0.35 (0.08-0.58)	0.20 (0.00-0.63)
HE	0.46 (0.36-0.58)	0.26 (0.14-0.39)	0.35 (0.22-0.46)	0.21 (0.08-0.36)
IMD	0.38 (0.25-0.50)	0.31 (0.17-0.45)	0.36 (0.21-0.49)	0.25 (0.10-0.39)
JDM	0.34 (0.21-0.45)	0.17 (0.00-0.33)	0.18 (0.02-0.34)	0.13 (0.00-0.30)
JA	0.41 (0.30-0.52)	0.28 (0.14-0.40)	0.35 (0.22-0.47)	0.22 (0.09-0.35)
Healthy	0.41 (0.30-0.52)	0.30 (0.20-0.40)	0.39 (0.30-0.50)	0.23 (0.10-0.40)

CF = Cystic Fibrosis; CHD = Congenital Heart Disease; HE = Hemophilia; IMD = Inherited Muscle Disease; JDM = Juvenile Dermatomyostis; JA = Juvenile Arthritis.

Table 3: Disease Specific Prediction Equations. Two prediction equations are presented for each type of Accelerometer (Actical or Actigraph) one equation with Heart-Rate and one equation without Heart-Rate for Estimating METs.

Diagnosis	Prediction Equation	Limits of Agreement Mean difference (lower and upper bounds)	Paired Difference T-value (P- value)	Device
CF	$\text{METs} = -3.3 - 0.07(\text{zero counts}) + 0.52 \times \log(\text{counts}+100) + 0.026(\text{heart rate})$	-0.01 (-1.5 to 1.5)	-1.2 (0.24)	Actigraph
	$\text{METs} = -2.7 - 0.4075(\text{zero counts}) + 0.9074 \times \log(\text{counts}+100)$	-0.06 (-1.7 to 1.5)	2.3 (0.01)	Actigraph
	$\text{METs} = -3.2 - 0.0815(\text{zero counts}) + 0.4384 \times \log(\text{counts}+100) + 0.03(\text{heart rate})$	-0.004 (-1.5 to 1.6)	-0.51 (0.61)	Actical
	$\text{METs} = -2.4 - 0.5(\text{zero counts}) + 0.9 \times \log(\text{counts}+100)$	-0.00 (-1.8 to 1.8)	0 (0.99)	Actical
CHD	$\text{METs} = -3.5 - 0.54(\text{zero counts}) + 0.83 \times \log(\text{counts}+100) + 0.015(\text{heart rate})$	-0.04 (-2.0 to 1.9)	1.7 (0.09)	Actigraph
	$\text{METs} = -2.87 - 0.84(\text{zero counts}) + 1.02 \times \log(\text{counts} + 100)$	-0.006 (-2.2 to 2.2)	-0.30 (0.77)	Actigraph
	$\text{METs} = -3.68 - 0.3154(\text{zero counts}) + 0.7892 \times \log(\text{counts}+100) + 0.018(\text{heart rate})$	0.01 (-1.5 to 1.6)	1.1 (0.26)	Actical
	$\text{METs} = -3.5 - 0.5(\text{zero counts}) + 1.1 \times \log(\text{counts}+100)$	0.01 (-1.6 to 1.6)	0.88 (0.38)	Actical
HE	$\text{METs} = -3.81 - 0.2824(\text{zero counts}) + 0.8396 \times \log(\text{counts}+100) + 0.01692(\text{heart rate})$	-0.01 (-1.3 to 1.3)	-1.9 (0.06)	Actigraph
	$\text{METs} = -3.62 - 0.496(\text{zero counts}) + 1.11 \times \log(\text{counts}+100)$	-0.01 (-1.4 to 1.4)	-1.5 (0.14)	Actigraph
	$\text{METs} = -4.0 - 0.3424(\text{zero counts}) + 0.8569 \times \log(\text{counts}+100) + 0.01989(\text{heart rate})$	-0.02 (-1.5 to 1.5)	-1.2 (0.06)	Actical

	$METS = -3.55 - 0.69(\text{zero counts}) + 1.15 \times \log(\text{counts}+100)$	-0.01 (-1.7 to 1.7)	-1.4 (0.16)	Actical
IMD	$METS = -2.4 - 0.02933(\text{zero counts}) + 0.3044 \times \log(\text{counts}+100) + 0.02652(\text{heart rate})$	0.60 (-1.0 to 2.2)	2.4 (0.02)	Actigraph
	$METS = -2.1 - 0.1753(\text{zero counts}) + 0.7552 \times \log(\text{counts}+100)$	0.09 (-1.4 to 1.5)	1.3, (0.19)	Actigraph
	$METS = -3.1 - 0.06421(\text{zero counts}) + 0.3975 \times \log(\text{counts}+100) + 0.02731(\text{heart rate})$	0.08 (-1.2 to 1.4)	11.0, <0.0001*	Actical
	$METS = -3.9 - 0.05573(\text{zero counts}) + 1.112 \times \log(\text{counts}+100)$	-0.08 (-1.5 to 1.3)	1.3, 0.17	Actical
JA	$METS = -3.1138 + 0.1745(\text{zero counts}) + 0.276 \times \log(\text{counts}+100) + 0.041(\text{heart rate})$	0.01 (-1.7 to 1.7)	1.2 (0.24)	Actigraph
	$METS = -1.8 - 1.0(\text{zero counts}) + 0.8462 \times \log(\text{counts}+100)$	0.09 (-2.1 to 2.3)	0.45 (0.65)	Actigraph
	$METS = -3.64 - 0.0879(\text{zero counts}) + 0.041 \times \log(\text{counts}+100) + 0.03883(\text{heart rate})$	0.004 (-1.7 to 1.7)	0.41 (0.68)	Actical
	$METS = -3.4 - 1.1(\text{zero counts}) + 0.85 \times \log(\text{counts}+100)$	0.01 (-1.9 to 1.9)	-0.95 (0.34)	Actical
JDM	$METS = -3.0 - 0.5089(\text{zero counts}) + 0.4797 \times \log(\text{counts}+100) + 0.02821(\text{heart rate})$	0.006 (-2.2 to 2.2)	1.7 (0.08)	Actigraph
	$METS = -2.0 - 0.3(\text{zero counts}) + 1.1 \times \log(\text{counts}+100)$	-0.002 (-2.2 to 2.2)	-0.13 (0.89)	Actigraph
	$METS = -4.3 - 0.13(\text{zero counts}) + 0.7148 \times \log(\text{counts}+100) + 0.02678(\text{heartrate})$	0.004 (-1.8 to 1.8)	0.36 (0.72)	Actical
	$METS = -3.9 - 0.47(\text{zero counts}) + 1.18 \times \log(\text{counts}+100)$	-0.003 (-1.8 to 1.8)	-0.35 (0.72)	Actical

CF = Cystic Fibrosis; CHD = Congenital Heart Disease; HE= Hemophilia; IMD=Inherited Muscle Disease; JA = Juvenile Arthritis; JDM = Juvenile Dermatomyositis. * Denotes significance at $p < 0.0002$ level after adjustment using Bonferroni correction for multiple tests.

Table 4: Cut points for Actigraph and Actical Accelerometer by Diagnosis

Diagnosis	Intensity*	Actigraph				Actical			
		AUC (95%CI)	Sensitivity %	Specificity %	Cut point	AUC (95%CI)	Sensitivity %	Specificity %	Cut point
Chronic Disease (combined)	Sedentary	0.81 (0.77-0.85)	71	96	< 10	0.88 (0.86-0.90)	77	94	< 10
	Light	NA	NA	NA	>10-426	NA	NA	NA	>17-288
	Moderate	0.80 (0.77-0.83)	70	81	>426-784	0.82 (0.80-0.85)	72	78	>289-569
	Vigorous	0.86 (0.79-0.94)	87	84	>785	0.95 (0.92-0.97)	92	87	>570
CF	Sedentary	0.90 (0.84-0.95)	77	98	<10	0.86 (0.80-0.92)	74	95	< 5
	Light	NA	NA	NA	>10-487	NA	NA	NA	>5-368
	Moderate	0.88 (0.83-0.93)	83	81	>487-852	0.79 (0.72-0.86)	70	78	>368-1025
CHD	Vigorous	0.91 (0.86-0.96)	100	88	>853	0.98 (0.96-1.0)	100	98	>1025
	Sedentary	0.99 (0.99-1.0)	92	97	<10	0.99 (0.99-1.0)	100	98	<9
	Light	NA	NA	NA	>10-349	NA	NA	NA	>9-349
	Moderate	0.82 (0.71-0.93)	85	76	>349-785	0.87 (0.81-0.94)	81	83	>349-633
HE	Vigorous	0.81(0.61-1.0)	87	84	>785	0.95 (0.90-1.0)	100	92	>633
	Sedentary	0.97 (0.93-1.0)	90	99	<17	0.94 (0.90-1.0)	95	94	< 19
	Light	NA	NA	NA	>17-432	NA	NA	NA	>19-306
	Moderate	0.88 (0.84-0.93)	76	87	>432-788	0.82 (0.77-0.88)	72	80	>306-1114
IMD	Vigorous	0.93 (0.85-1.0)	100	84	>788	0.85 (0.64-1.0)	67	98	>1114
	Sedentary	0.90(0.86-0.95)	78	91	<37	0.96 (0.93-0.98)	82	97	<14
	Light	NA	NA	NA	>37-663	NA	NA	NA	>14-297
	Moderate	0.91(0.85-0.97)	81	94	>663-972	0.89 (0.83-0.94)	82	81	>297-523
JDM	Vigorous	0.92 (0.88-0.96)	100	92	>972	0.91 (0.87-0.95)	100	90	>523
	Sedentary	0.83 (0.79-0.9)	73	84	<14	0.89 (0.83-0.94)	83	92	<18
	Light	NA	NA	NA	>14-172	NA	NA	NA	>18-166
	Moderate	0.78 (0.71-0.86)	82	66	>172-543	0.85 (0.79-0.90)	86	70	>166-601
JA	Vigorous	0.79 (0.52-1.0)	83	79	>543	0.96 (0.93-0.99)	100	91	>601
	Sedentary	0.82 (0.74-0.90)	75	91	<19	0.84 (0.78-0.90)	78	88	<25
	Light	NA	NA	NA	>19-152	NA	NA	NA	>25-255
	Moderate	0.78 (0.71-0.86)	86	63	>152-542	0.82 (0.77-0.88)	72	75	>255-771
	Vigorous	0.78 (0.52-1.0)	83	79	>542	0.98 (0.96-1.0)	100	94	>771

*Sedentary (<1.5 METs); light (1.5-2.99 METs); moderate (3.0 - 5.99 METs); vigorous (>6.0 METs); NA = Not applicable- values were not calculated as sedentary and moderate provide the boundaries for the cut point thresholds.

Figure 1: Oxygen Uptake (ml/kg/min) Across Physical Tasks by Diagnosis

Figure 2: Mean Accelerometer Count (Actigraph) Across Physical Task by Diagnosis