

## PKSE Refinement for ambient temperature

### VO2 estimate from GoX Studio vs. Cosmed, August 2016

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**Objective:** The purpose of this study was to modify the PKSE to include running and develop a predictive model which includes an effect of temperature.

**Methods:** We used the pilot data we collected during the base phase and some option phase data. The subjects walked at a constant 1.112 m/s pace on a level treadmill for 5 minutes, then increased their pace to 1.56 m/s for 3 minutes, then increased their pace to 2.24 m/s for 3 minutes, then increased their pace to 2.68 m/s for 3 minutes, then a 5 minute cool down at 1.112 m/s. Several subjects walked at 1.112 m/s with either 20% body weight load or 40% body weight load. The heart rate, respiration rate, and VO2 were measured using Cosmed. We normalized the energy expenditure by the body mass. VO2 was converted to watts and normalized by body mass.

### Results and Discussion:

We tested the model using data from the pilot study. The results are tabulated in table 1. The model predictions on average are 10 percent for both males and females.

*Table 1: PKSE predictions for metabolic cost for subjects*

Subject	Gender	Measured VO2, ml/min/kg	Predicted VO2, ml/min/kg	% Error
1	Female	11.8	12.9	9.2%
1	Female	18.1	20.7	13.9%
1	Female	32.7	31.4	-4.0%
1	Female	37.3	38.7	3.7%
2	Male	14.1	16.0	13.4%
2	Male	21.3	23.0	8.3%
2	Male	37.3	34.0	-8.9%
2	Male	41.4	41.7	0.8%
3	Female	11.1	9.9	-10.3%
3	Female	14.6	15.3	4.8%
3	Female	29.6	25.6	-13.8%
3	Female	32.0	31.4	-1.8%
3	Female	12.3	11.4	-7.0%
6	Male	12.5	14.6	16.7%
6	Male	16.0	20.8	30.2%
6	Male	30.8	33.0	6.9%
6	Male	36.8	39.0	6.2%
6	Male	14.6	17.8	21.8%