



of the American Alliance for Health, Physical Education, Recreation and Dance

## AAHPERD RESEARCH GRANT PROGRAM AWARD 1999

### Validation of the CSA Accelerometer as a Tool for Classifying Energy Expenditure in Adults

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#### ABSTRACT

This study was designed to create new energy expenditure prediction equations for use with healthy adults wearing the CSA (Computer Science Application) activity monitor. There was reason to believe that previous prediction equations were not as accurate as they could be. For example, previous equations were derived from activities performed on a treadmill while most people actually spend very little time on treadmills. Secondly, use of current prediction equations may not work very well for the shortest and tallest people because of a potential design flaw in the prediction equations. The present study attempted to address these issues by creating new prediction equations for the CSA activity monitor.

A total of 57 adults (28 women and 29 men) were recruited to walk around an indoor track wearing a CSA activity monitor while measuring energy expenditure through a portable oxygen consumption system. The information from these sessions was used to create two new MET (short for metabolic equivalent) prediction equations. One MET is equal to an oxygen consumption of  $3.5 \text{ ml} \cong \text{kg}^{-1} \cong \text{min}^{-1}$ , or the population average for resting metabolic rate (RMR). Thus, the equations predict energy expenditure as multiples of RMR. The new equations are as follows, where CSA is the output from the CSA activity monitor in  $\text{counts} \cong \text{min}^{-1}$  and Ht is body height measured in meters:

$$(1) \quad \text{METs} = 0.000619\text{HCSA} + 1.551$$

$$(2) \quad \text{METs} = 0.00171\text{HCSA} + 1.957\text{HHt} - 0.000631\text{HCSAHHt} - 1.833$$

The first equation is similar in format to previous equations, but gives lower estimates of energy expenditure. This could be due to the use of ground walking rather than treadmill based activities. The second equation has the additional use of body height as a predictor of METs. This helps to account for the fact that shorter people must take more steps at a given walking speed (and accumulate more CSA counts) than a taller person.

Both equations are very different from previous equations and need further testing before using them outside of a laboratory setting. Thus, the next logical step is to validate these equations against a criterion measure of energy expenditure (such as activity diaries or direct observation) during the normal activities of daily living.

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