Cornell University researchers developed the “Physical Activity Research & Assessment tool for Garden Observation” (PARAGON), a direct observation tool to measure children’s physical activity (PA) while gardening. PARAGON is low-cost and easy to use, though some training is required.

Gardens as a Public Health Intervention.
Gardens are gaining prominence and are recognized for their potential as a public health intervention. Gardens may help to combat the epidemics of physical inactivity and obesity among youth by boosting physical activity levels (Wells, Myers & Henderson, 2014). Given this, there is an interest in measuring PA in the garden.

Measuring Physical Activity.
In general, it is neither easy nor inexpensive to measure PA. Self-report surveys of PA may be weak in reliability or validity, particularly when administered to children, whose accuracy tends to be lower than adults'. Objective measurement is desirable but accelerometers, for example, cost hundreds of dollars. Direct observation – with trained raters carefully watching and recording movements - can be a practical alternative to self-report surveys or objective measurement (Loprinzi & Cardinal, 2011). Also, unlike other measures, direct observation enables researchers to document the contexts within which PA occurs.

In recent years, new tools have been developed to systematically observe children's PA levels in a variety of settings such as physical education classes; before, during, and after school; on playground; and in community parks (McKenzie, 2010). However, no previous direct observation tool specifically captures children's physical movements, postures, and motions while gardening. PARAGON fills this gap in PA measurement.

PARAGON Reliability and Validity.
Sixty-five children (38 girls and 27 boys) attending four New York State elementary schools were observed over eight days. During the observation, children simultaneously wore GT3X+ accelerometers. The overall inter-rater reliability of PARAGON was 88 percent agreement and Ebel was .97. Percent agreement for PA level, garden tasks, motions, associations, and social interactions all met acceptable criteria. The validity of PARAGON was established by previously validated PA codes and by expected convergence and divergence with accelerometry (Myers & Wells, 2015).

Using PARAGON.
PARAGON use involves trained observers coding children's activity across five categories: 1) PA level; 2) garden tasks; 3) garden motions; 4) social associations; and 5) interactions. Using momentary time sampling, each trained observer watches a
focal child for 15-seconds and then records behavior for 15 seconds. PARAGON is a paper-and-pencil instrument. PARAGON training materials (photos, videos, and recording forms) are available at no charge from www.wellslab.human.cornell.edu. Training in PARAGON coding procedures takes each observer approximately 20 to 25 hours.

Conclusions
PARAGON is a reliable, valid measure of children’s physical activity while gardening (Myers & Wells, 2015). Findings described here are published in the Journal of Physical Activity and Health.

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