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UNIVERSITY OF CALGARY

One Two Buckle My Shoe, Three Four Step Some More: Measuring Physical Activity at Camps for Kids

Tying down the number of steps kids take daily is not a simple thing to do and poses more than just a few challenges. Yet, a valid measure of physical activity has the potential to be a very useful tool in countering the obesity epidemic (McNamara et al., 2010). In 2015 we embarked on a pilot study investigating **Ki**ds **S**teps in the **S**ummer (July and August) at **U**niversity **C**amps (KISS UC). We recruited kids already registered in the Active Living camps at the University of Calgary in Alberta, where the summer enrollment reached over 10,500 children and youth.

Day Camps

Most day camps have a structured environment of activities and are designed to nurture healthy development in a variety of ways. The amount of physical activity a camper is exposed to will vary depending on the type of camp they are enrolled in. For example a *Bits, Bytes and Bots* programming camp will have light-intensity activities such as standing, moving around and some active play where as a *Learn to Score* soccer camp will have more continuous movement as well as moderate-to-vigorous intensity activities such as jogging and sprinting.

Moderate-to-Vigorous Intensity Activities (MVPA)

The Canadian Physical Activity Guidelines for health benefits recommend that children (aged 5 to 11) and youth (aged 12 to 17) accumulate at least 60 minutes of




MVPA, daily. This seems like a doable goal for summer camps. However, after reviewing the Statistics Canada data (http://www.statcan.gc.ca/pub/82-625-x/2011001/article/11553-eng.pdf) we learn this is a very ambitious guideline. Only 7% of Canadian children and youth on average achieve 60 minutes of MVPA daily at least six days a week. More youth however, are able to accumulate 30 minutes per day of MVPA on at least six days a week. These numbers continue to increase for MVPA on at least three days of the week.

Meeting the Physical Activity Guidelines

Many summer camps pride themselves on providing a venue for campers to meet the recommended guidelines. However, only a few studies have measured the actual steps taken daily during a summer camp. One study using pedometers showed over an 8-hour day that campers averaged between 9284-13222 steps (Hickerson et al., 2014). According to the Heart and Stroke walk about website children (8-10 years) should reach 12,000-16,000 and youth 11000-12000 steps to meet the recommended daily physical activity guidelines (http://walkaboutns.ca/walkabout-info/resources/step-count-recommendation/).

Measurement

We wanted to measure the number of steps taken, distance walked and the energy expended. Although, pedometers count a step each time they detect a vertical change in direction, they have no way of adjusting for factors that affect calories used. The day camps at University of Calgary, even the non-sport camps intentionally include an AM and PM Fit Break with some form of Tag involving movement in three dimensions, eg., up/down, right/left, and forward/backward. Some of the camps have one day of swimming per week as well, therefore the device needs be triaxial, waterproof and




have a flexible yet secure wristband. Lastly the campers need to wear the device 24/7 so that total daily expenditure can be recorded. Accelerometer-based motion sensors are expensive, but have improved accuracy and are considered as an accepted measure of physical activity in children and youth (Trost and O'Neil, 2014).

Wrist Tracker Accelerometer

The Garmin Vivofit™ (GVWT) accelero-meter is waterproof to 50m and has a battery life of over a year. The wrist strap has two sizes (note: kids have small wrists) and the strap is a flexible wrap around in a variety of colours (note: these bright colours were helpful to identify the campers when observing their outdoor physical activity). Research assistant Louise Smith individually calibrated each camper's GVWT by inputting age, measured height, weight and stride length. The GVWT (http://engadget.com/2014/03/13/garmin-vivofit-review) detects activities of walking and running, and factors in the difference this makes on stride length; another important feature. A limitation of the GVWT was the age default of 12 years, unfortunate, since most of our campers were younger.

Before leaving at the end of the day, the camper's data (number of steps, distance and caloric expenditure) was recorded on a spreadsheet. Each morning when they arrived the same procedure was repeated. At the end of the camp week the data was downloaded (http://connect.garmin.com/) into an Excel spreadsheet.

Camps

Logan Jones, (Active Living Youth Program Manager), selected a variety of camps with a one week duration (5-day period) that were educational, sport, and arts focused. A total of 228 campers were registered in the selected camps categorized by grades: Active Gamers, grades 4-5; Broadway Bound, grades 4-5; Megaventure, grades 4-5; Kreative Kids,

grade 5; Engineering 101, grades 5-6; Mini Sport grades, 6/7/8; Girls only Applied Science and Engineering, grades 6-8; Thrill of the Catch, grades 6-8; Climb On grades, 6-8; and one age related camp Dinos Soccer U12-14.

Preliminary Results

A total of 191 (83%) campers in 10 camps agreed to participate. Eight camps had data collected from Tuesday to Friday and two from Wednesday to Friday. Daily means and standard deviations for in- and out-of-camp data, as well as mean total camp data was calculated. The average total over four days (per 24hr period) was 16793±5407 steps. This was split into in-camp (10377±3282 steps; walked 6.95±2.58km) and out-of-camp hours (6694±3084 steps). The average total over three days (per 24hr period) was 15176±4721 steps and again split into in-camp (11442±4090 steps; walked 7.06±2.68km) out-of-camp hours (4738±2138 steps).

Seize the day

The Active Living summer camps at the University of Calgary provided a positive venue for physical activity while learning other skills. Based on this pilot data the campers were meeting the daily physical activity guidelines in 24hrs however they were not quite meeting the guidelines during camp hours alone. An interesting outcome was that although the non-sport camps had less steps in-camp, they had more steps out-of-camp. Perhaps the campers felt that they needed to do more physical activity in the evening so that they could have a renewed sense of clarity and focus for the next day...
...five six use steps as a mental fix. ■

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