

The Health Benefits of Physical Activity and the Role of Step Counters

Brought to you by the Team of Registered Dietitians & Nutrition Professionals at Kellogg Canada Inc.

DR. THERESE BRISSON, PHD



As an accomplished academic and world-class athlete, Dr. Therese Brisson personifies the commitment to physical activity. She holds a BSc and MSc in Exercise Science from Concordia University and a Ph.D. in Motor Control and Learning from Université de Montréal. She has also been a member of the Canadian National Women's Hockey Team since 1993, where she has won five World Championships, a silver medal at the 1998 Winter Olympic Games in Nagano, and a gold medal winner at the 2002 Winter Olympic Games in Salt Lake City.

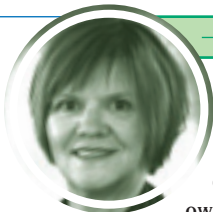
Dr. Brisson has served as a professor in the Faculty of Kinesiology at the University of New Brunswick and as an adjunct professor at

the Institute of Biomedical Engineering while at UNB. Dr. Brisson also holds a National Coaching Certification Program (NCCP) Intermediate certification for hockey from the Coaching Association of Canada and was the head coach of University of New Brunswick, Varsity Women's Hockey team for the 1998-99 season.

Her experience, not only as an athlete and a coach but also as an academic, has offered Dr. Brisson the opportunity for many unique experiences and allowed her to develop an extensive network in the Canadian sport community. Recently she played a key role as the Interim Executive Director of Athletes CAN, where, in November 2000, she organized the annual Athletes Forum and the Athletes Round Table on National Sport Policy.

Dr. Catrine Tudor-Locke is an Assistant Professor of Health Promotion in the Department of Exercise and Wellness at Arizona State University East. Her research is focused on understanding and addressing the problems associated with sedentary lifestyles in a range of populations including youth, older adults, and individuals with Type 2 diabetes.

She developed The First Step Program, a novel daily physical activity intervention that capitalizes on a simple



DR. CATRINE TUDOR-LOCKE

and inexpensive pedometer as a self-monitoring, goal-setting, and feedback tool. Dr. Tudor-Locke is the author of a self-help book based on The First Step Program titled Manpo-kei: The Art and Science of Step Counting (2003 Trafford Publishing). She monitors her own physical activity daily with a pedometer and averages

14,000 steps/day.

THE IMPACT OF PHYSICAL INACTIVITY

Physical inactivity has costs. Data from developed countries, reported by the World Health Organization (WHO)¹, indicate that the direct costs of inactivity are enormous. This data suggests physical activity has been under-recognized from the preventive health and health economic perspectives in terms of resources and attention.

For example, approximately 300,000 U.S. deaths a year are currently associated with obesity and overweight (compared to more than 400,000 deaths a year associated with cigarette smoking).² The total direct and indirect costs attributed to overweight and obesity amounted to \$117 billion in the year 2000.³ Physically active individuals save an estimated \$500 per year in health care costs according to 1998 data. Inactivity alone may have contributed as much as \$75 billion to US medical costs in the year 2000.

In Australia, the first ranked contributor to population ill health is tobacco, then physical inactivity.⁴ Physical inactivity is estimated to be a factor in more than 8,000 deaths per year, of which 1,531 occur in people under 70 yrs old, representing 77,000 years of life lost prematurely. Inactivity accounts for \$400 million in direct healthcare costs. It is estimated that a 1% increase in the population that is sufficiently active could save up to \$8 million in healthcare costs.

In Canada, physical inactivity accounts for an estimated 6% of total health care costs. A recent study provides estimates that 36% of all deaths in the adult population (over 20 yrs old) can be attributed to physical inactivity and that the total direct costs of inactivity were \$2.1 billion in 1997.⁵ The diseases in which inactivity causes the largest burden are coronary heart disease (\$891 M), osteoporosis (\$352 M), stroke (\$345 M), and hypertension (\$314 M). Direct health care cost savings from a 10% reduction in the proportion of the population who are inactive would amount to \$150M per year.

Table 1 presents some of the health conditions that have been found to be associated with physical inactivity, as well as the societal economic impact on Canadians and Table 2 outlines the many health risks associated with obesity.

Table 1: Health Consequences of Physical Inactivity and Canadian Societal and Economic Impact

Conditions Associated with Physical Inactivity	Canadian Societal and Economic Impact
Obesity	<ul style="list-style-type: none"> Increases the risk of coronary heart disease, osteoarthritis, various cancers, and back injuries, which are a significant cost to industry. Over 50% of Canadians carry excess weight and two-thirds of these are considered to be at health risk.
Cardiovascular disease	<ul style="list-style-type: none"> Number one cause of premature death in Canada, claims the lives of 79,000 annually and costs the health-care system over \$7.3 billion in direct and \$12.4 billion in indirect costs.
Cancer	<ul style="list-style-type: none"> Economic burden (direct and indirect costs) of \$13.1 billion. 5,900 deaths from colorectal cancer in 1997 and an estimated 16,400 new cases. Over 2,300 Canadian women died of breast cancer in 1997 with an estimated 18,400 new cases.
Diabetes	<ul style="list-style-type: none"> Affects 11% of those over 65 yrs old, accounts for 5,000 deaths annually, and results in over \$1 billion in direct and indirect costs in 1993. Diabetes is also a complicating factor in heart disease and stroke.
Arthritis	<ul style="list-style-type: none"> Affects over 4 million and is the leading cause of disability in more than 600,000. Musculoskeletal conditions, including arthritis, account for \$15.3 billion in indirect costs, plus another \$2.5 billion in health-care costs.
Osteoporosis	<ul style="list-style-type: none"> Affects 25% of women over 50 yrs and 50% over 70 yrs and is involved in 7 in 10 fractures in those over 45 yrs.
Mental illness	<ul style="list-style-type: none"> Accounts for over \$5 billion in direct costs to the health-care system each year; over 210,000 hospital admissions in 1994-95, accounting for almost 16 million days in hospital.

Table 2: Health Risks Associated with Obesity

Obesity is Associated with an Increased Risk of:	
Premature death	Sleep apnea
Type 2 Diabetes	Asthma and breathing problems
Heart disease	Pregnancy complications
Stroke	Menstrual irregularities
Hypertension	Hirsutism
High blood cholesterol	Stress incontinence
Gallbladder disease	Increased surgical risk
Osteoarthritis	Depression and other psychological disorders
Cancer (endometrial, colon, kidney, gall bladder and post menopausal breast cancer)	Psychological difficulties due to social stigmatization

Adapted from NIDDK⁶

THE HEALTH BENEFITS OF PHYSICAL ACTIVITY

An increase in physical activity can prevent and reverse to a degree many of the conditions reported in tables 1 and 2, above. Physical activity has many health and economic benefits especially in terms of reduced health care costs, increased productivity, as well as healthier physical and social environments.⁷ Since the publication of the 1996 US Surgeon General's (USSG)⁸ report on physical activity and health, the health benefits of physical activity are becoming more accepted in terms of their importance for public health and primary prevention. The best health evidence for physical activity comes from well-designed cohort studies, supported by a few well-designed case-control studies.

A review of the most recent scientific research collected by Active Australia⁹, the U.S. Surgeon General¹⁰, Health Canada¹¹ and the World Health Organization¹² indicate that there is clear evidence for many health benefits of physical activity, either directly or indirectly, through its positive impact on major risk factors, in particular high blood pressure, high cholesterol, obesity, tobacco use and stress.¹³ Furthermore, physical activity reduces the risk of cardiovascular disease, some cancers and Type 2 diabetes. These benefits are mediated through a number of mechanisms: in general, physical activity improves glucose metabolism, reduces body fat and lowers blood pressure. Physical activity may reduce the risk of colon cancer by effects of prostaglandins, reduced intestinal transit time, and higher antioxidant levels. Physical activity is also associated with lower risk of breast cancer, which may be the result of effects on hormonal metabolism. Participation in regular physical activity can also improve musculoskeletal health, control body weight, and reduce symptoms of depression.

The most recent research suggests that if the population were more active, the accrued health benefits would include: cardiovascular disease prevention, diabetes prevention and control, the primary prevention of some cancers, injury prevention and control, and the promotion of mental health. Further, there is an inverse relationship between physical activity and all-cause mortality that holds for all age groups and for diverse populations in different countries. Table 3 presents a summary of the health benefits of regular physical activity.

Table 3: The Health Benefits of Regular Physical Activity

Health Benefits of Regular Physical Activity
Reduces the risk of dying prematurely.
Reduces the risk of dying from heart disease or stroke, which are responsible for one-third of all deaths.
Reduces the risk of developing heart disease.
Reduces the risk of colon cancer and type 2 diabetes by as much as 50%.
Helps to prevent/reduce hypertension, which affects one-fifth of the world's adult population.
Helps control weight and lower the risk of becoming obese.
Helps to prevent/reduce osteoporosis, reducing the risk of hip fracture in women.
Reduces the risk of developing lower back pain and can help in the management of painful conditions, like back pain or knee pain.
Helps build and maintain healthy bones, muscles, and joints and makes people with chronic, disabling conditions improve their stamina.
Promotes psychological well-being, reduces stress, anxiety and depression.
Helps prevent or control risky behaviours, especially among children and young people, like tobacco, alcohol or other substance use, unhealthy diet or violence.

EVERYONE MUST BE DOING IT, RIGHT?

If regular physical activity is so good for you, everyone must be doing it, right? Wrong! In 1999, an estimated 61 percent of U.S. adults were overweight, along with 13 percent of children and adolescents. Obesity among adults has doubled since 1980, while overweight among adolescents has tripled. Less than one-third of Americans meet the federal recommendations to engage in at least 30 minutes of moderate physical activity at least five days a week, while 40 percent of adults engage in no leisure-time physical activity at all.¹⁴

The most recent Canadian data suggests that in 2000, 61% of Canadian adults (over 18 yrs) were not active enough to achieve health benefits, compared with 79% in 1981.¹⁵ Over 50% of children and youth aged 5-17 are not active enough for optimal growth and development, defined as energy expenditure of at least 8 kcal/kg body weight per day (KKD).¹⁶ This would be equivalent to 30 minutes of martial arts plus 60 minutes of walking throughout the day.

Childhood obesity is on the rise and gaining attention both in Canada and worldwide. Canadian children are becoming progressively more overweight. A recent study showed that from 1981 to 1996 the prevalence of overweight increased by 92% in boys and by 57% in girls.¹⁷ Moreover, during that same time frame, the prevalence of obesity more than doubled in both boys and girls. Another study showed that obesity in children tripled from 5% to 16.6% for boys and from 5% to 14.6% for girls between 1981 and 1996. Cases of Type 2 diabetes mellitus, high cholesterol levels and high blood pressure are becoming more common in severely overweight children. This recent evidence suggests that a lack of physical activity is as dangerous to children's and youth's health as smoking, and can be a major contributor to obesity.

HOW TO GET ACTIVE

Based on the available evidence, Canadians clearly need to get more active. Becoming more active is very safe for most people, but if in doubt, the **Physical Activity Readiness Questionnaire (PAR-Q)** can provide a quick checklist.¹⁸ Some people should check with their doctor before they start becoming much more physically active.

Canada's Physical Activity Guide to Healthy Active Living¹⁹ recommends that to achieve health benefits, adults need to accumulate 30-60 minutes of physical activity most days of the week, preferably every day. This level of activity can be reached through a broad range of appropriate and enjoyable physical activities and body movements in people's daily lives, such as walking to work, climbing stairs, gardening, dancing, as well as a variety of leisure and recreational sports. **Additional health gains** can be obtained by relevant daily moderate to vigorous physical activities of longer duration. For example, **children and young people** need an additional 20 minutes of vigorous physical activity three times a week. **Weight control** would require at least 60 minutes every day of moderate/vigorous physical activity.

There are **three types of activities you need to do to keep your body healthy:**

- **Endurance activities** (those that work the heart and lungs) 4-7 times per week.
- **Flexibility activities** (bending, stretching to keep muscles relaxed and joints mobile) 4-7 times per week.
- **Strength activities** (those that strengthen muscles and bones plus improve posture) 2-4 times per week.

Do a variety of activities from each group to get the most health benefits. **The Physical Activity Guide** offers a rainbow of activities to choose from. Take a look and see what activities appeal to you. Choosing things you like to do is one of the best ways to build regular physical activity into your life. Other ideas for including regular activity into your life include the following:

- **Walk whenever you can - get off the bus early and use the stairs instead of the elevator.**

- Reduce inactivity for long periods, like watching TV.
- Get up from the couch and stretch and bend for a few minutes every hour.
- Play actively with your kids and get out to walk the dog.
- Choose to walk, wheel or cycle for short trips.
- Start with a 10 minute walk – gradually increase the time.
- Find out about walking and cycling paths nearby and use them.
- Observe a physical activity class to see if you want to try it.
- Try one class to start – and you don't have to make a long-term commitment.
- Do the activities you are doing now, more often.
- Arrange to meet friends for physical activity – make it part of your social life.

Finally, although a "healthy active living" approach has been adopted in physical education curricula across Canada, The Canadian Association for Health, Physical Education, Recreation and Dance (CAHPERD) statistics indicate that most Canadian schools average only 60 minutes of physical education per week. CAHPERD advocates that all Canadian children (from kindergarten through grade 12) participate in 150 minutes of physical education per week (i.e., 30 minutes per day). The challenge remains to make 30 minutes of physical education a daily reality in Canadian schools.

WALKING: THE SIMPLEST APPROACH TO A HEALTHY LIFESTYLE

Walking continues to be the most commonly reported leisure time activity and a fundamental movement necessary for daily living. Regular walking has been associated with a number of health benefits including reduced risk of coronary heart disease and diabetes, weight loss/weight maintenance, and lowered blood pressure. Unfortunately, there is evidence to suggest that many people who would describe themselves as walkers actually fail to walk enough to meet public health recommendations.

Canada's Physical Activity Guide to Healthy Active Living recommends that everyone should accumulate 30-60 minutes or more of moderate-intensity physical activity, such as brisk walking, on a daily basis. But how do you know if you are walking enough? One way of course is to plan a 30-60 minute walking bout into your day, perhaps after supper. But we also know that there are health benefits of shorter (e.g., at least 10 minutes in length) accumulated bouts of activity. This flexible approach to accruing walking throughout the day is more user-friendly given today's hectic schedules. Taken literally, this approach suggests we need only track and record time in moderate-intensity activity and sum the collected separate bouts taken at the end of the day. Timing, recording, collecting and adding up the scattered bouts of activity on a daily basis, however, is unrealistic. Fortunately there is a practical alternative: a pedometer.

HOW DO Pedometers WORK AND ARE THEY ACCURATE?

Initially discounted as a toy or gadget, pedometers are defying the fad label and being readily adopted by researchers and front-line practitioners interested in helping people increase their activity and achieve their personal health goals. Pedometers are simple and inexpensive (\$10-30) devices that are typically worn attached to the waist band. They count the number of steps taken using an internal lever that detects the up-and-down movement at the hip while walking. Pedometers are very accurate at detecting steps taken, but less accurate when this information is used to estimate distance traveled (i.e., kilometers) or energy expended (kilocalories). The consensus among researchers is that, although there is some variability in accuracy between brands, pedometers are acceptably accurate for assessing typical walking behaviors in terms of steps/day. Small errors due to missed steps associated with slow walking, or extra steps detected during bending or fidgeting

movements are considered relatively unimportant in the context of a day's activity. However, regardless of precision, as part of a program of self-monitoring, goal-setting, and feedback, pedometers can be effectively used to motivate increased physical activity for most people.

HOW MANY STEPS ARE EQUIVALENT TO PUBLIC HEALTH RECOMMENDATIONS?

Thirty minutes of moderate-intensity walking is approximately equal to 3000-4000 steps. To meet public health recommendations, however, these 3000-4000 steps need to be taken over and above typical daily levels of activity. Therefore, pedometer recommendations are often described in terms of total steps/day. The following categories were proposed in January 2004 to classify pedometer-determined steps/day in healthy adults: 1) "5000 steps/day may be used as a "sedentary lifestyle index"; 2) 5,000-7,499 steps/day is typical of daily activity excluding volitional sports/exercise and might be considered "low active"; 3) 7,500-9,999 likely includes some volitional activities and health benefits and might be considered "somewhat active"; and 4) "10,000 steps/day" indicates the point that should be used to classify individuals as "active" individuals who take 12,500 steps/day are likely to be classified as "highly active". There is no evidence at this time to suggest an index indicative of excessive activity associated with health decrements.

These categories are useful to identify people's activity levels and assess their progress through an intervention. However, the blind application of "10,000 steps/day" as a universal recommendation for activity has its problems. For example, we now know that it is definitely too low for children (who more likely should be taking 12000-15000 steps/day). It is also likely too difficult a target to achieve (let alone sustain) for sedentary people and those living with chronic diseases.

WHAT IS THE LATEST SCIENTIFIC RESEARCH ABOUT USING Pedometers TO INCREASE PHYSICAL ACTIVITY?

A more realistic approach to increasing physical activity using pedometers emphasizes the individual and is built on the well-known clinical practices of self-monitoring, goal setting, and feedback. *The First Step Program* embodies such an approach and was originally developed in Canada to meet the needs of individuals with Type 2 diabetes. It is currently the only systematically developed and scientifically supported pedometer-based physical activity intervention. It is an 8-week lifestyle program designed to incrementally elicit and sustain habitual physical activity behaviors in previously sedentary people. The program is made up of two distinct 4-week phases separately targeting adoption and adherence. The first 4-weeks comprise the adoption phase of weekly group meetings (focused on education and counseling) in addition to individual self-monitoring, goal-setting, and feedback (using a combination of pedometer and calendar). The subsequent 4-week period is the adherence phase that includes continued self-monitoring, goal-setting, and feedback and follow-up contact by telephone and/or postcard. Additional program detail is available in a readable self-help book titled *Manpo-kei*:

The Art and Science of Step Counting (2003 Trafford Publishing; <http://www.trafford.com/robots/02-1196.html>).

The First Step Program was developed using a systematic process that included a needs assessment and consultation with Diabetes Educators and program participants. Formative evaluation was used to refine program elements and establish feasibility and acceptability. A preliminary outcome evaluation established expected changes in physical activity. A randomized controlled trial further demonstrated that participants increased their physical activity by more than 3,000 steps/day (approximately 30 minutes/day) during the intervention. Finally, outcomes elicited through programs delivered by peer leaders (i.e. former graduates of the First Step Program) were compared and found not to be significantly different from matched Diabetes Educator-led programs, and were also consistent with results from the original randomized control trial. The First Step Program has been subsequently successfully adapted to other populations including non-diabetic adults at typically sedentary workplaces in Prince Edward Island. From research to practice, the First Step Program consistently elicits substantial increases in pedometer-determined physical activity that are accompanied by modest changes in health-related outcomes. The First Step Program is currently delivered in Canada through the Canadian Centre for Activity and Aging in London, Ontario.

References — Physical Activity

- 1-Department of NCD Prevention and Health Promotion, World Health Organization. <http://www.who.int/hpr/index.shtml>
- 2-U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity. [Rockville, MD]: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; [2001]. Available at <http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf>
- 3-Ibid
- 4-Baumen, A., Bellows, B., Vita, P., Brown, W., & Owen, N. (2002). Getting Australia active: Towards better practice for the promotion of physical activity. National Public Health Partnership, Melbourne. Summary available at http://www.dhs.vic.gov.au/nphp/publications/sigpah/gaa_summary.pdf
- 5-Katzmarczk P.T., Gledhill, N., Shephard R.J. (2000). The economic burden of physical inactivity in Canada.. Canadian Medical Association Journal. 163:1435-1440
- 6-National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). Statistics related to obesity and overweight [Internet]. [Bethesda (MD)]: NIH; 1996 July [cited 2001 Oct 31]. (NIH Publication No. 96-4158). Available from: www.niddk.nih.gov/health/nutrit/pubs/statobes.htm
- 7-Department of NCD Prevention and Health Promotion, World Health Organization. <http://www.who.int/hpr/index.shtml>
- 8-U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996. Available at <http://www.cdc.gov/nccdphp/sgr/pdf/sgrfull.pdf>
- 9-Baumen, A., Bellows, B., Vita, P., Brown, W., & Owen, N. (2002). Getting Australia active: Towards better practice for the promotion of physical activity. National Public Health Partnership, Melbourne.
- 10-U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General (1996).
- 11-Health Canada Website: Research Layer on the Key Benefits of Physical Activity available at: http://www.hc-sc.gc.ca/hppb/fitness/work/res_layer3_e.html
- 12-Department of NCD Prevention and Health Promotion, World Health Organization. <http://www.who.int/hpr/index.shtml>
- 13-Department of NCD Prevention and Health Promotion, World Health Organization. <http://www.who.int/hpr/index.shtml>
- 14-U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity (2001).
- 15-Canadian Fitness and Lifestyle Research Institute: Physical Activity Monitor (2000). <http://www.cflri.ca/cflri/pa/surveys/2000survey/2000survey.html>
- 16-Ibid
- 17-Tremblay, M. S., & Willms, J. D. (2000). Secular trends in the body mass index of Canadian children. Canadian Medical Association Journal, November 28, 2000, 163 (11).
- 18-The Physical Activity Readiness Questionnaire (PAR-Q). Available at <http://www.hc-sc.gc.ca/hppb/fitness/questionnaire.html>
- 19-Canada's Physical Activity Guide to Healthy Active Living available at <http://www.hc-sc.gc.ca/hppb/fitness/pdf/guideEng.pdf>

Recommended Reading — Step Counters

1. Tudor-Locke, C., Myers, A.M., & Rodger, N.W. Formative evaluation of The First Step Program: A practical intervention to increase daily physical activity. Canadian Journal of Diabetes Care 2000; 24(4):34-38.
2. Tudor-Locke, C., & Myers, A.M. Challenges and opportunities in measuring physical activity in sedentary adults. Sports Medicine 2001; 31(2): 91-100.
3. Tudor-Locke, C., Myers, A.M. & Rodger, N.W. Development of a theory-based daily activity intervention for individuals with type 2 diabetes. Diabetes Educator 2001; 27(1):85-93.
4. Tudor-Locke, C., & Myers, A.M. Methodological considerations for researchers and practitioners using pedometers to measure physical (ambulatory) activity. Research Quarterly for Exercise and Sport 2001; 72(1):1-12.
5. Tudor-Locke, C. A preliminary study to determine instrument responsiveness to change with a walking program: Physical activity logs vs. pedometers. Research Quarterly for Exercise and Sport, 2001; 72(3): 288-292.
6. Tudor-Locke, C., Ainsworth, B.E., Whitt, M.C., Thompson, R., Addy, C.L., Jones, D. The relationship between pedometer-determined ambulatory activity and body composition variables. International Journal of Obesity 2001; 25: 1571-1578.
7. Tudor-Locke, C., Myers, A.M., Bell, R., Harris, S., Rodger, N.W., & Mitek, N. Pedometer-assessed ambulatory activity and body composition in individuals with Type 2 diabetes. Diabetes Research and Clinical Care, 2002; 55(3):191-199.
8. Tudor-Locke, C., Myers, A.M., Bell, R., Harris, S., & Rodger, N.W. Preliminary outcome evaluation of the First Step Program: A daily physical activity intervention for individuals with type 2 diabetes. Patient Education and Counseling, 2002; 47(1):23-28.
9. Tudor-Locke, C. Taking steps toward increased physical activity: Using pedometers to measure and motivate. President's Council of Physical Fitness and Sports Research Digest, 2002; 3(17):1-8. <http://fitness.gov/pcpfsdigestjune2002.pdf>
10. Tudor-Locke, C., Jones, G.R., Myers, A.M, Paterson, D.H., & Ecclestone, N.A. Contribution of structured exercise class participation to total physical activity in community-dwelling older adults. Research Quarterly for Exercise and Sport, 2002; 73(3): 350-356
11. Tudor-Locke, C., Williams, J.E., Reis, J.P. & Pluto, D. Utility of pedometers for assessing physical activity: Convergent validity. Sports Medicine, 2002; 32(12): 795-808.
12. Tudor-Locke, C., Ainsworth, B.E., Thompson, R.W., Matthews, C.E. Comparison of pedometer and accelerometer measures of free-living physical activity. Medicine and Science in Sports and Exercise, 2002; 34 (12): 2045-2051.

Kellogg's*



REGISTERED
DIETITIANS
at Kellogg Canada Inc.