

Research UPDATE

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Summary

This article highlights a study that assesses physical activity, fitness, body mass index and insulin sensitivity in youth aged 9 to 15 years. The Healthy Hearts research project is a school-based study conducted in seven rural communities in central Alberta.

Key Terms

Body Mass Index (BMI) is defined as an individual's weight (kg) divided by his/her height, squared (m²). The resulting value classifies him/her as normal weight, overweight or obese, based on internationally derived sex- and age-specific BMI cut-points (Cole, Bellizzi, Flegal, & Dietz, 2000).

Accelerometry is a tool used to measure physical activity objectively. The device is lightweight, durable, portable and has the ability to measure duration and intensity of movement for up to weeks at a time. As the majority of previous research of physical activity in youth was done using self-reported measures, this tool provides a more accurate assessment of physical activity steps a person takes.

Alberta Centre for Active Living
11759 Groat Road
Edmonton, AB T5M 3K6
Phone: 780-427-6949
Alberta toll-free: 1-800-661-4551
active.living@ualberta.ca
www.centre4activeliving.ca
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Healthy Hearts: Physical Activity, Fitness & Obesity in Alberta Youth

Randi Lynn Rinaldi, BPE, and Normand Boulé, PhD, Assistant Professor, Faculty of Physical Education and Recreation, University of Alberta

Background

Over the past three decades, the percentage of Canadian children and adolescents who are overweight or obese has risen considerably. Recent results from the Canadian Health Measures Survey (CHMS) show that the percentage of overweight or obese adolescents aged 15 to 19 years rose significantly between 1981 and 2009 (Tremblay et al., 2010). The number of overweight or obese boys in this age group rose from 14 to 31%, while the rate for girls went from 14 to 25% between 1981 and 2009.



A major concern surrounding childhood obesity is that over 60% of obese children remain obese into adulthood (Serdula et al., 1993). Another concern is that the duration of a person's obesity is associated with an accelerated progression to chronic diseases, such as heart disease, type 2 diabetes and many forms of cancer (World Health Organization [WHO], 2010).

The Canadian Physical Activity Guidelines published by the Public Health Agency of Canada (PHAC) recommend that children do 90 minutes of moderate-to-vigorous activity above and beyond the incidental activities required by daily living. As of 2007, only 12% of children were meeting this standard (Canadian Fitness and Lifestyle Research Institute [CFLRI], 2009).

What We Did

Using participants previously enrolled in the school-based research project called Healthy Hearts, a sub-sample of 457 youth (aged 9 to 15) were studied between January and October 2008.

Satellite laboratories were set up at each school, with research assistants from the University of Alberta completing various testing protocols with each participant, as follows:

- height and weight were measured;
- body mass index was calculated;
- fitness level was measured using a multi-stage run protocol (Leger Shuttle Run); and
- a fitness classification was determined, based on final stage completed.

In addition, an entire week of physical activity was measured using accelerometers. Duration and intensity of activity was formulated using specialized computer software (KineSoft, Denver, USA).

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What We Found

The following results are worth noting:

- 24.8% of female participants and 27.1% of male participants were considered either overweight or obese.
- 11.9% of females and 26.2% of males scored within the “needs improvement” category for fitness level, based on their age, sex and final stage completed in the multi-stage run test.
- 64.9% of female and 49.4% of male participants completed less than 30 minutes of moderate-vigorous physical activity per day (which is 60 or more minutes less than the recommended minimum of 90 minutes, as suggested in the Canadian Physical Activity Guidelines).
- While wearing the accelerometer, only 2% of this sample met the recommended minimum of 90 minutes of moderate-vigorous physical activity per day.
- There was no significant difference between boys and girls when focusing on body mass index, waist circumference, height and weight.
- There was significant difference between boys and girls for fitness final stage completion and average moderate-vigorous physical activity minutes/day.

The following table provides a portrait of an average 12-year-old from the Healthy Hearts study compared to the recently published data from the national CHMS (Tremblay et al., 2010).

Variable	Boys		Girls	
	2008 Healthy Hearts* (Alberta)	2007-2009 National (CHMS) Survey*	2008 Healthy Hearts* (Alberta)	2007-2009 National (CHMS) Survey*
Age (yrs)	12	12	12	12
Height (cm)	153.0	155.8	153.0	155.9
Weight (kg)	45.2	48.0	44.3	47.6
Body Mass Index (kg/m ²)	19.0	19.2	18.8	19.5
Waist Circumference (cm)	69.0	66.2	68.0	68.0
Physical Activity/Day** (min)	32.66	Not available	27.85	Not available

*estimates are based on median values for boys and girls


** at a moderate-vigorous intensity which is equivalent to a walking speed or greater intensity

Since 1981, the national survey has shown noticeable increases in weight, waist circumference and body mass index (Tremblay et al., 2010). Our data suggests that the current situation in Alberta is similar to the national average.

This Healthy Hearts sub-sample is part of a three-year prospective cohort study, designed to pinpoint doses of physical activity and fitness associated with protection from obesity and risk for type 2 diabetes in youth. Additional results will be published at a later date.

Practical Implications

The data presented herein reinforces many trends that have been noted in previous studies: overweight and obesity levels are high in youth and physical activity levels are relatively low.

These realities are cause for concern considering the increased risk of chronic diseases associated with obesity and inactivity. Prevention steps or interventions are needed at multiple levels, across society, to help reverse these unhealthy trends in our youth population and to help reduce costs and demands on the health care system in the future. 

About the Authors

Randi Lynn Rinaldi, BPE, is presently a graduate student at the University of Alberta. She has been part of the Healthy Hearts research team since 2006 and enjoys educating others on incorporating physical activity and wellness into their daily lives.

Normand Boulé, PhD, is an Assistant Professor in the Faculty of Physical Education and Recreation at the University of Alberta. His research interests are centred on the role of physical activity in the prevention and management of obesity and type 2 diabetes.

Jonathan McGavock, PhD, and **Richard Lewanczuk**, PhD, MD are the Principal Investigators for the Healthy Hearts research project.



Examining the Prevalence of Today's Chronic Diseases — How Did We Get Here?

Summary

This article explores the root causes of current health epidemics, such as the rise in obesity, through examining historical trends that have led to an increasingly sedentary society.

Key Terms

Chronic Disease: A disease that persists for a long time. A chronic disease is one lasting three months or more, by the definition of the U.S. National Center for Health Statistics. Chronic diseases generally cannot be prevented by vaccines or cured by medication, nor do they just disappear. Health damaging behaviours — particularly tobacco use, lack of physical activity, and poor eating habits — are major contributors to leading chronic diseases such as diabetes, heart disease, and obesity.

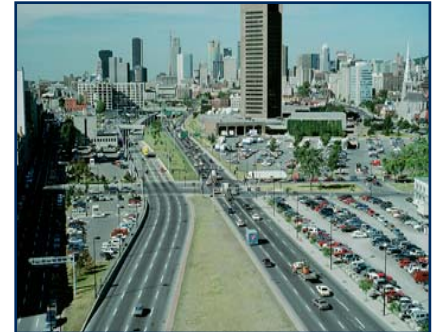
Environmental History: Environmental History involves the study of human interaction with the natural world. Discovering how humans have been affected by their natural environment, as well as how humans have affected the natural environment and with what results, is a main goal of the environmental historian [Smout, T.C. (Ed.). (1993). *Scotland since prehistory: Natural change and human impact*, Aberdeen: Scottish Cultural Press]. Understanding the relationships between humans and the surrounding world enables the environmental historian to understand the interaction between humans and their environment and, thus, the resulting effects on each.

James Daschuk, PhD, Assistant Professor, Faculty of Kinesiology and Health Studies, University of Regina, and Associate Researcher, Saskatchewan Population Health and Evaluation Research Unit (SPHERU)

Many factors have led to an increase in the prevalence of chronic disease in today's society. One of the biggest causes is our overly sedentary lifestyle; more than ever, we are physically inactive.

Ironically, even though we largely know the causes of chronic disease, including physical inactivity, we continue to lead sedentary lives.

Dr. Jim Daschuk, an environmental historian with SPHERU at the University of Regina, investigates the roots of this phenomenon by taking a closer look at the historical trends that have led up to today's high rates of chronic diseases, such as diabetes, obesity, and heart disease.



The Unintended Consequences of Societal Advancement

The origins of the current chronic disease epidemic are rooted in environmental changes. Contributing factors, such as poor urban and neighbourhood design, and the ever-growing impact of technology on our personal and working lives, have had a marked effect on our health.

As a society, we greatly enjoy the benefits of “progress,” invention, and innovation. However, the unintended consequence of our vehicle-dependent, highly-modernized society is the significant rise in various types of chronic diseases.

The Environmental History of Modern Life

We tend to think of “environment” in the context of nature and ecology, but the increasingly urban environment we have built over the past decades has had unforeseen but significant impact on our declining health. The vast majority of neighbourhoods designed and built over the last 40 years or more have had a serious negative effect on the health of their residents. Most neighbourhoods built in the last four decades are not self-contained communities where access to amenities and services are within walking distance (Lawrence Frank and Company Incorporated, 2008).

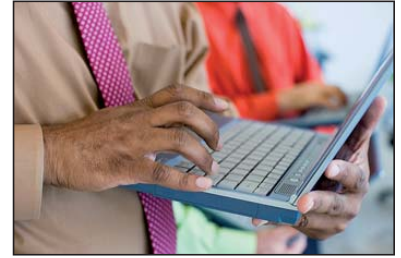
In most communities, residents find it necessary to drive a vehicle to and from work, schools, shopping outlets, and other services, amenities or activities. Clearly, this has led to a large, decrease in the amount of physical activity experienced by most people in their daily lives. Physical inactivity has become an unintended consequence of our lifestyle; thus, unintentionally contributing to the rise in obesity rates.

As neighbourhoods have developed with traffic flow as an organizing principle, the way our children play has profoundly changed. For example, many parents today do not allow their children to gather at playgrounds for unstructured, and unsupervised, play. Instead, children and youth are more often driven in the family vehicle to and from structured activities or lessons during time that was once considered “free.” The decline of play and decrease of physical activity among children and youth is our current reality, which can have a variety of social, developmental and health impacts.

Examining the Prevalence of Today's Chronic Diseases ... (Continued from page 3)

Technological Change and its Effect on Health

Originally intended to lessen the drudgery of physical labour, technological innovations have also fundamentally altered the way we work and the way we play. As electronic devices have come to dominate our daily life, we have experienced a drop in activity in our homes and workplaces. For example, children and adults of all ages are increasingly plugged into technology in a variety of ways, such as computers, portable music devices, video games and more (LeDrew, Zimmer, & Dorsch, 2010).



Typically, most people are sedentary at work, sitting at desks or in front of computers. At home, we continue our sedentary behaviour, as we sit in front of a television screen in our free time. Computers and other screens have become an integral part of daily life for people of all ages (Statistics Canada, 2006). By fully embracing these new technologies en masse into our lifestyles, we have become increasingly sedentary.

Over the last several decades, the physical activity associated with work has been significantly reduced, as technology permeates our workplaces. For many, work now entails no more physical labour than typing on a keyboard and clicking a mouse.

It is ironic that we have only come to recognize the benefits of physical activity with the widespread decline in manual or physical labour. Even in occupations traditionally associated with hard physical labour, such as farming and many other industries, machines and technology have reduced the physical workload. The catch is that although modern machinery and technology generally help to increase productivity, profit, and the quality of life for citizens, there has been a widespread reduction in work-related physical labour or activity.


Even though the intention of progress has enabled an improvement in lifestyle, the unintended consequence, reduced physical activity, has had an increasingly negative effect on the health of our population.

The Health Consequences of a Sedentary Society

Physical inactivity is a known cause of chronic disease. Chronic diseases are known causes of great suffering and pain, which results in an added burden to an already weighted health care system (Booth, Gordon, Carlson, & Hamilton, 2000).

Environmental factors and technology have led society to an increasingly sedentary lifestyle where chronic disease has been allowed to reach epidemic proportion; described in a recent Heart and Stroke Foundation report as a "Perfect Storm" (Heart and Stroke Foundation of Canada, 2010).

Canadian obesity rates are on the rise for adults (both women and men) and school-aged children (Canning, Courage, & Frizzell, 2004). It is alarming that obesity has now surpassed smoking as the top underlying cause of conditions that our health care system is presently dealing with (Jia & Lubetkin, 2010).

As a society, we are continuing toward a deepening public health crisis that has been the unintended consequence of our own prosperity. While some programs and efforts to address some aspects of our increasingly sedentary lifestyle have had a positive effect for those involved, there is more work to be done. Not until we widely and consistently promote change that includes increased physical activity on a daily basis will we begin to address the root causes of chronic disease. 

About the Author

James Daschuk, PhD, is an Assistant Professor (Faculty of Kinesiology and Health Studies at the University of Regina) and an Associate Researcher with the Saskatchewan Population Health and Evaluation Research Unit (SPHERU). He is an environmental historian with a background in anthropology who has been researching and teaching for nearly twenty years. He is an award winning researcher and published author whose work investigates epidemiological change in relation to the health of Canadians.



About the Organization

The **Saskatchewan Population Health and Evaluation Research Unit (SPHERU)** is a bi-university research unit with offices located across Saskatchewan, in Regina, Prince Albert, and Saskatoon. SPHERU engages in population health research, which is the study of social factors that contribute to the well-being of various groups within the population. Working across various disciplines, SPHERU researchers collaborate with communities, other academics, and policy-makers to undertake this critical research.

Bonnie Zink, Communication and Knowledge exchange officer (SPHERU), assisted with the writing of this article.

