CHILDHOOD AND YOUTH OBESITY: AN INTERNATIONAL PERSPECTIVE

by

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Abstract

Childhood and youth obesity is a global public health issue. International studies can provide research findings and training opportunities to expand knowledge and initiate action on this issue. This manuscript-based thesis is composed of three studies that aim to better address cross-national differences in the determinants of childhood and youth obesity and the effectiveness of an obesity research capacity building initiative.

The first manuscript examined cross-national differences in the chain food retail environment surrounding schools, student lunchtime eating behaviours, and the relations between these variables in 13-15 year old youth from Canada, Scotland, and the US. More chain food retailers were located within 1 km from schools in the US than in the other countries, yet fewer American students ate their lunch at a food retailer. An increase in the number of food retailers located close to schools was related to eating behaviours in Canadian students only.

The second manuscript examined differences in the relationship between physical fitness and obesity measures within 10-13 year old children from three countries that sit at the early (Kenya), mid (Mexico), and end (Canada) stages of the nutrition and physical activity transitions. Negative relationships between aerobic fitness and obesity were observed in children from all three countries. Mexican children with low aerobic fitness levels had higher obesity values than did Canadian and Kenyan children.

The third manuscript evaluated an obesity research capacity building initiative. This initiative consisted of a short course on obesity research developed by Canadians for early career researchers from Mexico. Student attendance and feedback demonstrated excellent reach. Dose delivered was high with all 21 course sections taught as planned. In the year following the course, students used a diversity of skills learned in the course suggesting that dose received was good. Barriers to research identified by participants included a lack of devoted research time and money to conduct research.
The findings from this thesis contribute to an improved understanding of the determinants of obesity in children and how these determinants vary across countries. These findings also provide evidence that researchers from developed countries can help develop obesity research capacity in developing countries.
Co-Authorship

The manuscripts presented in this thesis are the work of Mariane Héroux in collaboration with her co-authors. The co-authors of the manuscripts included in this thesis are Dr. Ian Janssen (manuscripts 1 thru 3), Dr. William Pickett (manuscript 1), Dr. Ron Iannotti (manuscript 1), Dorothy Currie (manuscript 1), Dr. Mark Trembley (manuscript 2), Dr. Kristi Adamo (manuscript 2), Dr. Vincent Onywera (manuscript 2), Dr. Juan Lopez Taylor (manuscript 2 and 3), Dr. Edtna Jáuregui Ulloa (manuscript 2 and 3), and Dr. Lucie Lévesque (manuscript 3).

Manuscript 1: *The Food Retail Environment in School Neighbourhoods and its Relation to Lunchtime Eating Behaviours in Youth from Three Countries*. This manuscript has been submitted to *Health & Place* and is presented according to the journal guidelines. Mariane Héroux was responsible for reviewing Technomic reports and identifying which chain food retailers to include in the Yellow Pages searches. She was also in charge of developing a protocol for the Yellow Pages searches, conducting the searches, and building datasets of food retailers surrounding schools in Canada, Scotland, and the USA based on the searches. In addition, Mariane was responsible for building relationships with co-authors from all participating countries, organizing data from the Health Behaviour in School Aged Children from the three countries, conducting statistical analyses, and preparing all aspects of the manuscript. Dr. Janssen provided valuable input with regards to the design, statistical analyses, interpretation of results and editorial feedback on the manuscript. Dr. Pickett, Dr. Iannotti, and Ms. Currie provided content feedback and country-specific expertise. This research was funded by grants secured by Drs Janssen and Pickett in Canada, Dr. Candice Currie in Scotland, and Dr. Iannotti in the United States.

Manuscript 2: *The Relation between Aerobic Fitness, Muscular Fitness, and Obesity in Children from Three Countries at Different Stages of the Physical Activity Transition*. This manuscript has been submitted to *Childhood Obesity* and is presented according to the journal...
guidelines. Mariane was involved with the primary data collection of body composition and fitness measures in the Mexican sample along with writing the ethics proposal for the data collection and entering, organizing, and translating the data. She was also responsible for establishing relationships with international partners. Furthermore, she was in charge of conducting statistical analyses using data from each of the countries and was responsible for the preparation of all aspects of the manuscript. Dr. Janssen provided valuable input with regards to the design, statistical analyses, interpretation of results and editorial feedback on the manuscript. Dr. Onywera, Dr. Tremblay, Dr. Adamo, Dr. Lopez Taylor, and Dr. Jáuregui Ulloa also provided editorial feedback and guidance. This research was funded by two different program grants secured by all of the co-authors.

Manuscript 3: Process Evaluation of International Knowledge Translation Intended for Obesity Research Trainees in Mexico. This manuscript was submitted for publication as a book chapter in the book Case Study: Documenting Capacity Building and Institutional Strengthening Across 14 Teasdale Corti (TC) Team Grants to be published in 2012. Mariane was responsible for planning and developing the evaluation as a whole. She created questionnaires, administered the questionnaires, entered and organized the collected data, and created a dataset. She also built and maintained relationships with international partners, conducted all statistical analyses, and prepared all aspects of the book chapter. Dr. Janssen and Dr. Lévesque provided valuable input with regards to the design, statistical analyses, interpretation of results and editorial feedback on the manuscript. Dr. Lopez Taylor and Dr. Jáuregui Ulloa provided insight regarding content. This research was funded by a program grant secured by the co-authors.
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Chapter 1
Introduction

1.1 General Introduction

Obesity has reached epidemic proportions in children and youth worldwide.¹ This is worrisome because obese children are more likely to experience several health problems such as breathing difficulties, increased risk of fractures, hypertension and other early markers of cardiovascular disease, insulin resistance, and poor mental health.²⁻⁴ Of further concern is the fact that most obese children become obese adults.⁵,⁶ Longitudinal studies have indicated that up to 90% of obese youth will remain obese as young adults.⁶ This is problematic as obese adults have increased risk of several chronic diseases and mortality.⁷

International studies of childhood and youth obesity can provide research findings and training opportunities that may help combat global childhood and youth obesity. One way by which this could be accomplished is by observing if the determinants of obesity are consistent across children and youth from different countries. In the field of epidemiology, one of the nine criteria used to determine if associations are causal is consistency of associations. Thus, the determinants of obesity that are found to be consistent internationally could provide evidence of a causal link with obesity. Furthermore, because the vast majority of research on childhood and youth obesity is based on populations from high income countries,⁸⁻⁹ establishing whether the determinants of obesity are consistent in low and middle income countries can provide evidence to the applicability of findings to other countries in this research field.

International studies of childhood and youth obesity can also be useful for studying the different stages of the nutrition and physical activity transitions. The nutrition transition was first described by Popkin¹⁰ in 1993 and seeks to describe how dietary changes and increased obesity
and chronic disease have occurred around the world. The nutrition transition consists of three stages beginning with a population shift from a high prevalence of under-nutrition and infectious disease to the predominance of obesity and diet related chronic diseases. The final stage is that of behavioural change where diet improves resulting in decreased body fatness and chronic diseases, and an improved health status. The physical activity transition, introduced by Katzmarzyk and Mason\textsuperscript{11} in 2009, suggests that, similar to the nutrition transition, the decline in physical activity patterns observed worldwide have progressed in tandem with the rise in obesity and chronic disease. While the nutrition transition focuses mostly on the changes that have occurred in energy intake, the physical activity transition highlights the changes that have occurred in energy expenditure over time. In primitive hunger-gatherer and early subsistence agricultural conditions, the primary motives to be physically active included such things as acquiring food, water and shelter, and escaping predation.\textsuperscript{11} Over time, reliance on physical activity to fulfill these requirements has decreased. In fact, in developed countries the need for physical activity has been nearly engineered completely out of everyday life.\textsuperscript{11} Thus, physical activity has shifted from being necessary for survival to being optional in one’s everyday life. Since the nutrition and physical activity transitions seem to be occurring simultaneously and since countries are progressing through the stages of the transitions at different points in time and at various rates, much can be learned through research efforts. For example, those countries that are only beginning to progress through the stages can foresee what may be coming by looking at those countries that are at more advanced stages. Preventive efforts, such as political action, can be taken in countries that are only beginning to experience the transitions.

Finally, a third way by which international studies can help combat childhood and youth obesity is by providing a mechanism for researchers from developed countries to help low and middle income countries develop research capacity in the field. This can be done through research capacity building initiatives including practical research training experiences,
networking, and by providing lower income countries with resources to conduct obesity research. Because the Western research model is dominant, it is the widely recognized and accepted model. Thus, if low and middle income countries are given the opportunity to learn and adopt such research techniques, dissemination of their research efforts will be more plausible and more immediate action can be taken.

1.2 Overview and Purpose of the Thesis

The objective of this thesis was to provide an international perspective of childhood and youth obesity by: (1) looking at cross-national differences in the food retail environment surrounding schools and how this environment relates to childhood eating behaviours and obesity, (2) observing whether physical fitness relates to obesity in a similar manner in countries at different stages of the nutrition and physical activity transitions, and (3) examining the effectiveness of an obesity research capacity building initiative conducted in a middle income country.

The next section of the thesis consists of a literature review which looks at current literature related to the three aforementioned topic areas. The literature review is then followed by three manuscripts. Manuscript 1 focuses on the consistency between the food retail environment surrounding schools, youths’ lunchtime eating behaviours, and youths’ obesity levels across three different countries. Manuscript 2 focuses on the relations between fitness and obesity measures in children from three countries at different stages of the nutrition and physical activity transitions. Manuscript 3 focuses on the evaluation of the 2009/2010 CAMBIO (Canada and Mexico Battling Childhood Obesity) short course for research trainees, in an effort to identify if this research capacity building initiative was effective. The final chapter of the thesis consists of a general
discussion which identifies the key findings from each manuscript, the strengths and limitations of the thesis, and discusses the public health implications of this research.
1.3 References


Chapter 2

Literature Review

2.1 Introduction

This chapter provides a review of the literature exploring international childhood and youth obesity research. The chapter is divided into five main sections. The first section (2.2) provides definitions for the key terms used in the chapter and remainder of the thesis. The second section (2.3) discusses the consistency of childhood and youth obesity determinants across countries. While several determinants are mentioned, the main focus is on the relationship between the food environment and childhood and youth obesity. The third section (2.4) explores the nutrition and physical activity transitions and their effects on children’s body composition, fitness, and strength. The fourth section (2.5) discusses the importance of childhood and youth obesity research capacity building.

2.2 Key Definitions

Several terms that are used throughout this chapter and the remainder of the thesis are defined below. It must be noted that definitions for several of these terms vary in the literature. The definitions provided here are those that were used in this thesis.

1. Child: A person less than 12 years of ages.

2. Youth: A person between the ages of 12 and 19.

3. Built Environment: The part of the physical environment that is constructed by human activity. It consists of land use patterns (the distribution across space of activities and the buildings that house them), the transportation system (the physical infrastructure of roads,
4. **Behavioural Determinants of Obesity:** A variety of modifiable factors that influence body composition such as physical inactivity and dietary intake.

5. **Food Retail Environment:** Refers to the quantity and type of food retailers available to an individual. For young people this may include food retailers in proximity to their home and school.

6. **Nutrition Transition:** The process by which a country shifts from a high prevalence of under-nutrition and infectious disease to the predominance of obesity and diet related chronic diseases. A final shift occurs whereby dietary patterns are improved resulting in decreased body fatness and nutrition related chronic diseases, and improved health.

7. **Physical Activity Transition:** The changes that have occurred in energy expenditure over time. In primitive hunger-gatherer and early subsistence agricultural conditions, the primary motives to be physically active included such things as acquiring food, water and shelter, and escaping predation. Over time, reliance on physical activity to fulfill these requirements has decreased resulting in decreased physical activity.

8. **Globalization:** Refers to the process by which regional economies, societies, and cultures have become integrated through a global network of communication, transportation, and trade. Globalization is recognized as being driven by a combination of economic, technological, sociocultural, political and biological factors.

9. **Physical Fitness:** The capacity to perform physical activity and encompasses cardiorespiratory and muscular fitness. *Cardiorespiratory (aerobic) fitness* refers to the overall capacity of the cardiovascular and respiratory systems and the ability to carry out
prolonged strenuous exercise.\textsuperscript{6} Muscular (anaerobic) fitness refers to the capacity to carry out work against resistance.\textsuperscript{6}

10. \textit{Knowledge Translation}: The act of translating knowledge from one body to another through the exchange, synthesis and ethically-sound application of knowledge.\textsuperscript{7}

11. \textit{Research Capacity}: Falls within the broad activities of knowledge translation and is defined as an ongoing process of empowering individuals, institutions, organizations, and nations to define and prioritize problems systematically, develop and scientifically evaluate appropriate solutions and share and apply the knowledge generated.\textsuperscript{8}

\textbf{2.3 Consistency of the Determinants of Obesity Across Countries}

Obesity is determined by a combination of several non-modifiable (e.g., age, genetics) and modifiable risk factors.\textsuperscript{9} The two main modifiable and proximal determinants of obesity are physical inactivity and poor diet. As shown in Figure 2.1, several individual characteristics and influences such as socioeconomic status and the built environment must also be considered, as these factors can influence obesity by influencing physical activity and diet. It is important to ascertain if both the proximal (i.e., physical activity and diet) and more distal (i.e., individual characteristics and influences) determinants of obesity are consistent across countries. If this is the case, the findings of the research conducted in one country could be used to develop strategies to combat obesity in other countries. This would be particularly useful for low and middle income countries, where the volume of research on the determinants of obesity may be small or non-existent.
Figure 2.1 also displays the importance of using a “socio-ecological” framework to understand the complexity of, and to guide the prevention of childhood and youth obesity. The socio-ecological model views children in the context of their families, communities, and cultures, emphasizing the relationships among environmental, biological, and behavioural determinants of health. The socio-ecological model also focuses on interactions between a person's physical, social, and cultural surroundings.¹⁰

Currently, there is evidence indicating that the primary behavioural determinants of obesity (poor diet, a lack of moderate-to-vigorous physical activity, too much sedentary behaviour) are fairly consistent across children and youth from different countries.³,¹¹-¹³ For example, a study by Janssen and colleagues¹¹ compared data from 11-15 year olds from 34 countries in North America and Europe. The authors reported that moderate-to-vigorous physical activity levels were significantly related to obesity in 30 of 34 countries, and that the amount of TV viewing (a measure of sedentary behaviour) was significantly related to obesity in 23 of 34 countries.¹¹ Several other studies from across the globe have reported temporal declines in
physical activity and shifts to poor dietary patterns,\textsuperscript{3, 12, 13} which is consistent with the worldwide trend in the prevalence of childhood and youth obesity.

We know less about whether or not the more distal determinants of obesity (Figure 2.1) are consistent across countries. There is some evidence that the social determinants of obesity may differ by country. For example, socioeconomic status (SES) is a negative predictor of healthy eating, physical activity, and healthy weights in children from high income countries such as Canada and the US.\textsuperscript{14-17} This association results from several factors, including the ability of those from higher SES strata to purchase healthier foods\textsuperscript{18, 19} and eat a healthier diet.\textsuperscript{20} The relationship between SES with diet, physical activity, and obesity appear to be in the opposite direction in low and middle income countries such as India and Cameroon.\textsuperscript{21, 22} A greater capacity of the elite to obtain adequate food supplies in societies where food is scarce, patterns of high energy expenditure in work and for transportation among the poor, and cultural values favouring a larger body size all contribute to the positive associations between SES and obesity that are observed in lower income countries.\textsuperscript{14, 23}

Another determinant of obesity is the built environment (Figure 2.1). Research in this area, at least within high income countries, has received considerable attention in recent years. Some of the built environment features that have been examined include accessibility to parks,\textsuperscript{24} accessibility to fast food restaurants,\textsuperscript{25} and neighbourhood walkability (e.g., presence of sidewalks, how well streets are connected).\textsuperscript{1, 26} The presence of these built environment features varies considerably from country to country. For example, the Netherlands is renowned for its extensive bicycle paths making it easy for residents to get from point A to point B using active transportation.\textsuperscript{27} Conversely, countries such as the US have automobile focused street environments that are not conducive to bicycling or walking.\textsuperscript{27} Access to fast food restaurants and supermarkets also varies between countries based on policies and type of neighbourhood and road networks.\textsuperscript{26, 28, 29}
Thus far, few studies have considered whether the influence of specific built environment features on healthy behaviours varies across countries. However, there is some evidence from studies from different countries examining different environmental measures. For example residential densities, neighbourhood design features, land-use mix (in particular local shops, services and schools within primary residential neighbourhoods), the presence and quality of pavements and sidewalks and footpaths, and perceptions of safety have all been cited as encouraging walking and cycling in North America, Australia and the UK.\(^1,24,30,31\)

The food retail environment is another aspect of the built environment that may have an impact on the behavioural determinants (i.e., dietary patterns) of childhood and youth obesity. The food retail environment refers to the quantity and type of food retailers available to a person. For young people this may include food retailers in proximity to their home and school. Of particular concern is the availability of convenience stores, fast food restaurants, and cafés as they sell foods that are relatively inexpensive (affordable by many youth), calorically dense, and of poor nutritional quality.\(^25,32-35\)

Research on the food retail environment, at least from an international perspective, is not as developed as that in the physical activity environment. For illustrative purposes, this section will focus on fast food restaurants; studies have also examined the relationship with other food retailers such as convenience stores.\(^36-43\) Table 2.1 (page 12) provides a summary of cross-sectional studies from across the globe, which have looked at the fast food retail environment and its effect on children’s eating habits and/or obesity. As displayed in the table, most of the existing studies have been conducted in the US and these studies provide some evidence indicating that the fast food environment is correlated to dietary patterns/obesity.\(^36,37,39-41,44-50\) For example a study by Mellor and colleagues,\(^44\) using a sample of children from California, found that children whose homes were within 0.1 miles of a fast food restaurant were 3.92 (95% confidence interval
(CI): 1.26-12.20) times more likely to be overweight or obese compared to children whose homes had no fast food restaurants within the same distance.

Studies on the food environment outside of the US are less common and have provided mixed results.38, 42, 43, 51-54 For example, a study in 9-10 year old children from the UK done by Jennings and colleagues38 found that the availability of a fast food retailer within 800 m from a child’s home was associated with BMI (0.4 kg/m², p=0.05) and body weight (1.3 kg, p=0.02). Another UK based study by Fraser and colleagues51 found that the density of fast food retailers near children’s homes (in the super-output areas (SOA) used for the census) was associated with being overweight in 3-14 year old children such that for every additional fast food retailer in the SOA, the child’s odds of being overweight or obese increased by 1%. Contrarily, a study by Crawford and colleagues54 conducted on Australian youth reported that among 13-15 year old girls, the likelihood of being overweight or obese was reduced (odds ratio (OR) = 0.19, 95% CI: 0.09-0.41) if they had at least one fast food retailer within 2 km from their home. This association, however, was not found in boys or girls aged 8-9 or boys aged 13-15. Furthermore, no significant results were reported for distance to fast food retailers and being overweight or obese.54

It is extremely difficult to compare the results from food retailer studies conducted in different countries as the subject selection criteria, food retailer measures, neighbourhood definitions, and outcome measures are inconsistent from one study to the next. Furthermore most studies measured obesity as the outcome and not the more proximal dietary behaviour. Thus, it is difficult to disentangle the effects of other obesity determinants on the observed associations. More studies relating the food environment, eating habits, and weight status are needed. Studies making cross-national comparisons are particularly important in order to identify whether or not the same aspects of the food environment contribute to unhealthy eating patterns and obesity worldwide.
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<th>Sample size</th>
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<td>Fraser, 2010&lt;sup&gt;51&lt;/sup&gt;</td>
<td>UK (Leeds)</td>
<td>33,594</td>
<td>Age 3-14</td>
<td>FF density in super output area (SOA) around child’s home (continuous)</td>
<td>Odds of being overweight or obese associated with:</td>
<td>Density of FF near home within SOA: Odds of overweight/obese: 1.01 (95% CI: 1.002-1.02) YES</td>
</tr>
<tr>
<td>Galvez, 2009&lt;sup&gt;56&lt;/sup&gt;</td>
<td>US (East Harlem)</td>
<td>323</td>
<td>Age 6-8</td>
<td>Distance from child’s home to FF within SOA (continuous)</td>
<td>Odds of being obese associated with 1 or more FF within home census block compared to none</td>
<td>Presence of FF within home census block: Odds of obesity: 1.11 (95% CI: 0.71-1.73) NO</td>
</tr>
<tr>
<td>Howard, 2011&lt;sup&gt;17&lt;/sup&gt;</td>
<td>US (California)</td>
<td>879</td>
<td>Grade 9</td>
<td>FF density in super output area (SOA) around child’s home (continuous)</td>
<td>Odds of being overweight or obese associated with:</td>
<td>Prevalence of overweight/obesity associated with having 1 or more FF restaurant within 800 m of school compared to none</td>
</tr>
<tr>
<td>Jago, 2007&lt;sup&gt;41&lt;/sup&gt;</td>
<td>US (Houston)</td>
<td>204</td>
<td>Age 10-14</td>
<td>Density of FF near home within SOA (continuous)</td>
<td>Odds of being obese associated with 1 or more FF within home census block compared to none</td>
<td>Relation between fruit and juice consumption with distance to FF from home</td>
</tr>
<tr>
<td>Jennings, 2011&lt;sup&gt;38&lt;/sup&gt;</td>
<td>UK (Norfolk)</td>
<td>1,669</td>
<td>Age 9-10</td>
<td>FF density in super output area (SOA) around child’s home (continuous)</td>
<td>Odds of being overweight or obese associated with:</td>
<td>Relation between BMI and neighbourhood FF availability (# of FF retailer in neighbourhood per km²)</td>
</tr>
<tr>
<td>Laska 2010&lt;sup&gt;79&lt;/sup&gt;</td>
<td>US (Minneapolis)</td>
<td>349</td>
<td>Age 11-18</td>
<td>Density of FF near home within SOA (continuous)</td>
<td>Odds of being overweight or obese associated with:</td>
<td>Relation between sugar sweetened beverage consumption with FF within 1600 m from home</td>
</tr>
<tr>
<td>Jennings, 2011&lt;sup&gt;38&lt;/sup&gt;</td>
<td>UK (Norfolk)</td>
<td>1,669</td>
<td>Age 9-10</td>
<td>Density of FF near home within SOA (continuous)</td>
<td>Odds of being overweight or obese associated with:</td>
<td>Relation between body fat with the presence of 1 or more FF within 800 m of school</td>
</tr>
<tr>
<td>Reference</td>
<td>Country (State)</td>
<td>Sample Size</td>
<td>Age Range</td>
<td>Outcome Descriptions</td>
<td>Odds Ratio and 95% CI</td>
<td>Results</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-----------</td>
<td>----------------------</td>
<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Leung, 2011⁴⁰</td>
<td>US (California)</td>
<td>444</td>
<td>Age 6-7</td>
<td>One or more FF within 0.25 miles from home compared to none</td>
<td>Odds of overweight/obesity 0.82 (95% CI: 0.28-2.44)</td>
<td>NO</td>
</tr>
<tr>
<td>Liu, 2007⁴¹</td>
<td>US (Indiana)</td>
<td>7,334</td>
<td>Age 3-18</td>
<td>Distance (km) to nearest FF:</td>
<td>Higher population density (≥500 persons/sq km), odds of overweight/obesity: 0.996 (p = 0.77)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower population density (&lt;500 persons/sq km), odds of overweight/obesity: 1.011 (p = 0.71)</td>
<td>NO</td>
</tr>
<tr>
<td>Mellor, 2011⁴⁴</td>
<td>US (Virginia)</td>
<td>2,023</td>
<td>Grade 3-7</td>
<td>FF within 0.1 mile from home:</td>
<td>Odds of overweight: 3.92 (95% CI: 1.26-12.20)</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Odds of obese: 1.14 (95% CI: 0.72-1.82)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FF within 0.25 miles from home:</td>
<td>Odds of overweight/obese: 1.14 (95% CI: 0.72-1.82)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Odds of obese: 1.11 (95% CI: 0.75-1.64)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FF within 0.5 miles from home:</td>
<td>Odds of overweight/obese: 1.42 (95% CI: 0.93-2.15)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Odds of obese: 1.11 (95% CI: 0.75-1.64)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FF within 1 mile from home:</td>
<td>Odds of overweight/obese: 1.11 (95% CI: 0.75-1.64)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Odds of obese: 1.11 (95% CI: 0.75-1.64)</td>
<td>NO</td>
</tr>
<tr>
<td>Oreskovic, 2009⁵⁰</td>
<td>US (Massachusetts)</td>
<td>21,008</td>
<td>Age 2-18</td>
<td>At least 1 FF within 400 m from home compared to none</td>
<td>Odds of overweight: 1.05 (95% CI: 0.98-1.12)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Odds of obese: 1.06 (95% CI: 0.98-1.14)</td>
<td>NO</td>
</tr>
<tr>
<td>Seliske, 2008⁴²</td>
<td>Canada</td>
<td>7,987</td>
<td>Age 11-16</td>
<td>1 or more FF within 1 km of school:</td>
<td>Odds of overweight/obese: 0.83 (95% CI: 0.70-0.98)</td>
<td>YES</td>
</tr>
</tbody>
</table>
### Timperio, 2007[^53]

**Australia**

- **1,560**
- **Age 5-6 & Age 10-12**
- **Relation between food choice and distance to and density of FF from home (distance and density continuous)**

<table>
<thead>
<tr>
<th>Distance to FF from home and weekly consumption of:</th>
<th>Odds of fruit consumption 2 or more times per day:</th>
<th>Odds of vegetable consumption 3 or more times per day:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit: 0.62 (95% CI: 0.40-0.95)</td>
<td>One or more FF within 800 m from home: 0.62 (95% CI: 0.40-0.95)</td>
<td>Yes</td>
</tr>
<tr>
<td>Fruit juices: 0.82 (95% CI: 0.67-0.99)</td>
<td>Number of FF within 800 m: 0.82 (95% CI: 0.67-0.99)</td>
<td>Yes</td>
</tr>
<tr>
<td>Vegetables: 0.99 (95% CI: 0.82-1.20)</td>
<td>Distance to closest FF: 1.17 (95% CI: 0.99-1.36)</td>
<td>No</td>
</tr>
<tr>
<td>Crisps: -0.09 (95% CI: 0.12-0.06)</td>
<td>One or more FF within 800 m from home: 0.93 (95% CI: 0.65-1.32)</td>
<td>No</td>
</tr>
<tr>
<td>Chips: -0.01 (95% CI: 0.07-0.08)</td>
<td>Number of FF within 800 m: 0.99 (95% CI: 0.82-1.20)</td>
<td>No</td>
</tr>
<tr>
<td>Sweets: -0.00 (95% CI: 0.08-0.09)</td>
<td>Distance to closest FF: 1.19 (95% CI: 1.06-1.35)</td>
<td>Yes</td>
</tr>
<tr>
<td>Chocolate: -0.12 (95% CI: 0.12-0.12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugary soft drinks: -0.04 (95% CI: 0.06-0.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast cereal: 0.11 (95% CI: 0.01-0.23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White bread: 0.05 (95% CI: 0.06-0.16)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Skidmore, 2009[^43]

**UK (Norfolk)**

- **1,721**
- **Age 9-12**

<table>
<thead>
<tr>
<th>Distance to FF from home and weekly consumption of:</th>
<th>Odds of consuming fruit 2 or more times per day or vegetables 3 or more times per day with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit: 0.07 (95% CI: -0.08-0.22)</td>
<td>One or more FF within 800 m from home compared to none</td>
</tr>
<tr>
<td>Fruit juices: 0.04 (95% CI: -0.13-0.20)</td>
<td>Number of FF within 800 m from home</td>
</tr>
<tr>
<td>Vegetables: 0.10 (95% CI: -0.03-0.23)</td>
<td>Distance to closest FF: 1.17 (95% CI: 0.99-1.36)</td>
</tr>
<tr>
<td>Crisps: -0.12 (95% CI: -0.24-0.01)</td>
<td></td>
</tr>
<tr>
<td>Chips: -0.08 (95% CI: -0.17-0.01)</td>
<td></td>
</tr>
<tr>
<td>Sweets: -0.09 (95% CI: -0.20-0.01)</td>
<td></td>
</tr>
<tr>
<td>Chocolate: -0.12 (95% CI: -0.22-0.02)</td>
<td></td>
</tr>
<tr>
<td>Sugary soft drinks: -0.10 (95% CI: -0.20-0.01)</td>
<td></td>
</tr>
<tr>
<td>Breakfast cereal: 0.01 (95% CI: -0.16-0.14)</td>
<td></td>
</tr>
<tr>
<td>White bread: -0.17 (95% CI: -0.29-0.05)</td>
<td></td>
</tr>
</tbody>
</table>

---

**Abbreviations:** BMI=body mass index; FF=Fast food; SOA=super output area
2.4 Lessons Learned from the Nutrition and Physical Activity Transitions

Until recently, obesity was only an issue in high income countries; however, the problem has spread worldwide as a result of the nutrition and physical activity transitions.\textsuperscript{3, 4, 12, 55} While the nutrition and physical activity transitions are distinctly different, they typically occur simultaneously. Popkin first introduced the term “Nutrition Transition” in 1993\textsuperscript{3} in which he included aspects of the physical activity transition, however the physical activity transition was formally introduced by Katzmarzyk and Mason in 2009.\textsuperscript{4}

In defining the nutrition transition, Popkin identified five broad nutrition patterns and suggested that the last three patterns comprised the stages of the nutrition transition (Figure 2.2). He proposed that the first stage of the transition, receding famine, involved a low variety, low fat, and high fiber diet as well as labour-intensive work. Stunting (very low height for age), underweight, macronutrient deficiencies and infant mortality also characterized this stage. He named the second stage the degenerative disease stage and suggested that this stage included an increased consumption of fat, sugar, and processed foods, reduced physical activity, and the emergence of obesity, and degenerative as well as chronic diseases. The final stage is that of behavioural change. Popkin described this stage as being characterized by the adoption of positive diet and lifestyle changes as well as a reduction in body fatness and of chronic disease. The lifestyle changes in the final stage include a reduced intake of fat and refined carbohydrates, an increased intake of fruits, vegetables, fiber and complex carbohydrates, and the replacement of sedentary lifestyle with recreation and physical activity.
Changes in diet and activity levels resulting from the transitions are influenced by many factors with globalization at the forefront.\textsuperscript{12} Globalization refers to the process by which regional economies, societies, and cultures have become integrated through a global network of communication, transportation, and trade.\textsuperscript{5} It is recognized as being driven by a combination of economic, technological, sociocultural, political, and biological factors.

Globalization first occurred in the developed world and consequently developed nations were the first to undergo the nutrition and physical activity transitions.\textsuperscript{56, 57} Today, as globalization is occurring at an accelerated rate in the developing world, countries are moving through the stages of the nutrition and physical activity transitions and experiencing an alarming increase in the prevalence of obesity and related chronic disease.\textsuperscript{12} In fact, rates are increasing so quickly that developing countries are experiencing a double burden where there is a co-existence
of under and over nourished children adding to the health and consequent economic burdens of many developing countries.\textsuperscript{12}

Figure 2.3 shows temporal trends in childhood and youth obesity in several countries at different stages of the nutrition and physical activity transitions, based upon the International Obesity Task Force (IOTF) body mass index (BMI) cut-points. Parts of Europe and North America had large increases in the prevalence of childhood and youth obesity from the 1970’s and 1980’s to the early 2000’s. In many less developed economies, a recent and rapid increase in the prevalence of childhood and youth obesity has occurred, especially among urban populations: e.g., steep increases have been noted in Ho Chi Minh City, Vietnam (Figure 2.3), Morocco,\textsuperscript{58} Guatemala,\textsuperscript{59} and Mexico.\textsuperscript{60} Figure 2.4, which shows the average annual percent change in overweight and obesity further demonstrates that the rate of increase of obesity among children in some developing countries (e.g., Brazil and Chile) is similar to or even greater than that in the US, Canada or Europe.
Figure 2.3: Secular changes in international childhood and youth overweight/obesity prevalence

Secular change in overweight/obesity of children as defined by IOTF criteria. Data reported is approximate: No account was taken of differences in survey size or representativeness. Figure adapted from Lobestin. Data sources: Wang and Lobstein, Lobstein, Buar, Uauy et al., and IASO compiled data (www.iaso.org).
Figure 2.4: Mean percent change per annum in international childhood and youth overweight/obesity prevalence

Mean percent changes per annum in childhood overweight and obesity as defined by IOTF criteria in 17 countries. Data reported is approximate: No account was taken of differences in survey size or representativeness. Figure adapted from Lobstein. Data sources: Wang and Lobstein, Lobstein, Buar, Uauy et al., and IASO compiled data (www.iaso.org).
In addition to changes in children’s BMI around the world, secular changes in children’s fitness have been documented (Figure 2.5). For example, Tomkinson and colleagues have reported temporal changes in aerobic\textsuperscript{64} and anaerobic\textsuperscript{65} performance for over 25 million 6-19 year old children and youth from 27 countries (representing five geographical regions). Results showed that that from 1958-2003, there was a global decline in aerobic fitness performance of \(-0.36\%\) per annum. The secular changes were very consistent across age, sex, and geographical groups but the patterns of change were not consistent over time, with improvements from the late 1950s until about 1970, and declines of increasing magnitude every decade thereafter. The greatest declines per annum were seen in North American children (-0.74\% per annum; 95\% CI \(-0.76\) - \(-0.72\)) and the smallest declines in European children (-0.31\% per annum; 95\% CI \(-0.32\) - \(-0.30\)).\textsuperscript{64} The rapid decline in aerobic fitness that occurred after 1970 has coincided with the steep increase in BMI,\textsuperscript{66} suggesting that the two are related and may in large be caused by a decrease in physical activity levels in the pediatric population.
While much of the developing world is only beginning to experience detrimental physiological and environmental changes as a result of the nutrition and physical activity transitions, many developed countries are now working towards reversing the effects of the transitions by striving to provide the population with healthier food options and more opportunities for physical activity; thus moving towards the final stage of the transition (Figure 2.2). Some examples of changes include changes to policies, the built environment, and education. For example many schools in the US have banned sweetened beverages, improved the quality of foods available to children at lunchtime, and have launched physical activity programs.
Nations that are currently at the earlier stages of the transitions can obtain valuable information from those countries that have already undergone the transitions. For example, developing countries can implement policies that have been successful in the developed world in an effort to prevent obesity from escalating to unmanageable rates. Furthermore, it could be extremely helpful to study the physiological changes that occur in children as the population progresses through the transitions. Identifying the stage of the transition in which detrimental effects (i.e., changes in body composition and fitness) present themselves in children would provide us with a better idea of what countries need immediate action and what countries would benefit most from preventive efforts. Thus, drawing on cross-national comparisons of countries sitting at different stages of the nutrition and physical activity transitions could provide useful insight regarding the management of the transitions in various countries.

2.5 Expanding Research Capacity

As previously mentioned and displayed in Figures 2.3 and 2.4, the rise in childhood and youth obesity in developing countries has occurred at an accelerated rate in the last decade. Policy-informing research is drastically needed in these countries. Unfortunately, most of these countries are not equipped to deal with or even study the problem as they have little or no research expertise in obesity and its causal behaviours. For instance, only 28 published obesity-related research articles per year have been produced by researchers residing in Mexico in the past decade.74 This implies that little expertise in obesity research exists in the country despite an extremely high prevalence of overweight and obesity. As the rise in obesity continues in the developing world, the need to increase the quantity and quality of obesity research in these countries will become increasingly important.75

There are several ways by which obesity related research activities can be increased and improved in the developing world. One such way is though research capacity building, a key
component of knowledge translation. Knowledge translation has been defined in several different ways; however, a commonality across the literature is the theme of translating knowledge from one body to another. Research capacity building falls within the broad activities of knowledge translation and is defined as an ongoing process of empowering individuals, institutions, organizations, and nations to define and prioritize problems systematically, develop and scientifically evaluate appropriate solutions and share and apply the knowledge generated. In many cases, individuals with expertise from developed countries work together with individuals from developing countries to share knowledge, experience, and to help build necessary skills sets so that research efforts can be taken and maintained. Such efforts can take on many forms including exchanges, courses, and mentoring.

It has been suggested that an ecological approach towards enhancing research capacity should be used. Such an approach would target multiple levels (i.e., individual, institutional, network, national, and supranational). Four components of such an approach have been identified: (1) *Individual training* provides researchers and research users (i.e., policy makers, program managers, health care practitioners, etc.) with opportunities to foster their research skills through masters’, doctoral, and post-doctoral programs; (2) *learning by doing approaches* offer researchers from developing countries grant funding opportunities and/or provide researchers with hands on training in ongoing research grants of mentor programs; (3) *building partnerships* involve creating collaborations between developing and developed countries and among developing countries themselves. These networks allow researchers to gain access to new ideas, best practices, technical expertise, and resources; (4) *centers for excellence* help further research capacity by creating substantial research infrastructure.

An example of an initiative which uses several of the above mentioned approaches to building research capacity is the Health Behaviour in School-Aged Children (HBSC) survey. The HBSC is a cross-national health survey in which approximately 45 participating countries work together to develop and execute national child health surveys in all participating countries. In this
instance, countries with more established researchers (e.g., Canada, England, US) work with and provide mentorship to countries with less established researchers (e.g., Armenia, Slovenia, Macedonia). Other initiatives using the above mentioned approaches to expand research capacity include the Canada Mexico Battling Childhood Obesity program (CAMBIO) which, among other things, has funded several collaborative research projects, has enabled academic exchanges, and has given Mexican students the opportunity to pursue graduate school in Canada.

In addition to implementing research capacity building initiatives, it is important to document and analyze their processes and outcomes so that they can be repeated and improved. Evaluating the delivery and process of an initiative is critical for understanding several factors such as for whom the initiative is effective, under what conditions the initiative is effective, and what factors and steps contributed to the failure or success of the initiative.\textsuperscript{80} Despite the known importance of the process by which an initiative is delivered, the outcome of the initiative is usually the main focus and little attention is typically given to the process.\textsuperscript{81} To fully understand why an initiative yields positive or negative results, measuring and evaluating the process leading to the outcomes of interest is critical. If other groups want to replicate what was done, they need to know more than simply whether or not the initiative worked. They will need details on how things were run, what problems were encountered along the way, and what they can do to improve the initiative. A good process evaluation should provide a clear description of what program staff and participants did and what they experienced as they engaged in those activities.\textsuperscript{82}

Several authors have developed frameworks composed of a series of measurable components that are meant to guide good process evaluations.\textsuperscript{80, 82-85} The chosen framework will depend on the type of initiative that is to be evaluated (i.e., public health, public education, etc.). Although each framework contains different measurable components, the components bear similarities. For example, most of the proposed frameworks include components that assess both the process and the outcome. Table 2.2 displays a summary of measured components for three frameworks as developed by Glasgow and colleagues (RE-AIM),\textsuperscript{85} Baranowski and Stables,\textsuperscript{83} and
These frameworks have recently been used in studies as guides to evaluate health related initiatives.\textsuperscript{80, 83-91}

Table 2.2: Framework comparisons and component definitions

<table>
<thead>
<tr>
<th>Measurable Components</th>
<th>RE-AIM\textsuperscript{85}</th>
<th>Baranowski and Stables\textsuperscript{83}</th>
<th>Linnan and Steckler\textsuperscript{80}</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reach</strong></td>
<td>The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative</td>
<td>Extent to which the program contacts or is received by the target group</td>
<td>Degree to which the target audience partakes in an initiative</td>
</tr>
<tr>
<td><strong>Efficacy</strong></td>
<td>Impact of an initiative on important outcomes, including potential negative effects, quality of life, and economic outcomes</td>
<td>Not a component but is incorporated within exposure, initial use, and continued use</td>
<td>Not a component but is incorporated within dose delivered</td>
</tr>
<tr>
<td><strong>Adoption</strong></td>
<td>Absolute number, proportion, and representativeness of settings and initiative agents who are willing to initiate a program</td>
<td>Not a component but is incorporated within recruitment, reach and context</td>
<td>Not a component but incorporated within reach and context</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>The initiative agents’ fidelity to the various elements of an initiative’s protocol. This includes consistency of delivery as intended and the time and cost of the initiative</td>
<td>Extent to which the program is implemented as designed</td>
<td>Not a component but is a combination of reach, dose delivered, dose received, and fidelity</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>Extent to which a program or policy becomes institutionalized or part of the routine organizational practice and policies as well as the long term effects of a program on outcomes after 6 or more months after the most recent initiative contact</td>
<td>Keeping participants involved in the programmatic and data collection</td>
<td>Not a component but is incorporated within dose received</td>
</tr>
<tr>
<td>Component</td>
<td>Description</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Recruitment</td>
<td>Attracting agencies, implementers, or potential participants for corresponding parts of the program</td>
<td>The methods used to attract participants</td>
<td></td>
</tr>
<tr>
<td>Context</td>
<td>Aspects of the environment of an initiative</td>
<td>The larger physical, social, and political environment that either directly or indirectly affects an initiative or program</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Materials or characteristics of agencies, implementers, or participants necessary to attain project goals</td>
<td>Not a component but is incorporated within recruitment</td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>Problems encountered in reaching participants</td>
<td>Not a component but is incorporated within reach and dose received</td>
<td></td>
</tr>
<tr>
<td>Exposure</td>
<td>Extent to which participants view or read the materials that reach them</td>
<td>Not a component but is incorporated within dose received</td>
<td></td>
</tr>
<tr>
<td>Initial use</td>
<td>Extent to which participants conducted activities specified in the materials</td>
<td>Not a component but is incorporated within dose received</td>
<td></td>
</tr>
<tr>
<td>Continued use</td>
<td>Extent to which a participant continued to do any of the activities</td>
<td>Not a component but is incorporated within dose received</td>
<td></td>
</tr>
<tr>
<td>Contamination</td>
<td>Extent to which participants receive initiatives from outside the program and the extent to which the control group received the treatment</td>
<td>Not a component</td>
<td></td>
</tr>
<tr>
<td>Dose delivered</td>
<td>The amount or proportion of the intended initiative that is actually delivered to program participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dose received</td>
<td>Described as a measure of the extent to which participants actually use the information learned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidelity</td>
<td>Quality of the implemented program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There is significant overlap between the three proposed models. Table 2.2 helps to further illustrate that the definitions of the measurable components are similar throughout the models despite bearing slightly different names. For example, exposure in Baranowski and Stables\(^3\) framework is equivalent to dose received in Linnan and Steckler’s.\(^8\) Furthermore, although the frameworks have different numbers of measurable components, overall, very similar aspects of an initiative are measured using each framework. For example, the RE-AIM framework has the fewest measurable components; however, the additional components in the other frameworks can easily be classified under the components of the RE-AIM framework (i.e., dose delivered and dose received in Linnan and Steckler’s framework can be classified as efficacy in the RE-AIM framework). Essentially, program evaluations conducted using any of the reviewed frameworks will be fairly similar. The difference will lie in the number of measured components and terms used.

One of the main assets of each of these frameworks is that measuring the suggested components ensures a complete evaluation. No one model is best and the model used will depend entirely on the initiative itself. Six steps have been proposed by Linnan and Steckler\(^8\) (Figure 2.6) to help program managers plan an appropriate process evaluation for the project at hand. Following the steps serves as guidance for program planners when developing and implementing an initiative helping ensure that all important process evaluation steps are considered and taken.\(^8\)
Unfortunately, few international research capacity building initiatives have been put forth and evaluated in the field of childhood and youth obesity and although several process evaluation frameworks have been developed, few initiatives have used them to conduct complete process evaluations. One example of an international obesity prevention initiative is The Pacific Obesity Prevention in Communities (OPIC) project. This initiative was developed in an effort to address childhood obesity with partnerships between Fiji, Tonga, New Zealand, and Australia. One of the main objectives of this initiative was to increase the capacity for obesity prevention research and action in the Pacific. The OPIC study implemented and evaluated the effectiveness of community-based obesity prevention strategies at sites in Fiji, Tonga, New Zealand and Australia. Communities within each of the four countries were selected as action sites where an
obesity initiative was put forth. The plans of action for each site of the OPIC project were developed within the context of the local communities and thus differed slightly in each country. Unfortunately, to date, no process evaluation of the project has yet been completed; only preliminary outcomes have been published. Another example is the Canada Mexico Battling Childhood Obesity (CAMBIO) project established in 2007. One of the main objectives of this initiative was to expand research capacity in Mexico in order to address the childhood obesity epidemic. The initiative included the development and delivery of an annual obesity short course, the development of collaborative research programs, student and faculty exchanges, and building partnerships and networking. This program has proven successful with 3 short courses completed, 13 collaborative research projects funded, the development of the Mexican Obesity Network, 4 English as a second language studentships, 3 graduate students from Mexico studying in Canada, and 2 academic exchanges.

International research capacity building initiatives that indirectly address obesity have also been put forth. An example is The Guide for Useful Interventions for Physical Activity in Brazil and Latin America (GUIA). This project was initiated in 2005 to examine and promote evidence-based strategies to increase physical activity in Brazil and Latin America. The project is a cross-national, multidisciplinary collaboration between partners in the US and Brazil, including the Centers for Disease Control and Prevention, the World Health Organization Collaborating Center, the Federal University of Sao Paulo, the Pan American Health Organization, and other important organizations at the national level in Brazil such as the Ministry of Health. One of the main goals of the GUIA project is to establish and build cross-national, collaborative relationships with researchers, practitioners, and institutions in Brazil to enhance capacity to determine and implement evidence-based initiatives that promote physical activity. Thus far, the GUIA project has proven to be very successful. The project has involved at least 13 graduate students and 15 faculty members from 9 universities in Brazil, Colombia, and the US.
Furthermore, GUIA is playing an important connecting role within Brazil related to both research and public health practice. For example, one of the initiatives that have been evaluated as part of GUIA, the Academia da Cidade Program, has recently been replicated in southern California.

The Academia de Cidade Program was implemented in an effort to increase leisure-time physical activity among residents of Recife, Brazil and was evaluated via questionnaire. The program consists of designated sites where physical education teachers offer free supervised leisure-time physical activity sessions, nutrition education, and health monitoring. All activities are offered on weekdays every hour from 5:00-10:00 a.m. and 5:00-10:00 p.m. The evaluation of the program was completed through telephone interviews whereby a survey was conducted. Interviews (n=2,046) were completed with randomly selected community members, 1.3% of which were current participants, 3.9% of which were former participants, and 94.8% of which had never participated. Results from the evaluation revealed that, in comparison to those who had never participated in the program, former participants were 2.0 (95% CI: 1.0-3.9) times as likely to engage in moderate to high levels of leisure-time physical activity, and current participants were approximately 11 times more likely to do so. Unfortunately this specific evaluation focused only on program outcomes and not its process.

Evidently, there is a need for more collaborative projects addressing obesity. Not only do more partnerships between the developed and developing world need to be established, but research capacity building efforts need to be documented and both their process and outcome need to be evaluated. Much can be learned from the successes and failures of research capacity building initiatives. However, if both successes and failures are not documented other groups will not be able to learn or adapt previous initiatives.
2.6 Summary

Childhood and youth obesity has become a global health crisis. Studying obesity in children and youth using an international perspective can help identify key differences and similarities across countries in an effort to guide policy makers, researchers, and practitioners. Thus far, little research has observed the more distal determinants of obesity across countries and whether or not the effects of these determinants are similar in children at the global level. Such observations are crucial for identifying in which countries immediate preventive efforts are needed as well as which countries would benefit from collaborative research initiatives.
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Chapter 3

The Chain Food Retail Environment in School Neighbourhoods and its Relation to Lunchtime Eating Behaviours in Youth from Three Countries
ABSTRACT

This study examined the relation between the food retail environment surrounding schools, youths’ lunchtime eating behaviour, and youths’ obesity levels across three countries. Participants consisted of 26,778 students 13-15 years old from 687 schools across Canada, Scotland and the US. The density of convenience stores, chain fast food restaurants, and chain café food retailers within 1 km of each school was measured. Lunchtime eating behaviours, weight, and height were self-reported. Although the density of chain food retailers was highest in the US, fewer American students (2.6%) routinely ate their lunch at a food retailer during the school week than did Canadian (7.7%) and Scottish (43.7%) students. The density of chain food retailers was associated with eating lunch at a food retailer in Canada only whereby students attending schools with 1-2, 3-4, and 5+ food retailers within 1 km from their schools were 1.39 (95% CI: 0.84-2.29), 1.87 (95% CI: 1.10-3.20), and 2.50 (95% CI: 1.56-4.01) times more likely to eat at a food retailer compared to students attending schools with no nearby food retailers. No associations were found between the chain food retailer density and obesity.

*Keywords*: food retail environment, lunchtime eating behaviour, obesity, school, youth
INTRODUCTION

Childhood obesity is a global public health problem (WHO, 1998, Wang et al., 2006) and there is a need to study its determinants to develop an evidence base for interventions. Eating behaviour is recognized as an obesity determinant (Popkin, 1993, Janssen et al., 2005, Schmidhuber et al., 2005, Hawkes et al., 2009, Wang et al., 2006) and the food retail environment is one contextual factor that influences the eating behaviour and weight status of children (Cummins et al., 2006). The food retail environment refers to the quantity and type of food retailers available to a person. For young people this may include food retailers in proximity to their home and school. Of particular concern is the availability of convenience stores, fast food restaurants, and cafés as these retailers sell foods that are affordable to many youth, calorically dense, and of poor nutritional quality (French et al., 2001, Bowman et al., 2004, Young et al., 2002, Glanz et al., 2005, Sallis et al., 2006).

The number of fast food restaurants has grown considerably in recent decades and there has been a cultural shift whereby chain food retailers have been replacing independently owned and operated food retailers (Bowman et al., 2004, Nielsen et al., 2002, Christian et al., 2010). For instance, globally there were 31,967 McDonald's restaurants in 2008, which is double the number of McDonald's restaurants in 2003 (McDonald's Inc., 2009). The availability, convenience, and affordability of foods sold at convenience stores, fast food restaurants, cafés, and similar retailers has contributed to secular changes in eating behaviours (e.g., increased intake of high sugar, processed foods) and obesity (Sallis et al., 2006, Glanz et al., 2005).

Recent literature reviews (Fraser et al., 2010, Holsten, 2009, Cummins et al., 2006, Feng et al., 2010, Fleischhacker et al., 2010) have reported that the relationship between the food retail environment, eating behaviours, and weight status varies between different settings. For example, in their review of fast food retailer proximity and density, Fraser and colleagues (Fraser et al.,
2010) included 9 studies that examined eating behaviours and 14 studies that looked at weight status. Of the 9 eating behaviour studies, 3 found a positive association, 3 found a negative association, and 3 found no statistically significant association. Of the 14 weight status studies, 6 found a positive association, 2 found a negative association, and 6 did not identify an association. While several studies found no statistical association, their findings should not be discounted as the direction of the association was often positive and the studies may have been underpowered (i.e., unable to detect meaningful associations due to small sample sizes). Furthermore, most of the studies included in the recent literature reviews studied adults from the US (Cummins et al., 2006, Fraser et al., 2010, Holsten, 2009, Feng et al., 2010, Fleischhacker et al., 2010). The relevance of this literature to youth from other countries remains unclear.

Many of the existing studies that have examined the food retail environment of youth have focused on food retailers in proximity to the young persons’ homes. Since school-aged youth often purchase their lunch and snacks off school grounds (Johnston et al., 2007, Nielsen et al., 2002), food retailers located in school neighbourhoods may also influence their eating behaviour and body weight. Although several authors have suggested that curbing the obesity epidemic among school-aged youth will require addressing the food environment in and around schools (Zenk et al., 2008, Sturm, 2008, Austin et al., 2005), few studies have directly assessed the relationship between food retailers in school neighbourhoods with lunchtime eating habits and weight status (Seliske et al., 2009, Davis et al., 2009). Moreover, of these studies, conflicting results have been reported. For example, an American study found that youth with fast food restaurants located within 0.8 km of their school were 6% more likely to be overweight compared to youth attending schools with no fast food restaurants located within 0.8 km (Davis et al., 2009). Conversely, a Canadian study found that youth with fast food restaurants located within 1 km of their school were 30% less likely to be overweight compared to youth attending schools with no food retailers located within 1 km (Seliske et al., 2009). The differences observed may
result from a variety of factors including whether or not youth actually consumed foods from the retailers.

Studies that examine relationships between the food environment surrounding schools, eating behaviour, and the body weight of young people are needed in order to provide robust evidence about contextual determinants of obesity. Further, the study of these relationships in different countries will help determine if the effects of the food environment are consistent in different parts of the world thus providing guidance regarding international policy development and action. It is possible that the chain fast food environment influences youth differently in different countries as a result of cultural differences. For example, in Scotland chip trucks/vans and independent food retailers are very popular (Bowker et al., 1999, Macintyre et al., 2005) while in Canada and the US chain retailers tend to be dominant. The purpose of the current study was to determine whether the relation between the chain food retail environment surrounding schools, youths’ lunchtime eating behaviour, and youths’ obesity levels are consistent across three different countries.

METHODS

Study Overview

The current study used data from 13-15 year old students from three countries (Canada, Scotland, and the US) that participated in the Health Behaviour in School-Aged Children Survey (HBSC). These countries represent three developed countries that are geographically distinct. Youths’ weekday lunchtime eating behaviour and body weight status were assessed via a questionnaire completed by individual students. The number of convenience stores, and chain fast food restaurants and cafés located within 1 km of the participants’ schools within each country were extracted using Yellow Pages directories. Multi-level regression analyses were used to
determine if the number of food retailers surrounding the school was related to lunchtime eating behaviour and body weight status of the student participants within each country. Cross-national differences in these relationships were explored.

**HBSC Survey**

The study population consisted of participants from the 2009/2010 HBSC, a cross-national survey performed in collaboration with the World Health Organization (Currie et al., 2011). A more detailed description of the survey methodology is provided in Appendix A. Youth aged 11, 13 and 15 years are the target for the international study with a minimum sample size of 1,500 students in each age group (Currie et al., 2011). The 2009/2010 HBSC included 43 countries. In addition to the mandatory HBSC questionnaire items that were agreed upon internationally, the three countries studied here administered an optional dietary module with a question about where the lunchtime meal during the school week was consumed.

Each of the participating HBSC countries used school class as the unit of selection, with classroom grades chosen to reflect the distribution of students aged approximately 11 (grade 6 in Canada and US, grade Primary 7 in Scotland), 13 (grade 8 in Canada and US, grade Secondary 2 in Scotland), and 15 (grade 10 in Canada and US, grade Secondary 4 in Scotland) years. The Canadian and US samples also included 12 (grade 7) and 14 (grade 9) year old students. Eleven and 12 year old students were excluded from the analyses as few of these students (<1% in all three countries) reported that they usually ate their lunch at a food retailer, and within all three countries, many students of this age are not allowed to leave school grounds during the school day. Schools were selected using a weighted probability technique to ensure that the sample was representative by regional geography and key demographic features (e.g., religion, community size, school size, language of instruction). More details on the sampling procedures can be found elsewhere (Currie et al., 2011). A total of 437, 273, and 317 schools were included in the Canadian, Scottish, and US samples. The number of students who completed the questionnaire
(ages 11-15) in these three countries were 26,078, 6,771, and 12,649, respectively. Based on the inclusion criteria mentioned above (ages 13-15 only), the current study was comprised of 15,532 students from Canada, 4,697 students from Scotland, and 6,867 students from the US representing 320, 178, and 189 schools, respectively.

Information obtained from the HBSC questionnaire included sociodemographic information (age, sex, socioeconomic status, etc.), health behaviours (eating behaviour, food frequency, physical activity, smoking, alcohol and drug use, etc.), and a variety of health determinants. The questionnaire was administered to students in their classrooms during regular school hours and took approximately 1 hour for students to complete (examples of survey questions are provided in Appendix B). Ethics reviews for survey completion were obtained from all participating countries and consent was obtained from children and their parents or guardians. The ethics approach adopted in HBSC can be either a passive or active consent, depending on jurisdictional requirements.

*Lunchtime Eating*

The primary outcome of this study was whether the participants usually ate their lunch (mid-day meal) during the school week at a food retailer. This information was based on responses to the question “Where do you usually eat your mid-day meal on schooldays?” There were six response options to this question (1. at school; 2. at home; 3. at someone else’s home; 4. in a snack-bar, fast food restaurant, café; 5. somewhere else, please specify; 6. I never eat a mid-day meal). Those who selected option four were considered to have the outcome. If option five was chosen and a convenience store, fast food restaurant, or café was specified the student was also said to have the outcome. This question and response options in the Scotland questionnaire were worded slightly differently from the Canadian and US instruments (“On most school days, what do you do for lunch?” 1. school lunch in the dining room or canteen; 2. packed lunch in school; 3. go home for lunch; 4. buy lunch from local shop, café, or van; 5. I don’t eat lunch; 6.
other, please specify). Responses for options one and two were combined to represent the category “at school” from the Canadian and US questionnaires and the category “at someone else’s house” from the Canadian and US questionnaires was left blank in the Scotland population.

Overweight and Obesity Status

The secondary outcome of this study was overweight and obesity status, as determined by the self-reported height and weight of the participants. The body mass index (BMI, kg/m$^2$) was calculated, and the age- and sex-specific BMI cut-points advocated by the International Obesity Task Force (Cole et al., 2000) were used to classify youth as having a normal, overweight, or obese BMI. These age- and sex-specific cut-points were derived from a large international sample. Regression techniques were used to pass a line through the health-related adult BMI cut-points at 18 years. Participants with BMI values corresponding to an adult BMI of <25.0, 25.0-29.9, and ≥30.0 were classified as normal weight, overweight, or obese, respectively (Cole et al., 2000). The overweight and obese groups were merged into a single category to create a dichotomous outcome measure (normal weight or overweight/obese).

Covariates

Potential confounders included sex, grade, and family affluence (the validated HBSC measure of socioeconomic status (Currie et al., 2008)). Sex and grade were self-reported by students. The family affluence scale was developed by assessing participants’ answers to four questions regarding material conditions of their household (“Does your family own a car, van or truck”, “Do you have your own bedroom for yourself”, “During the past 12 months, how many times did you travel away on holiday with your family” and “How many computers does your family own”). Based on responses, participants were classified into low, moderate, or high family affluence categories (Currie et al., 2008).
Measurement of Food Retail Environment Surrounding Schools

Information on the number of food retailers located within a 1 km circular buffer surrounding each of the schools that participated in the HBSC in each of the three countries was obtained using electronic Yellow Pages databases (Canada, www.yellowpages.ca; Scotland, www.yell.com; US, www.yellowpages.com). A distance of 1 km was chosen based on previous research (Austin et al., 2005, Apparicio et al., 2007, Seliske et al., 2009); this distance captured food retailers that were within a reasonable walking distance (~10 minutes or less) to schools. Convenience stores, fast food restaurants, and cafés (including sub/sandwich shops and donut/coffee shops) were selected as they provide a wide variety of inexpensive, high calorie, low nutrient foods that are known contributors to obesity (Nicklas et al., 2001, Sallis et al., 2006, Glanz et al., 2005). Also, these food retailers match the response options to the lunchtime eating question that was part of the HBSC questionnaire.

In the Yellow Pages searches for all three countries, school addresses were inputted and food retailers within 1 km of each school were identified. Convenience stores were identified for each participating school by using the search term “convenience store”. There is not a single search term that can be used to capture fast food restaurants or cafés in the Yellow Pages search engine. For instance, many fast food restaurants are listed under the full service restaurant category. Therefore, we performed individual searches on the names of the most common fast food restaurants and cafés within each country (detailed protocol is provided in Appendix C). Within each country these searches were guided by food industry reports generated by Technomic, Inc. (Chicago, IL). Specifically, the Technomic reports for Canada and the US included a list of the top 200 chain restaurants by sales for 2009 and 2010, respectively, and the UK report included a list of the top 100 chain restaurants by sales for 2010. We separated these chains into fast food and café (donut/coffee shop) type chains. For Canada and the US, we determined which fast food restaurants or cafés comprised 75% of the total sales (Austin et al.,
2005). Since the UK Technomic report only listed the top 100 chain retailers, the equivalent percentile cut-points for 100 chain restaurants were determined from the Canada and US reports of the top 200 chain retailers. This cut-point was 85%. In the end, Yellow Page searches in Canada were made based upon the name of 12 fast food restaurants and 2 cafés, Yellow Page searches in Scotland were made based upon the name of 7 fast food restaurants and 4 cafés, and Yellow Page searches in the US were made based upon the names of 18 fast food restaurants and 3 cafés. A list of the fast food restaurants and cafés that were included in the search for each country along with their total sales is included in Appendix D. Note that with this approach we assumed that the food retailer sales were similar in Scotland as in the UK as a whole.

For the purpose of the analyses, four categories were created for each food retailer type (total, convenience stores, fast food, and cafés): 0 stores located within 1 km, 1-2 stores, 3-4 stores, and 5 or more stores. The category representing 3-4 and 5+ cafés were collapsed due to few schools having 5+ cafés located within 1 km.

Statistical Analyses

Analyses were performed using SAS version 9.2 (SAS Institute, Cary, North Carolina). Overlapping confidence intervals around the means were used to see if the number of different types of food retailers surrounding schools varied across the three countries. Within each country multi-level logistic regression was used to examine associations between the study variables, which included individual-level variables (lunchtime eating, overweight/obesity status, covariates) and area-level variables (food retailers surrounding schools). Sample multi-level regression output is provided in Appendix K. First an empty model was used to determine the interclass correlation coefficient, which provides an estimate of the proportion of the variation in the study outcome that was due to differences between schools. Next, we examined bivariate relations between the food retailer exposure variables and covariates with the lunchtime eating and overweight/obesity outcome variables. Next, we examined multivariate relations that
included the food retailer exposure variables and the covariates that were significant (p<0.10) in
the bivariate models. Because all the covariates were significant in the bivariate models, only the
final model containing all covariates is shown. The prevalence of students who ate lunch off
school grounds and the prevalence of students who were overweight or obese were calculated for
each food retail establishment and category (i.e., fast food retailer: 0, 1-2, 3-4, 5+ retailers within
1 km from the school).

RESULTS

Table 1 displays descriptive characteristics of the participants from each of the three
countries. There was a relatively even distribution by sex and grade within each country. The
majority (~50%) of participants in all three countries had high family affluence. The proportion
of participants who were overweight or obese was higher in the US (34.6%) than in Canada
(25.4%, p<0.0001) and Scotland (16.7%, p<0.0001). Conversely, the proportion of participants
who normally ate their lunchtime meal at a snack bar, fast food restaurant, or café was lower in
the US (2.6%) than in Canada (7.7%, p<0.0001) and Scotland (43.7%, p<0.0001).

As shown in Table 2, the mean number of food retailers located within 1 km of schools in
Canada, Scotland, and the US were 3.2 (95% CI: 2.8-3.6), 3.1 (95% CI: 2.5-3.7), and 5.1 (95%
CI: 4.3-5.8), respectively. Approximately one third of schools in Canada and Scotland did not
have a food retailer in close (1 km) proximity; compared to one fourth of schools in the US. Thus,
there were more food retailers surrounding schools in the US than in Canada or Scotland. Similar
observations were made for convenience stores and chain fast food restaurants.

The interclass correlation coefficient values in Canada, Scotland and the US indicated
that 8.6%, 1.9%, and 7.4% of the variation in the lunchtime eating outcome was due to school-
level factors, respectively. Table 3 displays the prevalence and relative odds that youth ate their
lunch during the school week at a food retailer according to the number of food retailers in the 1 km buffer surrounding their school. Relationships in Canada were consistent for all food retailers and the different food retailer types in that the odds of eating at a food retailer increased with increased food retailer availability. For example, in comparison to youth who attended a school with no food retailers in its surrounding environment, the relative odds for eating lunch at a snack bar, fast food restaurant or café were 1.39 (95% CI: 0.84-2.29) for youth who attended a school with 1 or 2 food retailers in its surrounding environment, 1.87 (95% CI:1.10-3.20) for youth who attended a school with 3-4 food retailers in its surrounding environment, and 2.50 (95% CI: 1.56-4.01) for youth who attended a school with 5 or more food retailers in its surrounding environment. Unlike Canada, within Scotland and the US there were no consistent patterns or associations between the number of food retailers (all food retailers, convenience stores, fast food restaurants, or cafés) and lunchtime eating behaviour. When stratified by sex, similar patterns were observed within boys and girls in all three countries with the exception of Canadian boys and girls attending schools with 2-3 retailers. For this exposure group a significant association was found in boys (OR 1.79, 95% CI 1.04-3.06) but not girls (OR 1.15, 95% CI 0.66-2.01).

The interclass correlation values in Canada, Scotland and the US indicated that 1.5%, 0.1%, and 1.4% of the variation in the overweight/obesity outcome was due to school-level factors, respectively. Tables 4 and 5 display the relative odds of overweight/obesity according to the number of food retailers in the 1 km buffer surrounding the participants’ schools (Table 4) and lunchtime eating behaviour (Table 5). Irrespective of country, no statistically significant relationships were observed between the food retailers and overweight/obesity, or between lunchtime eating behaviour and overweight/obesity. Similar observations were made when analyses were stratified by sex within each country (data not shown).
DISCUSSION

The key findings of this study were that there were cross-national differences in the chain food retail environment surrounding schools, student lunchtime eating behaviours, and the relations between these variables. Although there are more chain food retailers located within 1 km from schools in the US than in Canada and Scotland, fewer American students in this age range typically eat their lunch at a chain food retailer during the school week. While an increase in the number of chain food retailers located close to schools was related to lunchtime eating behaviours in Canadian students, this was not the case in American or Scottish students.

Findings from previous US studies have suggested that there is no relationship between student eating behaviours and the presence of food retailers surrounding schools (Davis et al., 2009, Laska et al., 2010, van der Horst et al., 2008). For example, Davis and Carpenter reported that the relative odds for consuming vegetables, juice, soft drinks, and french fries were within 5% for students who attended schools located within 0.5 miles of a fast food restaurant compared to students who did not attended such schools (Davis et al., 2009). The non-significant results reported in these American studies (Davis et al., 2009, Laska et al., 2010, van der Horst et al., 2008) may reflect the lack of specificity of the food outcome measures (e.g., Davis and Carpenter (Davis et al., 2009) or the fact that they measured the total frequency of consumption, which could be influenced by home, school, and other environments. They may also reflect a true lack of association between food retail environments surrounding schools and eating behaviours within the US. Since only 2.6% of American students in the current study ate their lunch outside of school, it is perhaps not surprising that the food retail environment surrounding the US schools was not a determinant of students’ lunchtime eating behaviours. The wide variety of foods available in a typical American school offered from food programs, cafeterias, and vending
machines, may be more relevant for the lunchtime eating behaviours of American school children (Finkelstein et al., 2008, Fox et al., 2009, Pasch et al., 2011, Rovner et al., 2011).

Interestingly, few chain food retailers were identified within the 1 km buffers around the Scottish schools. However, the percentage of students eating their lunch at a food retailer was considerably higher in Scotland than in the other two countries. This finding may be a reflection of the popularity of chip trucks/vans (Bowker et al., 1999) and independent food retailers (Macintyre et al., 2005) in the UK, which were not captured in our food retailer measures. This finding could also be attributed to cultural differences across the studied countries.

Contrary to the US and Scottish data, within Canadian students, lunchtime eating behaviours were related to the number of chain food retailers located within 1 km from schools. We speculate that this cross-national difference may be driven by differences in the variety of foods offered both within and outside of schools in the three countries as well as in differences in school policies that may allow children to access outside food sources. For example, the US offers a variety of food programs within schools greatly increasing students’ access to food without needing to leave school grounds (Finkelstein et al., 2008, O'Toole et al., 2007). On the contrary, in the UK, schools frequently do not have enough dining space for all pupils therefore many children leave the school premises during their lunch hour (Wills et al., 2005, Young et al., 2005).

Given the strong association between students’ lunchtime eating behaviour and chain food retailers surrounding schools in Canada, school-aged children within this country may benefit from the adoption of municipal or regional (e.g., provincial) policies that regulate the number of chain food retailers located within close proximity of schools. Unfortunately, no studies to date have assessed whether or not implementing such a policy would be effective. A policy restricting fast food restaurants in a socioeconomically disadvantaged area in California was recently implemented but its effectiveness has not been evaluated (Sturm et al., 2009).
addition, several local councils across England have begun to ban new fast food retailers from opening within 400 yards of schools within their district (Campbell, 2010) but no evaluations of this policy have been conducted. However, there is some evidence that suggests that changing the food environment can positively impact eating behaviours. For example, the introduction of a new supermarket in a socioeconomically disadvantaged neighbourhood in the UK had an impact on the fruit and vegetable consumption of the adults residing in that neighbourhood (Wrigley et al., 2003). Thus, students eating behaviours may improve if their schools are surrounded by a healthier food environment.

While the availability of chain food retailers was related to lunchtime eating behaviours within the Canadian sample, no relationships were observed with BMI status in any of the three countries; a finding that adds to the mixed results that have been reported in the literature (Davis et al., 2009, Seliske et al., 2009, Howard et al., 2011, Currie et al., 2010). The lack of association observed for BMI, even within Canada where effects were seen for lunchtime eating behaviours, may reflect that there are many determinants of obesity other than lunchtime eating. The chain food environment surrounding schools may influence eating behaviour at lunch during the school week, but should not influence breakfast, dinner, weekend meals, or evening snacks. Furthermore, because youth only attend school approximately 200 days per year and because calories consumed by youth at lunch represent only ¼ of their total daily caloric intake (Garriguet, 2004), the lunchtime meal during the school week only contributes to a small proportion of total energy intake. There are also several other non-dietary determinants of obesity that need to be taken into consideration such as a lack of moderate- to vigorous-intensity physical activity (Rennie et al., 2005), too much sedentary behaviour (Prentice-Dunn et al., 2011, Rey-Lopez et al., 2008), and a lack of sleep (Chen et al., 2008). Thus, the lack of association between the school food retail environment and obesity is not surprising.
As with all studies, this one has several limitations. First, chip trucks/vans and independent fast food retailers and cafés were not captured in our food retailer measures. This likely resulted in non-differential misclassification of the food retailer exposure groups, particularly in Scotland. Second, the 1 km buffer used to capture chain food retailers around schools was based on a circular buffer and thus does not reflect how people travel using a road network. Third, student’s self-reported heights and weights were used to calculate BMI. Students tend to overestimate their height and to underestimate their weight (Sherry et al., 2007, Shields et al., 2008) likely biasing effects towards the null. Finally, several potential confounding variables (e.g., school food policies, school meal program participation, school neighbourhood safety, etc.) were not available for all three countries and thus were not included in the analyses. In addition, urban/rural status was an effect modifier in the Canadian sample in that the odds of students eating out increased with an increasing number of retailers located within 1 km from urban schools but no such patterns were observed in rural schools, however, this information was not collected in all countries.

In conclusion, cross-national differences exist in the chain food environment surrounding schools, the lunchtime eating behaviours of students, and the relations between these variables. However, it must be noted that cross-national comparisons are very difficult to conduct due to national differences in the food environment. Therefore, future studies are needed whereby such variables are evaluated and compared.
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References


Table 1: Descriptive characteristics of the Health Behaviour in School-Aged Children survey participants from the three participating countries.

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<thead>
<tr>
<th></th>
<th>Canada (n=15,532)</th>
<th>Scotland (n=4,792)</th>
<th>United States (n=6,454)</th>
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<td>Mean (95% CI)</td>
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<td>C, S &lt; US</td>
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*Country differences identified by non-overlapping confidence intervals; C=Canada, S=Scotland, US=United States
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<td>Prevalence (%)</td>
<td>Odds Ratio* (95% CI)</td>
<td>Prevalence (%)</td>
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<td>9.6</td>
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* controlled for sex, grade, and family affluence
Table 4: Association between food retail environment surrounding schools and overweight (including obesity)

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<td>All food retailers</td>
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<td>1.0</td>
<td>16.8</td>
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<tr>
<td>3+</td>
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* controlled for sex, grade, and family affluence
Table 5: Association between lunchtime eating behaviour and overweight (including obesity)

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<td>Prevalence (%)</td>
<td>Odds Ratio* (95% CI)</td>
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<td>0.92 (0.70-1.20)</td>
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<td>0.77 (0.53-1.11)</td>
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*Controlled for sex, grade, family affluence
Chapter 4

The Relation between Aerobic Fitness, Muscular Fitness and Obesity in Children from Three Countries at Different Stages of the Physical Activity Transition
ABSTRACT

**Background:** The nutrition and physical activity transitions are occurring worldwide and are contributing to an increase in childhood obesity and a decrease in fitness.

**Objective:** To compare body composition, aerobic fitness, and muscular fitness measures in children from three countries and to examine inter-country differences in the relationship between body composition and fitness measures.

**Methods:** Participants consisted of 736 Canadian, 193 Mexican, and 179 Kenyan children aged 9-13 years. Body mass index (BMI), waist circumference, triceps skinfolds, aerobic fitness, and muscular fitness were measured. Linear regression was used to examine associations between variables.

**Results:** The prevalence of obesity was highest in Mexican children (9.2% boys, 8.4% girls) and lowest in Kenyan children (0.9% boys, 2.8% girls) while aerobic fitness (VO$_{2\text{max}}$ in ml/kg/min) was highest in Kenyan children (50.2 boys, 46.7 girls) and lowest in Canadian children (41.3 boys, 38.3 girls). Regression analyses revealed that the aerobic fitness and three body composition measures were negatively associated irrespective of sex and country. The intercepts and slopes of the regression lines were greater in Mexican children such that Mexican children with low aerobic fitness levels had higher body composition values than did Canadian and Kenyan children. Muscular fitness was not associated with any of the body composition measures in Kenyan children but was a weak positive correlate of BMI and waist circumference in Canadian and Mexican children.

**Conclusion:** The current study provides some evidence to support the physical activity transition hypothesis.

*Key words: aerobic fitness, body composition, children, muscular fitness, obesity, physical activity transition*
INTRODUCTION

Childhood obesity has reached epidemic proportions (1). Increases in weight and adiposity at the population-level were first observed in high income Western countries (2). Research has linked these body composition changes to the nutrition and physical activity transitions which are characterized by an increased consumption of refined and processed foods, decreased levels of physical activity, and are closely associated with social and economic changes impacting urbanization, food systems, labour demands, and transportation choices (2-5). These transitions seem to be occurring simultaneously and low and middle income countries are now progressing through them experiencing similar body composition changes to those that have already occurred in high income countries (6-8). In fact, in the last decade the prevalence of obesity has tripled in several low and middle income countries (9). As a result, obesity and its related chronic diseases are significant public health issues worldwide (10,11).

In addition to the rise in childhood obesity and inactive lifestyles, secular changes in children’s fitness – a strong and independent marker of chronic disease risk (12,13) – have been documented. Tomkinson and colleagues calculated that the average annual decline in the aerobic fitness of 6-19 year olds from five geographical regions (Africa, Middle and East Asia, Australia, Europe and North America) was 0.36% between 1958 and 2003 (14). There is also evidence from developed countries supporting the notion that childhood obesity and fitness levels are negatively correlated (15). Whether or not such associations are consistent in developing countries, and whether changes in body composition and fitness at different stages of the nutrition and physical activity transitions reflect those for obesity, requires further investigation. By comparing the body composition and fitness of children living in countries situated at different stages of the nutrition and physical activity transitions, global correlates of childhood obesity can be better understood.
By examining the consistency of these correlates across countries the potential transferability of preventive efforts can be assessed. If correlates are similar from one country to the next, it is likely that comparable factors have contributed to the observed changes, and that preventive efforts that work in one country may, if appropriately contextualized, be successful in another. Thus, inter-country comparisons can serve to raise awareness, guide the development of preventive initiatives, and further our understanding of this public health concern.

The objectives of this study were to (1) compare body composition, aerobic fitness, and muscular fitness measures in children from three countries that currently sit at different stages of the nutrition and physical activity transitions (Canada – end stages, Mexico – mid stages, and Kenya – early stages) and (2) to examine the inter-country differences in the relationships between body composition and fitness measures.

**METHODS**

*Study Populations*

**Canada:** Canadian participants consisted of a representative sample of 736 children aged 9-13 years who participated in the Canadian Health Measures Survey (CHMS) (16-18). The CHMS is a nationally representative cross-sectional survey with data collected from 15 sites across Canada between March 2007 and February 2009. Data collection included a combination of a personal interview (demographic information) and a visit to a mobile examination centre for the collection of physical measures, including anthropometry and fitness. **Mexico:** The study population consisted of a convenience sample of 193 boys and girls from four public schools located in the urban core of Guadalajara, Mexico. Data were collected by our research team at the four schools in November 2009. Children in grades 5 and 6 (10-13 years of age) from the selected
schools were invited to participate. Trained personnel directly measured body composition and fitness indicators. An interviewer administered questionnaire was used to capture demographic details. **Kenya:** Participants consisted of a convenience sample of 179 school children aged 9-13 from four schools in Kenya. Two of these schools were located in urban areas and two were located in rural areas. Data were collected at the four schools by members of our research team in November 2008. Body composition and fitness data were directly measured by trained personnel. Demographic information was recorded by researchers.

Ethics approval for data collection was granted for all three study populations by respective institutional review boards (Appendix J). Informed consent/assent was also obtained from the child participants and their parents or guardians.

**Data Collection**

With the exception of the aerobic fitness measures in Mexico and Kenya, all body composition and fitness data were collected in each country using comparable equipment according to the Canadian Physical Activity, Fitness, and Lifestyle Appraisal (CPAFLA) (19). A more detailed description of the measures can be found in Appendix E.

**Body composition measures:** Height (to the nearest 0.1 cm) and weight (to the nearest 0.1 kg) were measured by trained personnel using calibrated stadiometers and scales, respectively. These measures were used to calculate body mass index (BMI, kg/m$^2$). Subjects were classified into four categories (underweight, normal weight, overweight, obese) according to the International Obesity Task Force age- and sex-specific BMI cut-points (20,21). Triceps skinfolds were measured in duplicate (or triplicate if measures varied by >0.4 mm) to the closest 0.2 mm using Harpenden skinfold calipers (Baty International, UK). Gulick measuring tapes were used to measure the waist circumference, to the nearest 0.1 cm, according to the World Health
Organization (22) and CPAFLA (19) protocols (i.e., midpoint between last floating rib and top of iliac crest in the mid-axillary line).

Muscular fitness: A hand dynamometer (Canada: Takei Scientific Instruments, Japan; Mexico/Kenya: LB9011 Senoh, Japan) was used to measure grip strength in kg. Both hands were measured alternately allowing two trials per hand. The combined maximum score for each hand was calculated.

Aerobic fitness: In the Canadian population aerobic fitness was measured using the modified Canadian Aerobic Fitness Test (mCAFT), during which children had to complete one or more 3 minute “stepping” stages (up and down steps with increasing intensity) at predetermined speeds based on their age and sex (19). Children aged 6-14 years started at what is stage five for women, to a maximum of three stages (23). Participants’ heart rate was recorded after each stage, and the test was completed when it reached 85% of their age predicted maximal heart rate (220-age). Predicted maximal aerobic power (VO₂max) was calculated for all participants using the pediatric-specific equation VO₂max (ml/kg/min) = 3.23 (OC) – 1.31(BMI) + 1.39(age) – 49.21 where OC is the oxygen cost of stepping (24). Other equations suggested specifically for adults using the mCAFT were not used as these have not been validated on children (19,25,26).

In the Mexican and Kenyan populations the 20 Metre Shuttle Run Test was used to measure aerobic fitness (27). This test involved continuous running by participants between two lines 20 metres apart in time to recorded beeps on a compact disc. The participants continued running between the two lines, turning when signaled by the recorded beeps. Each minute, a sound indicated an increase in speed and the beeps became closer together. If children did not reach the line in time for each beep, the child had to run to the line, turn, and try to catch up with the pace within two more beeps. The test was stopped when the child failed to reach the line (within 2 metres) for two consecutive ends. The level at which the child ended the test was
recorded and Leger’s equation (28) was then used to calculate peak oxygen consumption (\(\text{VO}_2\text{max}\)). This test is currently the most widely used aerobic fitness field test within children and adolescents (27) and has been shown to be a reliable and valid method of estimating \(\text{VO}_2\text{max}\) in this age group (14).

**Statistical Analysis**

All analyses were performed using SAS version 9.1 (SAS Institute, Cary, North Carolina). Data were analyzed separately by sex and country of origin. Estimates of means and their associated 95% confidence intervals were produced for all measures. Pearson correlations were completed between the three body composition measures within each sex and country subgroup. Linear regression models were used to examine the associations between the body composition (BMI, triceps skinfold, and waist circumference), aerobic fitness, and muscular fitness variables. Age was included as a covariate in these models. Regression diagnostics showed that residuals of the dependent variables (BMI, triceps skinfold, and waist circumference) were normally distributed and thus no transformations were needed. Differences in the descriptive and regression analyses across countries were determined by examining whether 95% confidence intervals of the means and regression (intercepts and coefficients) overlapped. Because of the complex sampling strategy, bootstrapping techniques were used on the Canadian data to generate the confidence intervals (29,30). Samples of Pearson correlation and linear regression output are provided in Appendix L and M, respectively.
RESULTS

Descriptive Statistics

Descriptive statistics are shown in Table 1. The mean age of children in all three countries was 11 years. There were no differences in the mean height of girls in all three countries but the mean height of Kenyan boys was less than that of Canadian and Mexican children. The mean BMI, waist circumference, and skinfold values of Canadian and Mexican boys and girls were higher than in their Kenyan counterparts. There were no differences between Canadian and Mexican children for these three body composition measures with the exception of waist circumference, which was higher in Mexican boys. The prevalence of obesity was highest in Mexican children while the prevalence of underweight was highest in the Kenyan children. No differences between countries were observed for grip strength. However, aerobic fitness (VO$_2$max) was different in boys across all three countries with the Kenyan’s having the highest values and the Canadian’s having the lowest values. In girls, aerobic fitness scores were higher in Kenya and Mexico than in Canada.

Associations between Body Composition Measures

Table 2 shows the correlations between the three body composition measures within each sex and country subgroup. Correlation coefficients were quite strong (r value range of 0.62-0.95), irrespective of sex and country. The correlations in Kenyan boys and Canadian girls tended to be weaker than in the other sex and country subgroup. BMI tended to be more strongly correlated with waist circumference than triceps skinfold, regardless of sex and country.

Associations between Body Composition and Aerobic Fitness Measures

Table 3 shows the results from the age-adjusted linear regression analyses looking at the association between aerobic fitness and the three body composition measures. The table displays
the slopes (beta coefficient) of the regression lines, the model fit (R²), and the predicted BMI at a VO₂ max of 40 and 50 ml/kg/min for each sex and country subgroup. The overall patterns of findings indicate that: (1) Aerobic fitness and body composition measures were negatively associated irrespective of country, sex, and body composition measure examined. (2) The slopes of the regression lines and predicted BMI at a low aerobic fitness (e.g., 40 ml/kg/min) tended to be greater in Mexican children than in Canadian and Kenyan children. Thus as illustrated in Figure 1 for BMI, Mexican children with low aerobic fitness levels had higher body composition values than did Canadian and Kenyan children. However, the body composition values of children in all three countries were similar in those with high aerobic fitness (e.g., 50 ml/kg/min). (3) The R² values for both sexes were higher in Canadian children (range 0.37-0.53) than in Mexican children (range 0.31-0.37) and higher in Mexican children than Kenyan children (range 0.11-0.32). Thus, aerobic fitness was more strongly associated with obesity in the most developed country (Canada) and least strongly associated with obesity in the least developed country (Kenya).

Associations between Body Composition and Muscular Fitness Measures

Table 4 and Figure 2 show the results from the linear regression analyses looking at the associations between the muscular fitness (grip strength) and body composition measures. The overall findings indicate that: (1) Muscular fitness was not associated with any of the body composition measures in boys and girls from Kenya. (2) Muscular fitness was positively associated with BMI and waist circumference, but not skinfold thickness, in boys and girls from Canada and Mexico. These associations were weak (R² range = 0.09-0.14) in Canadian children and Mexican boys and of a modest strength (R² = 0.32) in Mexican girls.
DISCUSSION

The results provide supporting evidence of inter-country differences in the aerobic fitness and body composition of children from countries at different stages of the nutrition and physical activity transitions. Negative relationships between aerobic fitness and obesity were observed in boys and girls from all three countries; however, these relationships were more pronounced in Mexican children than in Canadian and Kenyan children.

Differences in aerobic fitness were observed across all three countries wherein Kenyan children were the most fit and Canadian children were the least fit. Although mixed results have been reported in the literature (possibly resulting from the use of invalid self-reported physical activity questionnaires (31)), evidence based on valid questionnaires, objective physical activity measures, and physical activity initiatives suggests that aerobic fitness reflects the amount of aerobic physical activity performed in recent weeks and months (32-34). Thus, results from the current study are consistent with each country’s current stage within the physical activity transition. These results are also supported by Tomkinson and Olds who compared the secular decline in the aerobic fitness of 6-19 year old children from 27 countries in recent decades (14). Their results showed that the rate of decline in high income countries was greater than that of middle and low income countries (-0.49% vs. -0.39% per year) (14).

In the current study, no differences were found between countries for children’s mean grip strength. Irrespective of country, grip strength was not related to triceps skinfold thickness; however, grip strength was a weak positive correlate of BMI in Canadian and Mexican children. When coupled with the knowledge that weight gain is associated with increases in lean body mass and not just fat mass (35), this suggests that these positive associations were driven by a greater lean body mass in the heavier children within Canada and Mexico. We speculate that the
positive effects that the increased lean body mass had on muscular fitness in the heavier Canadian
and Mexican children was not reflected in higher grip strength values than in Kenyan children
because these effects were negated by decreases in physical activity that affected muscle quality
(e.g., strength per kg of muscle). It is also possible that insufficient variability in the BMI’s of the
Kenyan sample resulted in a lack of power to detect meaningful associations.

The low prevalence of overweight and obesity in the Kenyan children (5.6%) examined
in this study was expected given their stage of the nutrition and physical activity transitions and
previously published data from that country. In particular, the 2003 Kenya Global School-Based
Student Health Survey found that only 5.9% of 10-15 year old boys and girls were overweight or
obese (8,36). Although Mexico sits at an earlier stage of the nutrition and physical activity
transitions than Canada, the prevalence of obesity in the Mexican children (9.2% boys, 8.4%
girls) studied here was slightly higher than in the Canadian children (8.6% boys, 7.2% girls).
Although this observation is inconsistent with where the two countries currently sit within the
nutrition and physical activity transitions, this was not unexpected as these differences are
consistent with nationally representative data for the two countries. Specifically, the prevalence
of obesity in 5-19 year old boys and girls in the 2006 Mexican National Health and Nutrition
Survey was between 16.5% and 23.3% (37) while the prevalence of obesity in 6-17 year old boys
and girls in the 2004 Canadian Community Health Survey was between 7.5% and 11.1% (38).
The higher rates of obesity in Mexican children may be due to a variety of factors including
differences in dietary and physical activity behaviours, biological differences, and how they
interact with their environments. Growth stunting (very low height for age) could also be a
plausible explanation for the higher obesity rates observed within the Mexican population.
However, stunting in Mexico is on the decline. For example, between 1988 and 2006 stunting
decreased from 27% to 16% in Mexican children under the age of 5 (39) and results from the
2006 Mexican National Health and Nutrition Survey found that only 9.9% of children between the ages of 5-11 were stunted (40). Furthermore, within the current study population no differences were observed between the height of Canadian and Mexican children suggesting that, in the current study, the higher rates of obesity likely were not due to stunting.

Although temporality of relationships cannot be addressed in this study, the relations between the aerobic fitness and body composition measures suggest that low fitness has a greater impact on the body composition of Mexican children than of Canadian and Kenyan children. Thus, as Mexico continues to progress through the physical activity transition, wherein their physical activity and fitness levels approach those currently observed in Canada, we can anticipate that the obesity levels in Mexican children will rise at a faster rate than what has occurred in Canada in recent decades. Conversely, as Kenya progresses through the physical activity transition, the increased prevalence of obesity in the population may more closely match what has occurred in Canada. Nonetheless, our findings suggest that it may be inaccurate to project changes in children’s body composition in developing countries based on previous trends observed in developed countries. Thus, reproducing preventive physical activity initiatives that have been successful in high income countries may have varying levels of success in lower income countries. For example, our findings suggest that more substantial changes in physical activity and fitness would need to occur within Mexican children to have the same body composition benefits observed in predominately non-Hispanic white populations such as Canada. Dietary initiatives may also differ; however, the differential effects of diet on the body composition of children in different countries require further investigation.

As with all studies, this one is not void of limitations. Because the Kenya and Mexico testing sites were at schools that did not have a gymnasium, the aerobic fitness testing was performed outdoors where the high temperature and humidity could not be controlled. Altitude
also negatively impacts aerobic fitness performance (41), and therefore the VO$_2$\text{max} values obtained around the city of Nairobi in the Kenyan children were likely underestimated (though this would only further strengthen our findings). In addition, the aerobic fitness of Canadian children was assessed using the mCAFT test as opposed to the 20 m shuttle run test that was used in Mexico and Kenya. Thus, equations used to estimate VO$_2$\text{max} were different for Canadian youth resulting in possible comparability issues. Furthermore, the Mexican and Kenyan samples were convenience samples, which limit the generalizability of the findings, particularly as it pertains to how they may have been influenced by urban/rural status. Approximately 50\% of the Kenyan sample was from an urban area, while in the country as a whole only 22\% of the population is urbanized (42). The entire (100\%) Mexican sample was from an urban area, while in the country as a whole 78\% of the population is urbanized (43). Even within a country children may sit at different stages of the nutrition and physical activity transitions depending on where they live. In Kenya, for instance, children residing in urban areas are more obese and have lower physical activity and fitness levels than children residing in rural areas (7,8). While this urban/rural issue may have influenced the descriptive data, they were unlikely to have influenced the relations between the fitness and body composition measures. That is, when relationships between body composition and fitness measures were assessed by rural and urban dwelling in the Kenyan sample, no significant differences were observed in the intercepts and regression coefficients (data not shown).

In conclusion, there appear to be differences in the fitness and body composition measures of children from countries that currently sit at different stages of the nutrition and physical activity transitions. While negative relationships between aerobic fitness and obesity were observed in children from all three countries examined in this study, these relationships were more pronounced in Mexican children. This may, in part, explain why the prevalence of
obesity was higher in Mexican children than in their Canadian counterparts even though Mexico is at an earlier stage of the nutrition and physical activity transitions.
ACKNOWLEDGEMENTS

This work was carried out with support from CAMBIO, which is funded by the Global Health Research Initiative (GHRI) a collaborative research funding partnership of the Canadian Institutes of Health Research, the Canadian International Development Agency, the International Development Research Centre, Health Canada and the Public Health Agency of Canada. In addition, this study was supported by an International Opportunities Partnership grant from the Canadian Institutes of Health Research, Institute of Nutrition, Metabolism and Diabetes (OPD–83181). The authors wish to extend thanks to all of the school children who enthusiastically participated in this study and the support and co-operation of the teachers from each of the Kenyan and Mexican data collection sites. We are grateful to all those who helped in liaising and data collection in Mexican and Kenyan schools.
References


11. Tremblay MS, Onywera V, Adamo KB. A child's right to healthy active living - Building capacity in Sub-Saharan Africa to curb the impending physical activity transition. In:


<table>
<thead>
<tr>
<th>Boys</th>
<th>Canada</th>
<th>Mexico</th>
<th>Kenya</th>
<th>Country differences*</th>
</tr>
</thead>
<tbody>
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<td>N</td>
<td>374</td>
<td>98</td>
<td>86</td>
<td>none</td>
</tr>
<tr>
<td>Age, y (95% CI)</td>
<td>10.9 (10.8, 11.0)</td>
<td>11.1 (11.0, 11.3)</td>
<td>11.0 (10.9, 11.2)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>BMI, kg/m² (95% CI)</td>
<td>19.2 (18.8, 19.6)</td>
<td>19.8 (19.0, 20.5)</td>
<td>16.2 (15.7, 16.7)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Underweight (%)</td>
<td>5.9</td>
<td>6.1</td>
<td>44.4</td>
<td></td>
</tr>
<tr>
<td>Normal weight (%)</td>
<td>67.8</td>
<td>54.1</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td>Overweight (%)</td>
<td>17.7</td>
<td>30.6</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>Obese (%)</td>
<td>8.6</td>
<td>9.2</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Height, cm (95% CI)</td>
<td>145.8 (144.8, 146.8)</td>
<td>146.8 (145.2, 148.5)</td>
<td>142.0 (140.4, 143.6)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Waist circumference, cm (95% CI)</td>
<td>66.2 (65.1, 67.3)</td>
<td>70.0 (67.8, 72.3)</td>
<td>59.6 (58.5, 60.8)</td>
<td>C &lt; M, M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Triceps skinfold, mm (95% CI)</td>
<td>13.1 (12.5-13.6)</td>
<td>13.3 (12.0-14.5)</td>
<td>7.8 (7.0, 8.6)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Grip strength, kg (95% CI)</td>
<td>35.0 (33.9, 36.0)</td>
<td>36.6 (34.7, 38.5)</td>
<td>34.7 (32.0, 37.3)</td>
<td>none</td>
</tr>
<tr>
<td>VO₂max, ml/kg/min (95% CI)</td>
<td>41.3 (40.1, 42.7)</td>
<td>47.1 (46.1, 48.1)</td>
<td>50.2 (49.0, 51.4)</td>
<td>C &lt; M, M &lt; K, C &lt; K</td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>362</td>
<td>95</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>Age, y (95% CI)</td>
<td>10.9 (10.8, 11.0)</td>
<td>10.8 (10.7, 11.0)</td>
<td>11.0 (10.8, 11.2)</td>
<td>none</td>
</tr>
<tr>
<td>BMI, kg/m² (95% CI)</td>
<td>18.8 (18.4, 19.1)</td>
<td>19.2 (18.3, 20.1)</td>
<td>16.8 (16.2, 17.4)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Underweight (%)</td>
<td>6.9</td>
<td>15.8</td>
<td>37.9</td>
<td></td>
</tr>
<tr>
<td>Normal weight (%)</td>
<td>68.2</td>
<td>52.6</td>
<td>53.7</td>
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<tr>
<td>Overweight (%)</td>
<td>17.7</td>
<td>23.2</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>Obese (%)</td>
<td>7.2</td>
<td>8.4</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Height, cm (95% CI)</td>
<td>146.1 (145.1, 147.2)</td>
<td>145.6 (143.9, 147.4)</td>
<td>143.6 (142.0, 145.3)</td>
<td>none</td>
</tr>
<tr>
<td>Waist circumference, cm (95% CI)</td>
<td>64.7 (63.7, 65.7)</td>
<td>67.1 (64.8, 69.4)</td>
<td>60.4 (58.8, 62.0)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Triceps skinfold, mm (95% CI)</td>
<td>13.7 (13.2, 14.2)</td>
<td>13.6 (12.5, 14.7)</td>
<td>10.9 (9.7, 12.1)</td>
<td>M &gt; K, C &gt; K</td>
</tr>
<tr>
<td>Grip strength, kg (95% CI)</td>
<td>32.9 (31.9, 33.9)</td>
<td>32.3 (31.6, 34.9)</td>
<td>31.1 (28.7, 33.5)</td>
<td>none</td>
</tr>
<tr>
<td>VO₂max, ml/kg/min (95% CI)</td>
<td>38.3 (37.1, 39.5)</td>
<td>46.4 (45.5, 47.2)</td>
<td>46.7 (45.7, 47.8)</td>
<td>C &lt; M, C &lt; K</td>
</tr>
</tbody>
</table>

*country differences identified by non-overlapping confidence intervals; C=Canada, M=Mexico, K=Kenya
Table 2: Pearson correlations between the three body composition measures by sex and country (p <0.0001 for all correlations).

<table>
<thead>
<tr>
<th>Sex</th>
<th>Canada</th>
<th>Mexico</th>
<th>Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Waist circumference</td>
<td>Triceps skinfold</td>
<td>Waist circumference</td>
</tr>
<tr>
<td>Boys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.95</td>
<td>0.82</td>
<td>0.94</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>--</td>
<td>0.79</td>
<td>--</td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.94</td>
<td>0.75</td>
<td>0.95</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>--</td>
<td>0.71</td>
<td>--</td>
</tr>
</tbody>
</table>
**Table 3:** Age-adjusted relationship between body composition and aerobic fitness (VO\(_2\)max) measures by sex and country.

<table>
<thead>
<tr>
<th></th>
<th><strong>Boys</strong></th>
<th></th>
<th></th>
<th></th>
<th><strong>Girls</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Canada</td>
<td>Mexico</td>
<td>Kenya</td>
<td>Differences*</td>
<td>Canada</td>
<td>Mexico</td>
<td>Kenya</td>
<td>Differences*</td>
</tr>
<tr>
<td>Body mass index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\beta) (95% CI)</td>
<td>-0.21 (-0.23, -0.19)</td>
<td>-0.43 (-0.57, -0.30)</td>
<td>-0.17 (-0.25, -0.09)</td>
<td>C &lt; M, M &gt; K</td>
<td>-0.22 (-0.27, -0.18)</td>
<td>-0.57 (-0.77, -0.37)</td>
<td>-0.35 (-0.47, -0.22)</td>
<td>C &lt; M, M &gt; K</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.51</td>
<td>0.31</td>
<td>0.19</td>
<td></td>
<td>0.47</td>
<td>0.32</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Predicted BMI at</td>
<td>19.3</td>
<td>22.9</td>
<td>18.0</td>
<td></td>
<td>18.5</td>
<td>22.9</td>
<td>19.3</td>
<td></td>
</tr>
<tr>
<td>(V)(_O2)max 40\ ml/kg/min</td>
<td>17.2</td>
<td>18.5</td>
<td>16.2</td>
<td></td>
<td>16.5</td>
<td>17.2</td>
<td>15.7</td>
<td></td>
</tr>
<tr>
<td>Triceps skinfold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\beta) (95% CI)</td>
<td>-0.32 (-0.39, -0.25)</td>
<td>-0.76 (-0.97, -0.55)</td>
<td>-0.32 (-0.46, -0.18)</td>
<td>C &lt; M, M &gt; K</td>
<td>-0.31 (-0.36, -0.26)</td>
<td>-0.79 (-1.04, -0.55)</td>
<td>-0.75 (-0.97, -0.52)</td>
<td>C &lt; M, C &lt; K</td>
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<tr>
<td>(R^2)</td>
<td>0.42</td>
<td>0.31</td>
<td>0.19</td>
<td></td>
<td>0.37</td>
<td>0.33</td>
<td>0.32</td>
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<tr>
<td>Waist circumference</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(\beta) (95% CI)</td>
<td>-0.53 (-0.60, -0.48)</td>
<td>-1.29 (-1.66, -0.92)</td>
<td>-0.32 (-0.52, -0.12)</td>
<td>C &lt; M, M &gt; K</td>
<td>-0.63 (-0.76, -0.50)</td>
<td>-1.46 (-1.98, -0.94)</td>
<td>-0.84 (-1.15, -0.53)</td>
<td>C &lt; M</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.48</td>
<td>0.34</td>
<td>0.12</td>
<td></td>
<td>0.53</td>
<td>0.32</td>
<td>0.24</td>
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</table>

*country differences identified by non-overlapping confidence intervals; C=Canada, M=Mexico, K=Kenya
Table 4: Age-adjusted relationship between body composition and muscular fitness (grip strength) measures by sex and country.

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
<th>Differences*</th>
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<tbody>
<tr>
<td></td>
<td>Canada</td>
<td>Mexico</td>
<td>Kenya</td>
<td>differences</td>
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<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>β (95% CI)</td>
<td>0.10 (0.00, 0.21)</td>
<td>0.14 (0.06, 0.23)</td>
<td>0.04 (-0.00, 0.08)</td>
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<tr>
<td>R²</td>
<td>0.10</td>
<td>0.09</td>
<td>0.05</td>
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<tr>
<td>Predicted BMI at grip strength of 27 kg</td>
<td>18.5</td>
<td>18.5</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predicted BMI at grip strength of 41 kg</td>
<td>19.9</td>
<td>20.4</td>
<td>16.4</td>
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<tr>
<td>Triceps skinfold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>β (95% CI)</td>
<td>-0.02 (-0.11, 0.07)</td>
<td>0.13 (-0.02, 0.28)</td>
<td>0.01 (-0.06, 0.08)</td>
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<tr>
<td>R²</td>
<td>0.00</td>
<td>0.02</td>
<td>-0.02</td>
<td></td>
<td></td>
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<tr>
<td>Waist circumference</td>
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<td></td>
</tr>
<tr>
<td>β (95% CI)</td>
<td>0.31 (0.09, 0.53)</td>
<td>0.39 (0.15, 0.63)</td>
<td>0.10 (0.00, 0.19)</td>
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<tr>
<td>R²</td>
<td>0.14</td>
<td>0.09</td>
<td>0.06</td>
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</table>

*country differences identified by non-overlapping confidence intervals; C=Canada, M=Mexico, K=Kenya
Figure 1: Association between aerobic fitness and body mass index in boys and girls from Canada, Mexico, and Kenya

- Mexico
- Kenya
- Canada

![Graph showing the association between BMI and VO$_2$max for boys and girls from different countries.](image-url)
Figure 2: Associations between muscular fitness and body mass index in boys and girls from Canada, Mexico, and Kenya

- Mexico
- Kenya
- Canada

**Boys**

- Grip Strength (kg) vs. BMI (kg/m²)

**Girls**

- Grip Strength (kg) vs. BMI (kg/m²)
Figure Legends

Figure 1: Association between aerobic fitness and body mass index (BMI) in boys and girls from Canada, Mexico, and Kenya. The data for each sex and country subgroup are plotted from 2 SD below the mean to 2 SD above the mean. The figure shows a negative association irrespective of sex and country. The figure also displays that the intercepts and slopes of the regression lines are greater in Mexican children than in Canadian and Kenyan children. Thus, for BMI, Mexican children with low aerobic fitness levels have higher body composition values than do Canadian and Kenyan children. However, body mass index values of children in all three countries are similar in those with high aerobic fitness levels.

Figure 2: Associations between muscular fitness (grip strength) and body mass index (BMI) in boys and girls from Canada, Mexico, and Kenya. The data for each sex and country subgroup are plotted from 2 SD below the mean to 2 SD above the mean. The figure shows that muscular fitness is positively associated with BMI in boys and girls from Mexico and Canada. The association is less pronounced and not statistically significant in Kenyan boys and girls.
Chapter 5

Process Evaluation of International Knowledge Translation Intended for Obesity Research
Trainees in Mexico
ABSTRACT

Introduction: Research capacity to deal with increasing obesity in Mexico is underdeveloped. CAMBIO (Canada - Mexico Battling Childhood Obesity), established in 2007 to increase obesity-related research capacity within Mexico, delivered a course aimed at improving research skills among emerging Mexican obesity researchers. The objective of this study was to conduct a process evaluation of the CAMBIO course.

Methods: 16 Mexican graduate students and new professionals (10 women) between 22 and 54 years (median = 33) participated in a 10 day course taught by Canadian, American, and Mexican faculty. The course guided participants through the research process – from developing research questions to writing manuscripts. Theoretical (i.e., lectures, web-tutorials) and practical (i.e., labs, field work) teaching approaches were used. Quantitative process evaluation data were collected prior to, during, and after the course. The process evaluation examined reach, dose delivered, and dose received.

Results: Student attendance and feedback demonstrated excellent reach. Dose delivered was high with all 21 course sections taught as planned. In the year following the course, students used a diversity of skills learned in the course suggesting that dose received was good. Major barriers to research were identified by participants and included insufficient time and a lack of financial resources.

Conclusion: International research capacity building can be achieved through research courses targeted to small groups of students.
INTRODUCTION

Childhood obesity is a global problem that calls for immediate action. While the rise in childhood obesity was first observed in Western countries and progressed at a moderate pace (Cordain et al. 2005), developing countries are now witnessing similar increases, but at an accelerated rate (Schmidhuber and Shetty 2005). In fact, in the last decade, obesity rates have tripled in many low and middle income countries (Hossain et al. 2007). As a result, in addition to underweight, malnutrition, and infectious diseases, obesity and its related chronic diseases are now major health problems in low and middle income countries (Haslam and James 2005).

A substantial amount of research on childhood obesity has been completed in developed countries in an effort to gain a better understanding of the determinants of obesity and strategies for preventing and treating it (Sokar-Todd and Sharma 2004). Much less research in the obesity field has been produced in developing nations (Janssen et al. 2010; Sokar-Todd and Sharma 2004). This likely reflects limited resources and a lower priority for research in the developing world (Adair 1995; Nehinda 2002). Building or enhancing research capacity may be an effective and realistic way in which high income countries can provide middle and low income countries with guidance to address childhood obesity. Research capacity building is a key aspect of knowledge translation (Estabrooks et al. 2006) and is defined as an ongoing process of empowering individuals, institutions, organizations, and nations to define and prioritize problems systematically, develop and scientifically evaluate appropriate solutions and share and apply the knowledge generated (Lansang and Dennis 2004). It must be noted that research capacity building refers to the capacity to do research according to a Western model representing dominant and mainstream practices and ideology which may be considered imperialistic and hegemonic (Smith 2002).
In order to gauge the impact of research capacity building, it is important to document and analyze the process and outcomes of such initiatives. Evaluation is critical for identifying effective delivery strategies to enhance participant knowledge, skills, and capacity (Linnan and Steckler 2002). Furthermore, if other groups want to replicate a successful initiative, they will require details on how the initiative was designed and implemented, what problems were encountered along the way, and what changes are needed for improvement. When evaluating a research capacity building initiative, it is useful to draw on the literature pertaining to program implementation evaluation (Dietz 1998; He et al. 2011; Linnan and Steckler 2002; Stigman et al. 2009; Tremblay et al. 2010). According to this literature, a good program implementation evaluation should provide a clear description of what the capacity building (or other health promotion initiative) program staff and participants did and what they experienced as they engaged in those activities (McGraw et al. 1994). This is often measured as program reach, dose delivered, and dose received. While definitions vary slightly among authors, there appears to be general consensus that reach refers to the proportion of the intended audience that participates in the program, dose delivered refers to the number or amount of intended units or components delivered or provided, and dose received refers to the extent to which participants actively engage with, interact with, are receptive to, and/or use materials or recommended resources (Linnan and Steckler 2002).

Unfortunately, in the field of obesity research, very few research capacity building efforts have been implemented and even fewer have been evaluated. The Guide for Useful Interventions for Activity in Brazil and Latin America (GUIA) is an example of an initiative between the US Centers for Disease Control and Prevention (CDC) and Brazil that takes a knowledge translation approach (with aspects of research capacity building) to addressing physical inactivity, which indirectly addresses obesity. Among other things, GUIA strives to establish and build cross-
national collaborative relationships with researchers, practitioners, and institutions in Brazil, conduct formative research, and evaluate ongoing community initiatives (Pratt et al. 2010). Another initiative, Canada - Mexico Battling Childhood Obesity (CAMBIO), was recently developed in response to the alarming rise in obesity rates in Mexico (Bonvecchio et al. 2009) coupled with the lack of research on the issue (Janssen et al. 2010). Although the program as a whole is a knowledge translation initiative (Estabrooks et al. 2006), specific research capacity building efforts include student and professor exchanges, collaborative research, and research training through an annual short course.

The objective of the current study was to conduct a process evaluation of the 2009/2010 CAMBIO short course in an effort to add to the literature pertaining to the evaluation of obesity related research capacity initiatives. Although the short course itself was only one aspect of CAMBIO’s research capacity building efforts, an evaluation was conducted on this aspect only. Essentially, the course was conducted in an effort to improve research skills among emerging Mexican obesity researchers and was developed to provide these researchers with the tools and knowledge needed to conduct obesity research with the ultimate goal of empowering participants and instilling confidence to tackle the obesity problem in Mexico. The course utilized a “learn by doing” approach (Lansang and Dennis 2004) and sought to mentor the students as well as to promote skill development.

METHODS

Short Course Participants

Sixteen Mexican graduate students and new professionals (10 women) between 22 and 54 years old (median = 33 years) participated in the 10 day course (approximately 76 hours of course
instruction) taught by Canadian, American, and Mexican faculty. Participants were selected through an application process that involved being nominated by a faculty member working at a Mexican university or research agency, and after being nominated, submitting their curriculum vitae and a short essay on why they wanted to take the course. Sixteen applicants were selected out of 24 nominations.

Course Description

The short course was designed to guide participants through the research process – from developing research questions to writing manuscripts – and included theoretical (i.e., lectures, web-tutorials) and practical (i.e., labs, field work) teaching approaches. The course was developed by CAMBIO’s primary investigators (Drs. Ian Janssen and Juan Lopez Taylor), other CAMBIO team members (Drs. Edtna Jáuregui Ulloa, Robert Malina, Mark Tremblay, Lucie Lévesque, Louis Ortiz) and CAMBIO’s management team (Donna Ivimey, Gabriela Ibarguchi). The course components were designed to engage students to learn and undertake the steps involved in conducting obesity research using a population and public health disciplinary approach. Course curriculum was based on text book information and other sources of literature (e.g., peer reviewed publications) and the personal experiences and knowledge of the course instructors. Course instructors were selected based on their methodological and content expertise.

The main part of the course was divided into two in-person sessions that were 6 and 4 days long (November 2009 and February 2010). The in-person sessions covered eight main domains: (1) overview of the research process; (2) how to conduct literature searches; (3) how to develop a research plan; (4) how to evaluate and critique research papers; (5) how to obtain the measures that were relevant for the field work component of the short course research project; (6) how to create a database and accurately enter information; (7) statistics and use of the SPSS statistical software program; (8) scientific writing. Table 1 displays the itinerary from the short
course outlining the sub-topics covered within each of the eight domains, the amount of time spent on each sub-topic, and when pre- and post-course questionnaires were administered. Specific session objectives were also identified and are displayed in Table 1. A more detailed version of the short course itinerary can be found in Appendix F. A common objective among all sessions was for students to gain proficiency in the topic area. Lectures were given in both Spanish and English, depending on the Spanish proficiencies of the speaker. Live translation was provided by a certified translator for all English lectures.

In addition to the in-person sessions, students were required to complete an internet-based human subjects ethics training module and test prior to attending the first in-person session (https://www.citiprogram.org/aboutus.asp?language=english). The course was offered in Spanish and included the following 12 modules: (1) Introduction; (2) Module for students who do research and students who are research subjects; (3) History of ethics principles; (4) Informed consent; (5) International aspects of informed consent; (6) Risk assessment research in behavioural and social sciences; (7) Privacy and confidentiality; (8) Social and behavioural research for biomedical researchers; (9) Research with protected populations, vulnerable subjects: a definition; (10) Research involving minors; (11) Damage to groups. Research with culturally or medically vulnerable populations; (12) Workers as research subjects: a vulnerable population. At the end of each module, students were required to pass a multiple choice type quiz in order to move on to the next module. Students were not allowed to participate in the in-person sessions if they had not completed this ethics-training course. Three students were exempt from taking the online course due to adequate previous ethics training.

Students also completed two assignments between the in-person sessions. For the first of these assignments students were asked to write a brief two or three page report on one of the research measures used during the field work component of the short course (Table 1). Reports
were to: (1) provide an explanation of what was being measured (psychological basis of the test); (2) provide an explanation of the relevance of the measure (e.g., what does the measure tell us about the current or future health of the participants?); and (3) discuss the objectivity, reliability, validly and limitations of the measure within child populations. This assignment was to be submitted via e-mail within 2 months of the completion of the first in-person session. For the second assignment the students were asked to develop a research question based on the data collected during the field work component of the first in-person session, and to prepare the introduction and methods sections for a research paper that they would continue to work on (with guidance and assistance from the course instructors) during the second in-person session. This assignment was to be completed in time for the second in-person session. Students could complete assignments in Spanish. However, those proficient in the English language were encouraged to do so in English so that they could work with English-only speaking faculty.

Finally, the students were asked to complete an assignment after the second in-person session. This assignment consisted of finishing the scientific paper they had started to work on prior to and during the second in-person session. While completing this last assignment, students also had the opportunity to maintain contact with the course instructors, primarily to receive feedback on written work, and if desired, to work towards submitting the paper for publication at a peer-reviewed journal.

Students were asked to bring their personal laptop computers to the in-person course sessions. If students did not have a laptop, one was lent to them by the course organizers. Each student was given a USB key which contained the course itinerary, assignment instructions, and all PowerPoint lecture presentations.
Quantitative process evaluation data were collected prior to, during, and after the course and were used to conduct the process evaluation. Questionnaires that participants were asked to complete were modified for the short course by CAMBIO team members (Donna Ivimey, Mariane Héroux, Gabriela Ibarguchi) and were based in large part on evaluative instruments developed by Ottoson & Patterson 2000 (Ottoson and Patterson 2000) and Woodward 2004 (Woodward 2004). The short course evaluator (Mariane Héroux) administered all of the questionnaires and observed the participants throughout the short course to measure the three process evaluation components – reach, dose delivered, and dose received – as defined by Linnan and Steckler (Linnan and Steckler 2002). Each questionnaire is described in more detail below in relation to its use in measuring the above mentioned process evaluation components. Sample questions from each questionnaire (translated to English) are provided in Table 2 and copies of all administered questionnaires are provided in Appendix G (session specific), H (pre and post), and I (follow-up).

Reach assessed the proportion of the intended target audience that participated in the program. During the recruitment period, CAMBIO program managers attempted to recruit a large group of students from the Guadalajara, Jalisco region (a region of focus for CAMBIO’s research capacity building) and several students from other regions and states. One Kenyan student was invited as he was part of similar research initiative that was being led by CAMBIO team members. Basic demographics obtained at baseline were used by CAMBIO program managers to determine if the participants attending the course fit the characteristics of the target population outlined prior to the start of the study. Attendance at each in-class session was also taken to calculate the proportion of students attending sessions.
Dose delivered was assessed by recording the number or amount of intended units or components delivered and whether or not the time allocated to each session was followed (approximately 76 hours for the course in total). This was measured for the in-class components of the short course by comparing the course itinerary and prepared materials to what was actually taught and what materials were provided throughout the duration of the course. These observations were completed by the CAMBIO program evaluator.

Dose received measured the extent to which the participants perceived that they understood and learned from the lessons that were taught, the degree of perceived knowledge uptake, whether or not participants reported that they continued to use what they learned after the course was over, and if they were able to successfully apply the skills learned during the course.

Participant understanding of individual in-class lessons was assessed using the session specific questionnaire (Appendix G). The questionnaire asked participants to rate the amount of new information learned in sessions. The same five questions (amount of information learned during the session, likelihood of using the information in their current position, likelihood of using the information in the next 6 months, degree to which the presented information was perceived to be credible, and level of interest in learning more about the topic) were repeated at the end of each course section taught, as outlined in Table 1. Participants answered on a 7-point scale with 1 representing a negative response and 7 a positive response. An overall mean score was created for each of the five questions by adding participants’ numeric response across all 21 session specific questionnaires and dividing the total by the overall number of questionnaires (i.e., answers for question 1 across all 21 questionnaires were added together and then divided by 21 to obtain a mean score for question 1 for each participant). The session specific questionnaires also provided a place for comments where participants were able to provide feedback they felt was relevant to the lesson.
The degree of perceived knowledge uptake was obtained from the pre- and post-course repeated questionnaire (Appendix H). Before the course started, students were asked to complete a pre-course questionnaire, which was repeated at the end of the second in-person session (post-course repeated questionnaire). These questionnaires contained several demographic questions and questions about current knowledge and experience in the eight in-class course domains (research process, literature searches, research plans, evaluating papers, measures, database creation, statistics, and writing). Each course domain consisted of nine questions rated on a 5-point scale with 1 being ‘strongly disagree’ and 5 being ‘strongly agree’. An overall summary score (out of 45) was created for each question by summing the responses for each course domain.

The 1 year follow-up questionnaire (Appendix I) was used to assess the approximate frequency that students were able to apply skills learned in the short course in the 12 months following course completion. The follow-up questionnaire consisted of eight items (each on a 5-point frequency scale ranging from ‘never’ to ‘daily’) related to the eight previously mentioned course domains. The questionnaire also asked students to list what they perceived as barriers to conducting research. Finally, space was provided at the bottom of the questionnaire for students to write whatever comments and feedback they felt was relevant.

In addition, select students were contacted 1.5 years after course completion and asked to contribute a short written personal story expressing how they felt the short course helped them become a better skilled and confident researcher. They were asked to address the following topics in their story: (1) their occupation before attending the course; (2) why they were interested in taking the course; (3) what they learned from the course; (4) how the course helped them with their future career goals. The personal stories helped to illustrate to what degree the course was utilized by students as well as how it impacted their careers.
Finally, the three assignments given to students throughout the duration of the course (described in ‘course description’), were developed to give students a chance to apply the knowledge learned throughout the course and to demonstrate whether or not they understood the concepts.

*Statistical Analysis:*

All quantitative data were analyzed using SAS 9.2 (SAS Institute, Cary, North Carolina). Scales from the session specific and follow-up questionnaires were assessed using the *FREQ* procedure. Pre- and post-course repeated questionnaire scores were compared using a *t*-test. Samples of frequency and *t*-test output are provided in Appendix N and O, respectively.

**RESULTS**

*Short Course Participants*

All 16 participants had completed a bachelor degree, 9 had also completed a master degree, 2 were medical doctors, and 1 had completed a PhD. Five participants were still students while the remaining 10 had entered the workforce. Students represented 4 Mexican universities (Universidad de Guadalajara, Universidad de Chihuahua, Universidad Autonoma de Colahuila, La Salle Universidad), 1 African University (Kenyatta University), 1 Mexican hospital (Hospital General Instituto Mexicano del Seguro Social), and 1 Mexican public health institution (Instituto Nacional de Salud Publica). In general, the response rates to the questionnaires were excellent. All 16 participants returned the pre-course questionnaire and 100% of the session specific questionnaires. A single student did not complete the post-course questionnaire and 4 of the 16 students did not complete the 1 year follow-up questionnaire.
Short Course Process Evaluation Components – Process Measures

**Reach:** 100% of the 16 students who were invited to participate in the course (after being nominated, completing the nomination package, and being selected by CAMBIO’s management team) did so. Attendance for all in-person short course sessions was 100%.

**Dose delivered:** All 76 hours of course instruction and activities were delivered. With one exception, all 21 course sections were taught as planned and all four assignments were delivered as planned. The one exception was for the data dictionary component of the first in-person session, wherein the topic was taught but the students did not (as originally planned) create a dictionary due to time constraints (data entry and cleaning took longer than expected). All course materials were utilized as planned including PowerPoint presentations, handouts, the use of fitness testing equipment, and the use of laptop computers for conducting literature searches, entering data, completing statistical analyses, and writing scientific papers.

**Dose received:** Figure 1 shows the average results from the five questions addressed at the end of each of the 21 in-person class sessions. These questions were rated on a 7-point scale (1 = most negative response, 7 = most positive response). None of the 16 students had an average score of less than 4 out of 7 for any of the five questions. At least 10 (and up to 15) of the 16 participants had an average score of 6 or 7 out of 7 for all of the five questions. Thus, high ratings were reported for the amount of new information learned (question 1), likelihood of using the information taught in current position (question 2), expectation of using the information in the next 6 months (question 3), belief that the information presented was credible (question 4), and interest in learning more about the topic area (question 5).

Results from the pre- and post-course repeated questionnaires, which were available for 15 of the 16 students, suggested that perceived knowledge uptake was achieved in different research process areas (Figure 2). Although statistically significant (p<0.05) differences from pre-
to post-course findings were only observed for one of the eight individual domains (writing), there was a consistent pattern wherein the post-course scores for the self-perceived research skills were higher than the pre-course scores. Summary scores across all eight domains were higher post-course (mean = 205, SD = 59) than they were pre-course (mean = 174, SD = 66) but differences were also not statistically significant (p=0.20) (data not shown). It must be noted that a large emphasis in the curriculum was placed on writing activities (in terms of number of hours spent writing and one-on-one interactions with the faculty). Thus significant differences from pre-to post-course for this specific domain may be a reflection of the time dedicated to it.

Figure 3 shows how often the students reported that they used skills learned across the eight course domains in the year following the completion of the in-person short course sessions. This questionnaire was only completed by 12 of the 16 students. Eight out of 12 prepared an ethics application within the year. All 12 conducted a literature search within the year, and 5 of 12 did so at least weekly. Nine of 12 evaluated a scientific paper/report in the year, and 4 did so weekly. All but 1 or 2 of the 12 student’s recorded/entered data, conducted statistical analyses, and participated in the writing of a scientific paper/report in the year, but few participated in these activities on a weekly or daily basis.

In terms of the written assignments, 14 out of 16 students handed in the first assignment and 12 out of 16 students handed in the second assignment. Although a formal evaluation of these assignments was not conducted, the course instructors who reviewed these assignments, for the most part, felt like they were not of a high quality as defined by Western research standards. Several students maintained contact with course instructors following the second in-person session in an attempt to continue working on their paper until it was ready for submission to a peer reviewed journal. Five of these students have since submitted their paper for publication.
The personal stories submitted by students demonstrated that attending the course had a positive impact on their career paths. Students also identified the strong connections that they made with peers and instructors. Two personal stories are shared below:

**Personal Story 1 (English translation to follow)**

*Cuando inició el curso corto de CAMBIO concluía con mis estudios de licenciatura y comenzaba una nueva etapa en mi servicio social en el Instituto de Nutrición Humana de la Universidad de Guadalajara.*

*Al enterarme del curso corto de CAMBIO y conocer que era posible ser parte de él, estaba muy interesado y emocionado en asistir ya que iniciaba mi camino en el proceso de investigación y tenía una gran inquietud por conocer más acerca de este proceso. Además mi interés por el curso corto de CAMBIO creció ya que se enfocaba al área de obesidad en niños, el cual es un tema de mucha importancia en lo que corresponde a salud y es el tema principal en el que deseaba seguir trabajando en mis próximas etapas de estudio. En ese tiempo, tenía bajo consideración iniciar mis estudios de posgrado y estaba seguro que éste curso corto sería la piedra angular para mi decisión.*

*Una vez iniciado el curso corto las expectativas que llevaba no solamente se cumplieron, sino que las sobrepaso la manera de trabajar y enseñar por parte de todos los organizadores. Algunos aprendizajes que quedan muy marcados en mi formación como investigador fueron la manera tan detallada de realizar el trabajo de campo, la paciencia y pulcritud del vaciado de datos, la claridad de enseñanza de las clases de estadística, la tenaz búsqueda bibliográfica y la iniciación de un escrito científico; por mencionar solo algunos. Sin embargo, también obtuve grandes amistades con las que hoy en día sigo en contacto y me han ayudado en mi continua formación profesional. Tuve la oportunidad de conocer investigadores muy reconocidos en*
distintas áreas que son apasionados por el tema de la salud y que compartieron su experiencia y comentarios con todos los del curso. Me queda claro que el proceso de investigación es laborioso pero que todo lo que lo involucra es grandioso y gratificante.

Al finalizar el curso corto de CAMBIO continué con el escrito de un artículo científico el cual actualmente se encuentra en proceso de publicación y del cual he aprendido mucho. Actualmente me encuentro realizando mis estudios de maestría en el Instituto Nacional de Salud Pública y la experiencia que obtuve del curso corto de CAMBIO me ha sido de mucha utilidad; así como lo será en el transcurso de mi carrera profesional. Estoy muy agradecido por haberme permitido ser parte del curso corto de CAMBIO el cuál lo disfruté y lo aproveché al máximo, espero poder colaborar algún día con esté gran equipo y seguir en contacto por más tiempo.

**Personal Story 1 (English translation)**

When the CAMBIO short course started, I was finishing my undergraduate studies and was starting my social service at the Human Nutrition Institute at the University of Guadalajara.

When I found out about the CAMBIO course and that I could be part of it, I was very interested and excited to attend given that I was starting my research journey and that I had a great interest in learning more about this process. Furthermore, my interest in the CAMBIO course grew as it was focused on childhood obesity which is a very important topic in relation to health and given that this was the topic I wanted to work on for the upcoming stages of my studies. At that time, I was considering starting my graduate studies and I was sure that this course would be the milestone to support my decision.

Once the course began, my expectations were fulfilled and were exceeded given the way we worked and the way the organizers taught. Some learning experiences that marked my development as a researcher are the detailed manner for doing field work, the patience and care of the data entry, the clarity of the statistical classes, the great literature review and the initiation
of a scientific article among others. Moreover, I also made great friends who I still have contact with and who have helped me through my professional development. I had the opportunity to meet recognized researchers from different fields who are passionate about health topics and who shared their experiences and comments with all of the course attendees. It is clear to me that the research process is a lot of work but all that it involves is great and satisfying.

At the end of the CAMBIO course I continued writing a scientific manuscript which is currently under publication process and from which I have learned a lot. I am currently doing my masters studies at the National Institute of Public Health and the experience I obtained from the CAMBIO course has been of great help; just as it will be throughout my professional career. I am very grateful to have been allowed the opportunity to be part of the CAMBIO course which I enjoyed and used as much as I could, and I hope I can collaborate with this great team again someday and that I keep in touch for a long time.

Personal Story 2

Before attending the CAMBIO short course, I was working at the Public Health Institute in Mexico mainly as a researcher assistant. This was a challenging job, because I could not completely understand many aspects of my job. Thus I was only able to collaborate doing small things. I felt frustrated because since I finished my undergraduate degree I wanted to work in research. My boss told me that the CAMBIO course was a great opportunity to know more about research, and he helped me to contact the organization committee and apply to the course.

I was lucky to be selected for this course. When I took it I was preparing, with a researcher team, a proposal to evaluate physical activity in adolescents. It was the perfect time to get some feedback from the course. I learned many useful things for my research project; starting from very simple ones (like making questionnaires), to strategies for cleaning and analyzing data.
This course also introduced me to many wonderful and generous people willing to teach and help me. Some of them are working at the Mexican National Institute of Public Health. Thanks to this course I had the opportunity to study English at Queen’s University and later to be admitted in their master of science program.

Therefore, this course not only gave me background and tools for my work but it also defined the next steps in my career as a public health researcher interested in physical activity and the prevention of chronic diseases.

I really appreciate the opportunity that CAMBIO gave me. I am in my second year at the Queen’s University, completing my course work, and I am enjoying very much my training and the people I have met. Thanks to the CAMBIO course, I am convinced that research is what I want to do. I also think that junior researchers in Mexico need opportunities such as this. I hope more initiatives like this see the light in the future.

**DISCUSSION**

This research training short course was implemented in Mexico in an effort to increase the skills set and knowledge of emerging obesity researchers with the end goal of instilling participants with confidence to conduct obesity research in their country. Results of the course evaluation demonstrated that reach, dose received, and dose delivered were good. Students attended all in-class sessions, responded to session specific questionnaires favourably, and reported an increase in knowledge. Most students also reported using many of the skills they were taught in the short course in the year following its completion.

The reported increase in student knowledge after completion of the course is encouraging and suggests one of two things: (1) students’ understanding and competency of each course
domain increased in direct response to the course, and/or (2) students underestimated their competency prior to the course and came to realize that they had a higher level of knowledge and competency throughout the course. Regardless, the increase in perceived knowledge suggests that the short course helped instill confidence within the students to undertake research activities in the future. Furthermore, the increase in perceived knowledge may have contributed to reported use of several research-based skills in the year following the short course (Figure 3) as well as in partaking in research activities and conducting research.

Although few research capacity building initiatives have been developed and evaluated in the field of obesity, there is evidence from other research disciplines that such initiatives can impact knowledge and research productivity (i.e., grant applications, publications, etc.). For example, a 9 day research training workshop offered by the University of Pittsburgh to healthcare professionals in Pakistan resulted in increased local research capacity (Dodani and LaPorte 2008). The course focused on basic epidemiology, biostatics, genetic epidemiology, and international health and used face-to-face and video-teleconferencing delivery methods. Student knowledge on research methods was tested before (day 1) and after (day 9 and 1 year post-course) the course using questionnaires. Results showed that content knowledge across course subjects increased by up to 36% in the face-to-face group and by up to 24% in the video-teleconferencing group. Furthermore, knowledge was retained 1 year following the course (Dodani and LaPorte 2008). Unfortunately that study did not measure the participants’ research outputs after course completion. However, other findings suggest that an increase in research knowledge may translate into an increase in research output (F. White 2002; N. W. White 2004). While CAMBIO’s obesity short course resulted in a self-perceived increased knowledge and reported use of skills in the year following course completion, it remains to be seen if this will translate into an increase in research productivity by the short course participants. However, the
connections the students made throughout the duration of the course with faculty members resulted in the pursuit of additional, more intensive training by some of the students. The impact of this training may take years to come to full fruition and thus was not feasible to measure within the current study.

Unfortunately, not all students in CAMBIO’s short course completed the course assignments, which was disappointing to the organizers and teaching faculty of the short course. These assignments were to be completed between the two in-class sessions when students had other full-time commitments including school, work, and family obligations. Thus, the incomplete assignments is not necessarily a reflection of a lack of motivation or poor time management, but perhaps a reflection of limited time, which was mentioned by most as a barrier to conducting research. While the Western research and education model puts considerable emphasis on the timely completion of publications and assignments, it must be noted that many researchers in lower income countries produce research on their own time when they are working at their full-time jobs, inevitably affecting the amount of time available for research (Costello and Zumla 2000; Trostle and Simon 1992). Thus, in order to ensure that all assignments were completed it may have been helpful to give students more time to work on them during the in class-sessions.

Several other limitations to research in lower income countries have been identified in the literature and deserve mention. Some of the more prominent limitations include limited resources, limited accessibility to the scientific literature, limited funding opportunities, limited time, and limited emphasis placed on publishing (Adair 1995; Costello and Zumla 2000). Although the Western model is the dominant research model, lower income countries do not necessarily have the recourses (financial and physical) to adopt this model themselves. Thus, a research short course, such as the one evaluated in the current study, may be very successful at increasing
participant research knowledge and competency but will not necessarily translate into increased research production as valued by the Western model. Increased research production will be impacted by the various systemic barriers to research encountered by participants after course completion. Thus, measuring research outcomes valued by the population of interest may be a better way of capturing capacity building efforts. For example in the current study, rather than focusing on conference attendance and research publications which are considered important according to the Western research model, it may have been beneficial to measure the number of students who began small research studies after the course or who shared what they had learned with colleagues.

As with all research this study has several limitations that must be addressed. First, only 15 Mexican obesity researchers participated in the course. Although, only ~8% of the Mexican population hold a bachelor degree (Santibanez et al. 2005), and of this 8% few conduct obesity research, it is certain that several eligible students were missed in the nomination process. Thus, our measure of reach was somewhat superficial and internally directed as we targeted such a small number of students. Second, additional time for course delivery and practice would likely have benefited students. Unfortunately this was unfeasible due to budgetary constraints and the fact that instructors and students were already taking considerable time away from their institutions to teach/take the course. Third, language barriers were an issue as several students spoke little or no English and several instructors spoke little or no Spanish. Although translators were onsite, translation errors likely occurred resulting in miscommunication.

Despite the above mentioned limitations it must be noted that this short course is one of the first research capacity initiatives aimed at increasing obesity research in Mexico. Such an initiative is extremely important as obesity rates are increasing rapidly in Mexico (Bonvecchio et
al. 2009) and researchers need the tools and skills to conduct research which can be used as evidence to influence policy and change.

In conclusion, this course proved to be a successful means of increasing research capacity in the field of obesity in Mexico. Replication of this course in other low and middle income countries in an effort to increase research capacity in the field of obesity would be useful. Doing so would help empower countries to address the problem and give researchers tools and support to conduct obesity research. Furthermore, the replication of this course would indicate whether or not its effectiveness is consistent across countries. Thus, future studies need to evaluate the delivery of this short course within different population groups.
References


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### Table 1: Schedule of events for CAMBIO’s obesity short course and associated domains

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Objectives</th>
<th>Format</th>
<th>Domain</th>
</tr>
</thead>
</table>
| ~6h   | * Complete online CITI course on their own time before attending the course | * Understand the importance of ethics  
* Understand how to conduct ethically sound research | 100% independent work | The research process |
|       | **Pre-Course** |            |        |        |
| 2h    | * Overview of CAMBIO  
* Purpose of course  
* Introductions  
* Pre-course questionnaire (~1h) | * Understand the purpose of the course  
* Get to know each other | 50% lecture  
50% practical | The research process |
| 1h    | * STUDENTS: use evening to start readings/look over material; ensure that CITI Ethics Course is completed | * Get prepared for course | 100% independent work | The research process |
| 1.5h  | * Beginning the research process: nature and purpose of research, developing questions, ethics | * Understand the various steps in the research process  
* Understanding the different types of research questions  
* Understanding how to develop a research question  
* Recognize the different types of variables  
* Understand the various types of research studies and how they are applied | 100% lecture | The research process |
| 1.5h  | * Conducting literature searches | * Understand the importance of a thorough literature review  
* Appreciate the different computerized databases that can be used to perform a literature search  
* Establish a system for conducting a computerized literature search  
* Conduct a computerized literature search  
* Establish a system for keeping track of citations | 40% lecture  
60% practical (computers) | Literature searches |
| 1.5h  | * Developing the research plan  
* Selecting research approach  
* Selecting instruments (validity/reliability, feasibility, etc.)  
* Writing a research plan | * Know how to select the proper research design given the research questions  
* Know the various methods in selecting research participants  
* Appreciate how to select the appropriate measures and measurement techniques  
* Understand the various sections of a research plan  
* Create a research plan | 100% lecture | Research plan |
| 1.5h  | * Reading & evaluating research reports | * Understand the various sections of a research report and the information required within each section  
* Identify the steps involved in the critical review of a research paper  
* Critique and evaluate a research paper in their research field | 100% lecture | Evaluating papers |
<p>| 1.5h | Introduction to research component of short course and CPAFLA (Canadian Physical Activity and Fitness Lifestyle Appraisal) |
|      | Understand the purpose of the CPAFLA |
|      | Understand the components (tests and measures) involved in the CPAFLA |
|      | 100% lecture |
|      | Measures |
|      | 6% lecture |
|      | 20% practical |
|      | 74% field work |
| 32.5h | Development and organization of Research teams/groups |
|      | Be prepared for data collection phase |
|      | Accurately and reliably conduct partial curl up, grip strength, and flexibility tests according to the CPAFLA protocol |
|      | Accurately and reliably measure height, weight, skinfolds, and waist circumference according to the CPAFLA protocol |
|      | Conduct the 20 metre shuttle run test |
|      | Use the equipment to conduct the aforementioned tests |
|      | Understand the components of the health behaviour questionnaire that will be used for the field course research study |
|      | Conduct an interview to collect the data on the field course health behaviour questionnaire |
|      | Understand the data recording sheet that will be used for the field course research |
|      | Correctly record the data that will be obtained in the field course research on the data recording sheet |
|      | Work on and improve skills required to obtain the musculoskeletal fitness measures, aerobic fitness measures, anthropometric tests, and health behaviour questionnaire. |
|      | Collect research data in a field setting |
|      | Apply measurement techniques learning in prior short course session in a practical setting |
|      | Gain experience dealing with research participants |
|      | Apply research ethics principles |
|      | 12% lecture |
|      | 88% practical |
|      | Database creation |
| 4h   | Data Entry |
|      | Understand the necessity of using an electronic database |
|      | Learn how to set up a database to transform data from paper to electronic format in an efficient and accurate manner |
|      | Gain practical experience in data entry |
|      | 50% lecture |
|      | 50% practical |
|      | Database creation |
| 1h   | Data cleaning |
|      | Understand the importance of cleaning the database |
|      | Identify data cleaning principles |
|      | Gain practical experience in data cleaning |
|      | 25% lecture |
|      | 75% practical |
|      | Database creation |
| 1.5h | Creating data dictionary |
|      | Understand the importance of setting up a data dictionary |
|      | Understand the components of a data dictionary |
|      | Gain practical experience in setting up a data dictionary |
|      | 100% lecture |
|      | 100% Lecture |
| 1.5h | Wrap up of Session #1 and instructions for Session #2 |
|      | Homework assignment |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Type</th>
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<tbody>
<tr>
<td>0.5h</td>
<td>Welcome and orientation and outline for Session 2</td>
<td>100% lecture</td>
</tr>
<tr>
<td>13h</td>
<td><strong>SPSS</strong></td>
<td>20% lecture</td>
</tr>
<tr>
<td></td>
<td>- Understand how to use SPSS</td>
<td>80% practical</td>
</tr>
<tr>
<td></td>
<td>- Learn how to enter/import data</td>
<td>(computer)</td>
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<tr>
<td></td>
<td>- Learn how to do basic analyses (mean, median, standard deviations,</td>
<td></td>
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<tr>
<td></td>
<td>confidence intervals)</td>
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<tr>
<td></td>
<td>- Learn more complex analyses (i.e., regression)</td>
<td></td>
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<tr>
<td>0.5h</td>
<td><strong>Overview of field work data file</strong></td>
<td>100% lecture</td>
</tr>
<tr>
<td></td>
<td>(data collected from schools in November)</td>
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<tr>
<td></td>
<td>- Review the data from the field work</td>
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<tr>
<td></td>
<td>- Explore variables</td>
<td></td>
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<tr>
<td>0.75h</td>
<td><strong>Scientific writing style</strong></td>
<td>100% lecture</td>
</tr>
<tr>
<td></td>
<td>- Learn the correct grammatical and tense structure of scientific</td>
<td></td>
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<tr>
<td></td>
<td>writing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Learn the correct structure of scientific writing</td>
<td></td>
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<tr>
<td>0.75h</td>
<td><strong>Putting together a paper</strong></td>
<td>100% lecture</td>
</tr>
<tr>
<td></td>
<td>- Understand the correct structure and layout of scientific papers</td>
<td></td>
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<tr>
<td></td>
<td>- Understand the best ways to approach putting together a paper</td>
<td></td>
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<tr>
<td>0.5h</td>
<td><strong>Overview of writing assignment</strong></td>
<td>100% lecture</td>
</tr>
<tr>
<td></td>
<td>- Understand requirements of assignment</td>
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<tr>
<td>5.5h</td>
<td>**Students to formulate research questions, develop introduction &amp;</td>
<td>20% lecture</td>
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<tr>
<td></td>
<td>methods for paper with help from faculty</td>
<td>80% practical</td>
</tr>
<tr>
<td></td>
<td>- Apply skills learned throughout the course to write a paper</td>
<td>(computer)</td>
</tr>
<tr>
<td>7h</td>
<td>**Full day to run statistics, start to write and put together paper.</td>
<td>100% practical</td>
</tr>
<tr>
<td></td>
<td>- Students to work independently or in small groups (maximum of 3).</td>
<td>(computer)</td>
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<td>- Faculty available to meet, discuss, help, etc.</td>
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<td></td>
<td>- <strong>Post-course questionnaire (~1h)</strong></td>
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<td></td>
<td>- Apply skills learned throughout the course to write a paper</td>
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<td></td>
<td>- Apply statistical skills to analyze data</td>
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<td>- Research process</td>
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<td>- Literature search</td>
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<td>- Evaluating papers</td>
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<td></td>
<td>- Statistics</td>
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<td></td>
<td>- Writing</td>
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### Table 2: Sample questionnaire questions

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<tr>
<th>Questionnaire</th>
<th>Example questions</th>
<th>Response options</th>
</tr>
</thead>
</table>
| Session specific questionnaire | - Please rate the amount of new information that you learned at the session on “The Research Process”
  - In your current position, how likely are you to use the information presented at the session “The Research Process”? 
  - I expect to use the information learned at the session “The Research Process” within the next 6 months 
  - I found the information presented at the session “The Research Process” to be credible 
  - I am interested in learning more about the topics presented at the session “The Research Process” at a future short course | - Scale 1-7 (not very much to a great deal) 
- Scale 1-7 (not very likely to very likely) 
- Scale 1-7 (not very likely to very likely) 
- Scale 1-7 (not very credible to very credible) 
- Scale 1-7 (not very interested to very interested) |
| Pre- and post-course repeated questionnaire | - Please rate your Current Knowledge of ‘Conducting Literature Searches’ 
  - How many courses on conducting literature searches have you taken in the past (before this survey)? 
  - In your current position, what percentage of time do you devote to conducting literature searches? 
  - I possess sufficient skills and knowledge to describe how to conduct a literature search to my peers and colleagues 
  - I possess sufficient skills and knowledge to design and conduct a literature search 
  - I possess sufficient skills and knowledge to evaluate a literature search 
  - I possess sufficient skills and knowledge to apply for funding to conduct a literature search 
  - I possess sufficient skills and knowledge to publish the results of a literature search 
  - I possess sufficient knowledge to teach graduate students about conducting a literature search | - Scale 1-5 (no knowledge to very knowledgeable) 
- Scale 0-4 (no courses to 4 or more courses) 
- Scale 1-5 (0-10%, 11-25%, 26-50%, 51-75%, 76-100%) 
- Scale 1-5 (strongly disagree to strongly agree) 
- Scale 1-5 (strongly disagree to strongly agree) 
- Scale 1-5 (strongly disagree to strongly agree) 
- Scale 1-5 (strongly disagree to strongly agree) 
- Scale 1-5 (strongly disagree to strongly agree) |
| Follow-up questionnaire | - How many scientific conferences have you attended since the short course? 
  - In the last 12 months how often have you: conducted literature searches, prepared ethics proposals, developed a research plan, read and evaluated research reports, conducted fitness testing and anthropometric measures, recorded and entered data, conducted statistical analyses, written scientific papers? 
  - list 3 major barriers to conducting research and applying the skills learned during the short course | - Scale 0-4 (none to 4 or more) 
- Scale 0-4 (Never, a few times a year, monthly, weekly, daily) |
Figure 1: Session specific questionnaire scale

Figure Legend: Results from the session specific questionnaires which were rated on a 7-point scale where 1 indicated a negative response and 7 indicated a positive response. An overall mean score was created for each of the five questions by adding participants’ numeric response across all 21 session specific questionnaires and dividing the by the overall number of questionnaires (i.e., answers for Q1 across all 21 questionnaires was added together and then divided by 21 to obtain a mean score for each participant).
Figure 2: Pre- and post-course repeated questionnaire scale

**Figure Legend:** Each course domain consisted of nine questions rated on a 5-point scale with 1 being ‘strongly disagree’ and 5 being ‘strongly agree’. An overall summary score (out of 45) was created for each question by summing the responses for each course domain. A t-test was conducted to observe differences between responses from pre- to post-course. Statistically significant results from the t-test (p<0.05) are denoted by a *.
**Figure 3:** Use of skills learned during 1 year post-course

**Figure Legend:** Results from the post-course questionnaire displaying how often students used skills learned in the 12 month period following course completion.
Chapter 6
General Discussion

6.1 Summary of Key Findings

This thesis strives to provide an international perspective of childhood and youth obesity and its key behavioural determinants. Manuscript 1 examined whether cross-national differences exist in the food retail environment surrounding schools, student lunchtime eating behaviours, and the relationship between these variables. While several studies have looked at how the food environment surrounding young peoples’ homes relates to their eating behaviours, few have looked at how the food environment surrounding young peoples’ schools relates to their eating behaviours. Furthermore, little is known about whether or not the relationship between the food environment, eating behaviours, and obesity differs between countries.

The key finding from manuscript 1 is that strong relations exist between the food retail environment surrounding schools and students’ lunchtime eating behaviours in Canada, but not in Scotland or the US. This is a novel finding that provides evidence that the environmental determinants of eating behaviours may vary across countries. This finding suggests that, at least amongst the three countries examined, policies aimed at improving the food retail environment surrounding schools may benefit the eating behaviours of Canadian students.

The second manuscript examined differences and similarities in body composition, aerobic fitness, and muscular fitness measures in children from Canada, Mexico, and Kenya as a model of the nutrition and physical activity transitions. Cross-national differences in the relationship between body composition and fitness measures were also examined. Results provided evidence of cross-national differences in the aerobic fitness and body composition of children from the studied countries. However, these differences were not all consistent with the
changes expected by the nutrition and physical activity transitions. In particular, Mexican children were more obese than Canadian children even though Mexico lies at an earlier stage of the transitions. This may be explained by the more pronounced relation between aerobic fitness and obesity in Mexican children – low fitness was associated with higher body mass index and fat values in Mexican children than in Canadian and Kenyan children. These findings suggest that it may be inaccurate to project changes in children’s body composition in developing countries based on previous trends observed in developed countries.

The purpose of the third manuscript was to conduct a process evaluation of the 2009/2010 CAMBIO short course. At present, the literature pertaining to the evaluation of obesity-related research capacity initiatives is extremely sparse. Results from this study revealed that the short course was a success. Student attendance, feedback, and pre- and post-course questionnaires provided evidence of knowledge uptake. Furthermore, results from the follow-up questionnaire showed that students applied many of the skills they learned in the year following the short course. Results from this study are encouraging as they demonstrate that initiatives geared towards building research capacity in the field of childhood obesity can be successful. The evaluation of these types of initiatives is necessary in order to identify which do and do not work.

Cumulatively, the research presented in this thesis furthers our current understanding of childhood and youth obesity internationally. While there are several ways by which childhood and youth obesity can be studied, observing cross-national differences in the determinants of obesity is an important step in establishing causal relationships and in identifying important cultural differences. Together, the studies presented provide evidence that cultural differences in the determinants of childhood and youth obesity do exist and help to strengthen the idea that such differences need to be considered when conducting research. Furthermore, the studies help to
illustrate the importance of teamwork and international collaborations for prevention and knowledge translation. Thus, the studies that comprise this thesis complement each other demonstrating that while obesity is a problem at the global level children and youth from different countries may be affected differently due to geographical and cultural differences. However, countries are encouraged to work together to tackle the problem and to find solutions.

6.2 Overall Strengths of the Thesis

This thesis has several strengths. First, direct cross-national comparisons were made using comparable data (i.e., similar study designs, sampling approaches, and data collection methods between countries). The use of comparable data between countries increases confidence that the observed cross-national differences are real and not an artifact of different methods used in the different countries.

The breadth and complexity of the thesis warrants mention. A variety of study designs, data collection methods, and statistical analyses were utilized. The first and second manuscripts used a cross-sectional design while the third was a natural experiment. In terms of data collection, manuscripts 1 and 2 relied on both primary data collection and the use of secondary datasets while the third manuscript relied solely on primary data collection.

Primary data were collected using a variety of instruments. In manuscript 1, geographic information systems were used to capture food retailers located within 1 km from schools in Canada, the US, and Scotland. In manuscript 2, objective measures of body composition (height, weight, skinfold) and fitness (shuttle run, grip strength) were collected in addition to demographic information via an interviewer administered questionnaire. Finally, in the third study, a variety of questionnaires were developed based on evaluative instruments from the literature. The use of
primary data collection resulted in extensive training and experience with data collection procedures, study design and implementation, data entry and cleaning, and the use of various analytical approaches.

The use of secondary data provided training and experience with large, complex datasets. For example, working with the Health Behaviour in School-Aged Children Survey (manuscript 1) and the Canadian Health Measures Survey (manuscript 2) required a great deal of data management and cleaning, variable derivation, and complex statistical analyses including multi-level logistic regression and bootstrapping procedures.

In addition, each of the three manuscripts posed a different type of study question (e.g., etiological, descriptive, experimental), and therefore all required different designs and analytical approaches. Furthermore, while preparing for these studies, a substantial amount of time and effort was devoted to developing partnerships and collaborations with researchers from Kenya, Mexico, Scotland, and the US. Working with researchers with varying levels of research expertise, English language capabilities, and cultural attitudes towards work proved to be challenging at times but was an extremely rewarding experience.

The use of objectively measured variables in manuscripts 1 and 2 reduced the potential for biases associated with self-reported measures (i.e., social desirability bias). Furthermore, the measurement tools that were used were both valid and reliable. Finally, the large sample sizes and overall geographical scope of these two manuscripts are also recognizable strengths allowing for the generalizability of results across differing populations.
6.3 Overall Limitations of the Thesis

Several limitations warrant consideration. First, manuscripts 1 and 2 only examined cross-national differences between three countries; therefore inferences cannot be made regarding whether or not the observed results are generalizable to other countries. Furthermore, in manuscripts 1 and 2 a causal relationship cannot be inferred (e.g., in manuscript 2, we cannot conclude that low fitness caused obesity) because of the cross-sectional designs. It is noteworthy, however, that temporal evidence only fulfills one of the nine criteria Sir Bradford Hill suggested be used to establish causation.\(^{10}\) Although the findings in studies one and two do not meet the temporal sequence criteria, they do meet some of Hill’s other criteria such as strength of association, biological gradient, and reasoning by analogy.

A major methodological limitation in the third manuscript was the absence of a control group. This study was a natural experiment and not a randomized controlled trial. Having a control group would have provided better evidence as to whether or not the short course was successful at increasing research skills and knowledge.

In addition, several potential confounding variables (variables that are associated with the exposure and the outcome but are not in the causal pathway) were not included in analyses for the two cross-sectional studies. Thus, some of the results may be biased. For example, in the second manuscript urban/rural status was not taken into consideration. Urban/rural status of children is associated with children’s fitness levels\(^{11}\) and obesity status\(^{11}\) thus meeting the criteria of a confounding variable. Therefore, including urban/rural status as a confounding variable in the second manuscript may have attenuated the observed associations.

Several data collection issues must also be mentioned. In the first manuscript, only the top 75% of chain food retailers were obtained for practical reasons. Thus, chip trucks/vans and independent fast food retailers and cafés were excluded. This likely resulted in non-differential
misclassification of the food retailer exposure groups, particularly in Scotland where chip trucks/vans and independent retailers are very popular. This non-differential misclassification likely biased results towards the null. Furthermore, the 1 km buffer used to capture food retailers around schools was based on a circular buffer and therefore does not reflect how people travel using a road network. In fact, a study by Seliske and colleagues\textsuperscript{12} demonstrated that the relationship between food retailers located within 1 km from schools and the eating behaviours of Canadian youth was stronger when road network buffers were used than when circular network buffers were used. Thus, the observed relationships in the first manuscript were likely underestimated.

In the second manuscript, the aerobic fitness of Canadian children was assessed using the mCAFT test as opposed to the 20 metre shuttle run test that was used in Mexico and Kenya. Consequently, the testing methods and equations used to estimate aerobic fitness (VO\textsubscript{2}max) were different for Canadian youth resulting in possible comparability issues. In addition, self-reported data was used in the thesis research. Self-reported data is subject to social desirability bias whereby respondents have a tendency to answer questions in a manner that will be viewed favourably by others. For example, in the first manuscript the youth from all three countries self-reported their height and weight – two measures that have been shown to be over and under reported, respectively.\textsuperscript{13, 14} Furthermore, in the third manuscript, which used several questionnaires to assess participants’ content knowledge following course instruction, it is possible that students reported higher content knowledge in an effort to please instructors.

Finally it must be mentioned that language was a major barrier in the obesity short course. Most of the course was taught in English and about half of the participants spoke little or no English. Although live translators were present for the course duration (with the exception of data collection and independent work days), it is possible that miscommunication occurred.
Furthermore, although all questionnaires were translated from English to Spanish, translation errors may have occurred. Thus, results from the short course may have been more striking if these language issues had not been present.

6.4 Future Research Directions

Although the global effects of the nutrition and physical activity transitions in youth are of increasing interest to researchers, countless research questions remain. A few of the more pertinent questions are posed here: Do the long-term health impacts of childhood obesity differ across countries? What long-term health impacts do features of the built environment have on children and how do these long-term impacts differ across countries? Would creating healthy food environments in and around schools result in improved student eating habits and would such efforts be successful in various countries? Could a standardized research capacity building initiative be developed and implemented in various countries in an effort to provide developing countries with the necessary tools and knowledge to prevent the detrimental changes that result from the nutrition and physical activity transitions in children?

Future studies also need to take methodology into consideration. For example, studies looking at childhood obesity resulting from the nutrition and physical activity transitions should use an ecological approach whereby the most proximal (physical activity, nutrition) and distal (environment, ethnicity, sleep, sedentary behaviour, etc.) determinants are taken into consideration. Furthermore, measurement tools should be both valid and reliable and objective measures should be used when appropriate.
6.5 Public Health Implications

Each study within this thesis alludes to the need for more extensive policies and initiatives to address the effects of the nutrition and physical activity transitions. In the first manuscript, the strong association between students’ lunchtime eating behaviours and food retailers surrounding schools in Canada suggests that school-aged children within this country may benefit from the adoption of municipal or regional (e.g., provincial) policies that regulate the number of food retailers located within close proximity of schools or the adoption of rules that would limit students’ ability to leave school grounds during the school day. By limiting students’ access to unhealthy options at lunchtime, such policies have the potential to positively impact students’ eating behaviours.

The cross-national differences observed in the first and second studies suggest that replicating obesity prevention initiatives in different countries may have varying levels of success. Rather, initiatives need to be developed for the specific population of interest. For example, in the first manuscript students’ eating behaviours were not associated with the number of food retailers located within 1 km of US schools. Thus, steps taken to improve youths eating behaviours in this population will differ from those taken in the Canadian population where an association was observed. In the second manuscript, results suggest that more substantial changes in physical activity and fitness may need to occur within Mexican children to have the same body composition benefits observed in predominately non-Hispanic white populations such as in Canada. Thus, physical activity initiatives need to be specifically designed for the population of interest.

The third manuscript highlights the need for more research capacity building in the field of obesity in developing countries. Unfortunately, CAMBIO’s short course and the CAMBIO program as a whole is only a drop in the bucket. Replication of the short course and the
development and implementation of several other obesity research capacity building initiatives in other low and middle income countries may help empower researchers and provide them with the tools and support necessary for conducting obesity research. Governments need to allocate resources for obesity capacity building in low and middle income countries in an effort to better manage the global obesity epidemic.

6.6 Conclusion

Collectively, this thesis furthers our knowledge of childhood and youth obesity. The first study helps to strengthen our understanding of some of the more distal factors that contribute to the onset of childhood and youth obesity. The second study helps identify the negative effects of the nutrition and physical activity transitions on children’s fitness and body composition. Finally, the third study demonstrates an effective means of expanding obesity research capacity in developing countries.

The contents of this thesis also highlight the need for global action to address obesity in children and youth. All children should have the chance to live a happy and healthy life; both of which are pivotal to success. However, without global efforts and collaboration, children’s health will continue to be threatened. Thus, it is essential that countries from around the world work together to find solutions and effect change.
6.7 References


Appendix A
Health Behaviour in School-Aged Children Survey Methodology
Background

The *Health Behaviour in School-Aged Children* survey (HBSC) is a cross-national survey used to assess the health behaviours and health determinants of 11-15 year olds. It is conducted in collaboration with the World Health Organization. The first survey was completed in 1983/84 in five countries (Finland, Norway, England, Austria, and Denmark). Surveys have been conducted at 4 year cycles since 1985/1986. In each cycle the number of participating countries has increased, with 43 European and North American countries participating in the most recent survey which was conducted in 2009/10. Canada began participating in the HBSC in 1989/90 and has participated in seven cycles. The data in manuscript 1 of this thesis is limited to information from Canada, Scotland, and the US from the 2009/2010 survey cycle.

Methodology

The HBSC questionnaire is a standardized questionnaire used by all participating countries. The HBSC targets youth attending school who are 11, 13, and 15 years of age. The desired mean age for the three age groups is 11.5, 13.5 and 15.5 years. The questionnaire is school-based and data are collected through self-report. It is administered in the classroom during school hours and takes approximately 1 hour to complete. The HBSC questionnaire within each country includes: (1) mandatory questions that each country is required to include to create the international dataset; (2) optional packages of questions on specific topic areas from which countries can choose; (3) country-specific questions related to issues of national importance. All questions are subject to validation and piloting at national and international levels.

The mandatory questions that each country are required to include consist of background information (e.g., age, sex), health behaviours (e.g., alcohol use, eating patterns), health outcomes (e.g., self-reported health), and individual and social resources (e.g., family support). Optional
packages include supplemental questions in targeted areas such as dietary habits, physical activity, risky behaviours, engagement in bullying and other violent behaviours, etc.¹

**Sampling**

A cluster sampling approach is used with the primary sampling unit being school class. Schools are weighted based on the number of eligible classes with each class having the same likelihood of being selected. In schools where a class is randomly selected, classes in the other target age groups are also randomly selected to minimize the number of schools required for participation. The recommended sample size for each grade in each country is 1,500 students.¹

**Ethics**

In order to ensure ethics are adhered to, each HBSC country is required to: (1) ensure procedures are in place to review ethical conduct (i.e., ethics committee within a university or region); (2) make certain that any applicable legal requirements are satisfied in relation to researchers working with children (i.e., police checks); (3) guarantee participants in the study and their schools, parents/guardians are fully informed about the research and that procedures are in place to enable them to withdraw from the study easily; (4) employ written and/or oral procedures for informed or passive consent, depending upon jurisdictional requirements; and (5) fully document their national procedures.¹ Documentation is provided to inform parents/children of the ways in which confidentiality and anonymity are assured, and to give details of who has access to the data and how they are stored and used.
Limitations

The HBSC has some limitations which warrant mention. The primary limitation is the cross-sectional nature of the survey, which only permits associations between exposures and outcomes to be examined, and not cause and effect relations. Thus, temporal sequences cannot be established. Another limitation is that all data is obtained from a self-report questionnaire which is subject to recall bias and social desirability bias. Factors such as peer interaction while completing the questionnaire may also influence students’ responses.
References


Appendix B
Example Health Behaviour in School-Aged Children Survey Questions
M1 Are you male or female?

1 □ Male
2 □ Female

M2 What grade are you in?

1 □ 2 □ 3 □ 4 □
Grade 8 Grade 9 Grade 10 Grade 11

M3 What month were you born?

1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 □ 11 □ 12 □
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

M4 What year were you born?

1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □

M13 How much do you weigh? Answer using pounds or kilograms.

_____ pounds OR _____ kilograms

M14 How tall are you? Answer using feet and inches or centimetres.

_____ feet _____ inches OR _____ centimetres

ED15 Where do you usually eat your lunch or mid-day meal on school days?

1 □ at school
2 □ at home
3 □ somewhere else. Please write down where: __________________________
4 □ I never eat a lunch or mid-day meal

5 □ at someone else’s home
6 □ in a snack-bar, fast-food restaurant, cafe
Instructions for Collecting Data on Convenience Stores and Chain Food Retailers/Cafés:

Below are detailed instructions regarding data collection for convenience stores and chain fast food/café retailers in Canada, Scotland, and the US. The example below outlines the steps required for each food retailer type. The example pertains to convenience stores surrounding a Canadian school, Starbucks Coffee surrounding a Scottish school, and McDonald’s restaurant surrounding a US school.

Step 1 – Yellow Pages databases:

First, point your browser to the appropriate Yellow Pages database (Canada = [www.yellowpages.ca]; UK = [www.yell.com]; US = [www.yellowpages.com]). For Canadian schools, upon arriving to the homepage, click on the ‘By proximity’ Tab (shown below). When using the Scottish and US Yellow Pages there is no “by proximity” tab and thus the homepage is used in subsequent steps.

Yellow Pages Canada:

![Yellow Pages Canada Interface]

Yellow Pages UK:

![Yellow Pages UK Interface]
Yellow Pages US:

Step 2 – School address and food retailer

In the relevant boxes, fill in the school address information and the food retailer you are searching for. If you are searching for convenience stores then simply type in “convenience stores” however if you are searching for chain fast food restaurants/cafés type in the name of the specific retailer of interest (i.e., Starbucks, McDonald’s).

Yellow Pages Canada:

Yellow Pages UK:
Yellow Pages US:

Step 3 – Search results

Click the ‘Find’ button to obtain your results.

Yellow Pages Canada:
## Starbucks in Colebrooke Street, Glasgow, Lanarkshire

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Distance</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starbucks Coffee Co (UK) Ltd</strong></td>
<td>252, Byres Rd, Glasgow, G12 8SH</td>
<td>0.5 miles W</td>
<td>0141 357 5318</td>
</tr>
<tr>
<td><strong>Starbucks Coffee Co (UK) Ltd</strong></td>
<td>10, St. Georges Rd, Glasgow, G3 6UJ</td>
<td>0.7 miles SE</td>
<td>0141 332 7852</td>
</tr>
<tr>
<td><strong>Starbucks Coffee Co (UK) Ltd</strong></td>
<td>27, Sauchiehall St, Glasgow, G2 3AT</td>
<td>1.2 miles SE</td>
<td>0141 353 3149</td>
</tr>
</tbody>
</table>
### McDonald's in Astoria (11105)

**Sort by:** Best Match  
**Narrow by:** Neighborhood, Category  
**Show businesses with:** Coupons

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Name</th>
<th>Address</th>
<th>Distance</th>
<th>Rating</th>
<th>Phone Number</th>
<th>Reviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>McDonald's</td>
<td>2250 31st St, Astoria, NY 11105</td>
<td>0.3 miles</td>
<td>3 stars</td>
<td>(718) 932-8690</td>
<td>1 rating, 1 review</td>
</tr>
<tr>
<td>2</td>
<td>McDonald's</td>
<td>3167 31st St, Astoria, NY 11103</td>
<td>1.3 miles</td>
<td>3 stars</td>
<td>(718) 267-1343</td>
<td>1 rating, 1 review</td>
</tr>
<tr>
<td>3</td>
<td>McDonald's</td>
<td>3265 31st St, Astoria, NY 11106</td>
<td>1.4 miles</td>
<td>5 stars</td>
<td>(718) 545-6803</td>
<td>Be the first to review</td>
</tr>
<tr>
<td>4</td>
<td>McDonald's</td>
<td>3136 21st St, Astoria, NY 11106</td>
<td>1.4 miles</td>
<td>3 stars</td>
<td>(718) 545-0282</td>
<td>1 rating, 1 review</td>
</tr>
</tbody>
</table>

*Website*  
More Info  
What: Fast Food Restaurants, Hamburgers & Hot Dogs, American Restaurants

---

**Map Astoria (11105)**

Image of a map showing the location of McDonald's in Astoria (11105).
**Important Note:** If you are collecting data for a small town and entering the street address does not give you any results, then try searching the town name, and zip/postal code. If there are simply no restaurants within range, then generic web search results will come up (similar to a Google search results page). You can also double check results using google maps.

For my work with the food retailers surrounding schools, I am interested in the food retailer addresses around a 1 km circular buffer only. I collect up to 1.5 km around Canadian schools and 1 mile around UK and US schools. Note that distances in the UK and US will be converted to km prior to analyses at which point all food retailers in each country >1 km away will be excluded.

As mentioned, all the addresses that are within 1.5 km (Canada) or 1 mile (UK, US) from schools are needed. Thus from the above screen shots we see that two convenience stores from our Canadian example need to be retained, two Starbucks from our UK example need to be retained, and one McDonald’s from our US example needs to be retained.

**Step 4 – Exporting search results to excel**

Copy the web address (URL) from your search – (results page displayed in screen shots above). Next, start a new document in Microsoft Excel 2007 or higher. Go to the ‘Data’ tab, choose “From Web” as shown below (note that Microsoft excel for mac does not have this feature).
A modified web browser should come up. Paste the website address (URL) from your search results in step 3. After the results page loads, click ‘Import’.

**Step 5 – Cleaning the data**

You will notice that there is a lot of extra information in the header of the website (about 50 lines worth). Delete everything up to the first convenience store (or food retailer).
Cleaning Canadian data in Excel:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoppers Drug Mart 0.6 km</td>
<td>519-451-7992</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1365 Huron St, London, ON, N5V1R9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category: Convenience Stores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>519-451-7992</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoppers Drug Mart - convenience stores - 0.0 Star Rating Be the first to review Get directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 U Variety 1.1 km</td>
<td>519-451-5775</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1570 Highbury Ave N, London, ON, N5Y5N7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category: Convenience Stores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>519-451-5775</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 U Variety - convenience stores - 0.0 Star Rating Be the first to review Get directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the Canadian data (shown above), keep the first five lines of text, beginning with the name of the convenience store. Then delete all spaces and unnecessary text in between convenience stores. When finished, each convenience store should have five lines of text (retailer name and distance, telephone number, address, category, telephone number) and should be within 1.5km (1 mile for UK and US). Make sure to review the spreadsheet carefully to ensure that each store has five lines – this is extremely important for steps to come.
When UK and US data are imported into Excel the lines of text are slightly different than they are for Canadian data.

In the UK each retailer should have 4 lines (retailer name, address, distance, telephone number).

The rest can be deleted.

Cleaning UK data in Excel:

[Excel spreadsheet with highlighted rows for deletion]
In the US each retailer should have three lines of text corresponding to the retailer (retailer name, address, distance). The rest can be deleted.

**Cleaning US data in Excel:**

When you are finished, save your work in a master file representing each country (e.g., one folder will be called Canada where all Canadian data will be saved, one folder will be called UK where all UK data will be saved, and one folder will be called US where all US data will be saved).
Within the master files create three sub files – one for convenience stores, one for fast food retailers, and one for cafés. Then save your excel file in the appropriate file with the schools ID number and name as the file name (see example below).

Desktop:

Inside “Canada” file:
Inside “Conv Stores” file:

![Image of Excel file]

**Step 5 – Importing & processing data with SAS**

**Canada SAS code:**

First you import the file you just created in Excel:

```sas
PROC IMPORT OUT= WORK.test
   DATAFILE= "C:\Users\Mariane.epi\Desktop\Canada\Conv Stores\1 CONS Ecole Corinthia Park.xlsx"
   DBMS=EXCEL REPLACE;
   RANGE="Sheet1$";
   GETNAMES=NO;
   MIXED=NO;
   SCANTEXT=YES;
   USEDATE=YES;
   SCANTIME=YES;
RUN;
```

Here, tell SAS to number the lines from 0-4.

```sas
*creating a variable x1 numbering the lines from 0-4;
data new;
set test;
x1 = mod(_n_, 5);
run;
```
Now, we only want lines one and three (food retailer name and address), so the code below deletes the other lines. The rest of the code in the SAS program is data management where names and addresses are merged together into one dataset and variables that are no longer needed are deleted.

*deleting the lines numbered 0, 2 and 4, and keeping lines 1 and 3 (=name/distance & address);

data new2;
set new;
if x1 = 0 then delete;
if x1 = 2 then delete;
if x1 = 4 then delete;
run;

The one problem with the address field as given from the Yellow Pages website is that the relevant information (street name, city, province, postal code) is separated by commas. Each piece of information is required as its own variable. The code below accomplishes this.

data nameadd3;
set nameadd2;
delim=',';
street_name = scan(address, 1, delim);
city = scan(address, 2, delim);
prov = scan(address, 3, delim);
post_code=scan(address, 4, delim);
run;

Finally, if everything is working properly in the SAS program, we can export our SAS file back into Excel. The code below does that. Export the data to the same file you imported your data from (Canada → Conv Stores). Name the file the exact same as the file you imported but add SAS EXPORT at the beginning of the name (e.g., SAS EXPORT 1 CONS Ecole Corinthia Park.xls).

PROC EXPORT DATA= WORK.NAMEADDFINAL
OUTFILE= "C:\Users\Mariane.epi\Desktop\Canada\Conv Stores\SAS EXPORT 1 CONS Ecole Corinthia Park.xlsx"
DBMS=EXCEL LABEL REPLACE;
Open the new excel file you have created, and you will need to do a few things

- Rename the F1 column as ‘name’.
- Check for duplicate entries of food retailers. Delete any duplicates you come across (duplicate = same address & postal code and same name).
- Some postal codes may be missing from some retailers. Look up the food retailer address from the food retailer’s website.
- Check to see if some entries have mall/shopping plaza addresses. If they do, look up the street address of the mall/shopping plaza online and put that in the spreadsheet instead.

When you’re finished, save your changes and start the next school.

Note that because the number of lines and information in excel files was different in the UK and the US, a slightly different SAS code is required. See below for UK and US SAS codes.

_UK SAS code:_

```sas
options pageno=1 nodate ls=120 ps=64;

PROC IMPORT OUT= WORK.test
    DATAFILE= "C:\Users\Mariane.EPI\Desktop\Currently working on as of 07.08.11\Food retailer Data Collection\UK\UK FF3 FF.xlsx"
    DBMS=EXCEL REPLACE;
GETNAMES=NO;
MIXED=NO;
SCANTEXT=YES;
USEDATE=YES;
SCANTIME=YES;
RUN;

*creating a variable x1 numbering the lines from 0-2;
data new;
set test;
x1 = mod(_n_, 4);
run;
```
*separating the names from the addresses;
proc sort data=new;
by x1;
run;

*creating a dataset with restaurant name only;
data restname;
set new;
if x1=3 or x1=2 or x1=0 then delete;
run;

*creating a variable for observation number;
data restname2;
set restname;
um = _n_; 
drop x1;
rename F1 = name;
run;

proc print data=restname2;
run;

*creating a dataset with restaurant address only;
data restadd;
set new;
if x1=1 or x1=3 or x1=0 then delete;
run;

*creating a variable for observation number for merging datasets;
data restadd2;
set restadd;
um=_n_; 
drop x1;
rename F1 = address;
run;

proc print data=restadd2;
run;

*creating a dataset with miles only;
data miles;
set new;
if x1=2 or x1=1 or x1=3 then delete;
run;

*creating a variable for observation number for merging datasets;
data miles2;
set miles;
um=_n_; 
drop x1;
rename F1 = miles;
run;
`proc print data=miles2;
run;

*merging name and address and zip;
data nameadd;
merge restname2 restadd2 miles2;
by num;
run;

proc print data=nameadd;
run;

proc contents data=nameadd;
run;

data nameadd2;
set nameadd;
drop num;
run;

data nameadd2;
set nameadd2;
school_ID =3;
run;

DATA nameadd3;
    RETAIN school_id;;
    SET nameadd2;
RUN;

data nameadd2;
set nameadd2;

proc print data=nameadd2;
run;

PROC EXPORT DATA= WORK.nameadd3
    OUTFILE= "C:\Users\Mariane.EPI\Desktop\Currently working on as of 07.08.11\Food retailer Data Collection\UK\FF UK SAS EXPORT\3 FF SAS.xls"
    DBMS=EXCEL; SHEET="1 mile";
RUN;

US SAS code:

options pageno=1 nodate ls=120 ps=64;

PROC IMPORT OUT= WORK.test
DATAFILE= "C:\Users\Mariane.EPI\Desktop\Currently working on as of 04.26.11\Food retailer Data Collection\USA\US Sonic Drive In\Sonic DriveIn-299.xlsx"

DBMS=EXCEL REPLACE;
  RANGE="Sheet1$";
  GETNAMES=NO;
  MIXED=NO;
  SCANTEXT=YES;
  USEDATE=YES;
  SCANTIME=YES;
RUN;
*
*creating a variable x1 numbering the lines from 0-2;
data new;
set test;
x1 = mod(_n_, 3);
run;
*
*separating the names from the addresses;
proc sort data=new;
by x1;
run;
*
*creating a dataset with restaurant name only;
data restname;
set new;
if x1=2 or x1=0 then delete;
run;
*
*creating a variable for observation number;
data restname2;
set restname;
um = _n_; 
drop x1;
rename F1 = name;
run;

proc print data=restname2;
run;
*
*creating a dataset with restaurant address only;
data restadd;
set new;
if x1=0 or x1=1 then delete;
run;
*
*creating a variable for observation number for merging datasets;
data restadd2;
set restadd;
um=_n_; 
drop x1;
rename F1 = address;
run;

proc print data=restadd2;
run;
*creating a dataset with miles only;
data miles;
set new;
if x1=2 or x1=1 then delete;
run;

*creating a variable for observation number for merging datasets;
data miles2;
set miles;
num=_n_;
drop x1;
rename F1 = miles;
run;

proc print data=miles2;
run;

*merging name and address and zip;
data nameadd;
merge restname2 restadd2 miles2;
by num;
run;

proc print data=nameadd;
run;

proc contents data=nameadd;
run;

data nameadd2;
set nameadd;
drop num;
run;

proc print data=nameadd2;
run;

*Separating out the pieces of information necessary for geocoding addresses;
data nameadd3;
set nameadd2;
delim=','
street_name = scan(address,1,delim);
city = scan(address,2,delim);
state1 = scan(address,3,delim);
run;

*Cleaning up the data set;
data nameadd4;
set nameadd3;
drop address delim;
run;

* here i split state and postal code;
data nameadd5;
set nameadd4;
delim=' ';
zip_code = scan(state1, 2, delim);
state = scan(state1, 1, delim);
run;

data nameaddfinal;
set nameadd5;
drop state1 delim;
run;

PROC EXPORT DATA= WORK.NAMEADDFINAL
  OUTFILE= "C:\Documents and Settings\Mariane.epi\desktop\Currently working on as of 04.26.11\Food retailer Data Collection\USA\US Sonic Drive In SAS export\US Sonic Drive In-299_export.xls"
  DBMS=EXCEL; SHEET="1 mile";
RUN;
Appendix D
Chain Food Retailers Included in Food Retailer Measures
Chain food retailers included in food retailer measures according to country

<table>
<thead>
<tr>
<th>Retailer</th>
<th>Sales (CA $000)</th>
<th>Retailer</th>
<th>Sales (EU $000)</th>
<th>Retailer</th>
<th>Sales (US $000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Fast Food Restaurants</em></td>
<td></td>
<td><em>United Kingdom</em></td>
<td></td>
<td><em>Unites States</em></td>
<td></td>
</tr>
<tr>
<td>McDonald’s</td>
<td>2750000</td>
<td>McDonald’s</td>
<td>1815400</td>
<td>McDonald’s</td>
<td>32395000</td>
</tr>
<tr>
<td>Subway</td>
<td>1109000</td>
<td>KFC</td>
<td>604200</td>
<td>Subway</td>
<td>10600000</td>
</tr>
<tr>
<td>KFC</td>
<td>705000</td>
<td>Pizza Hut</td>
<td>480000</td>
<td>Burger King</td>
<td>8710000</td>
</tr>
<tr>
<td>A&amp;W</td>
<td>645000</td>
<td>Subway</td>
<td>454350</td>
<td>Wendy's</td>
<td>8340000</td>
</tr>
<tr>
<td>Wendy's</td>
<td>559000</td>
<td>Burger King</td>
<td>408100</td>
<td>Taco Bell</td>
<td>6950000</td>
</tr>
<tr>
<td>Dairy Queen</td>
<td>385000</td>
<td>Domino's Pizza</td>
<td>376540</td>
<td>Pizza Hut</td>
<td>5390000</td>
</tr>
<tr>
<td>Pizza Pizza</td>
<td>373200</td>
<td>Nando's</td>
<td>346765</td>
<td>KFC</td>
<td>4710000</td>
</tr>
<tr>
<td>St. Hubert</td>
<td>342000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burger King</td>
<td>332000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pizza Hut</td>
<td>265000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvey's</td>
<td>221904</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quizno's Subs</td>
<td>175500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cafés and Coffee/Donut Shops</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tim Hortons’</td>
<td>4921434</td>
<td>Starbucks Coffee</td>
<td>520195</td>
<td>Starbucks Coffee</td>
<td>9070000</td>
</tr>
<tr>
<td>Starbucks Coffee</td>
<td>885000</td>
<td>Greggs</td>
<td>473550</td>
<td>Dunkin' Donuts</td>
<td>5620000</td>
</tr>
<tr>
<td>Costa Coffee</td>
<td></td>
<td></td>
<td></td>
<td>Panera Bread</td>
<td>2916441</td>
</tr>
<tr>
<td>Caffé Nero</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>204510</td>
</tr>
</tbody>
</table>
Appendix E
Description of Body Composition and Fitness Measures
Overview

Below are descriptions of the body composition and fitness measures that were taken in manuscript 2. All measurements, with the exception of the 20 metre shuttle run, were taken according to the protocols outlined in the Canadian Physical Activity, Fitness, and Lifestyle Appraisal (CPAFLA) manual. Measurement procedures were the same for each country of study (Canada, Mexico, Kenya) unless otherwise noted.

Height

Procedure: The maximum distance from the floor to the highest point on the head was measured with the subject facing directly ahead. Shoes were removed, feet were together, and arms were by the participants sides. Heels, buttocks and upper back were in contact with the wall.

Equipment: Stadiometer or steel ruler placed against the wall

Weight

Procedure: The participant stood with minimal movement with hands by his/her side. Shoes and excess clothing were removed.

Equipment: Calibrated scale

Waist Circumference

Procedure: The participant was asked to stand erect with his/her arms hanging loosely at his/her sides. The measure was taken over the clothing. The tape was positioned horizontally mid-way between the bottom of the rib cage and the iliac crest and the measurement was taken at the end of a normal expiration. The appraiser ensured that sufficient tension was applied to the tape,
however not so much that the skin surface was indented. The measurement was recorded to the nearest 0.5cm.

*Equipment:* Anthropometric tape

**Skinfold thickness**

*Procedure:* Estimation of body fat was done using skinfold thickness measurements. Only the triceps skinfold measures were included in this study, as this is the only skinfold site that was measured in all three countries (Canada, Mexico, Kenya). Only the right side was measured (for consistency). To landmark, the forearm was brought to a 90 degree angle with the palm facing up. Using a measuring tape, a pen mark was placed on the back of the right arm at the point midway between the tip of the acromion process (right shoulder) and the tip of the olecranon process (right elbow). The arm was then extended down with the palm facing the upper leg. The tester pinched the skin at the pen marked site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calipers were then applied 1 cm below and at right angles to the pinch, and a reading in millimetres (mm) was taken 2 seconds later. Triceps skinfolds were taken twice. If the difference between the first and second measure was greater than 0.4 mm, a third measure was taken. The mean of the two values that most closely matched each other was then recorded.

*Equipment:* Skinfold caliper, measuring tape

**Handgrip Test of Muscular Strength**

*Procedure:* The participant held the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer was adjusted if required. The base rested on the first metacarpal (heel of palm), while the handle rested on the
middle four fingers. The participant squeezed the dynamometer with maximum isometric effort, which was maintained for about 5 seconds. No other body movement was allowed. Both hands were measured alternately allowing two trials per hand. The combined maximum score for each hand was calculated.

*Equipment:* Hand dynamometer

20 Metre Shuttle Run Test of Aerobic Fitness - *(used in Mexican and Kenyan samples only)*

*Procedure:* This test involved continuous running between two lines 20 m apart in time to recorded beeps. For this reason, the test is also often called the 'beep' test. The test participants stood behind one of the lines facing the second line, and began running when instructed by the CD. The speed at the start is quite slow. The participants continued running between the two lines, turning when signaled by the recorded beeps. After 1 minute, stage one ends, and a sound indicates an increase in speed, and the beeps are closer together for stage two, indicating a faster running speed. This increase in speed continues each minute as the stages progress up to a maximum of stage 17. If the line was not reached in time for each beep, the participant had to run to the line, turn, and try to catch up with the pace within two more ‘beeps’. If the line was reached before the beep sounded, the participant had to wait until the beep sounded to continue. The test ended if the participant failed to reach the line (within 2 metres) for two consecutive ends. The stage at which the test is ended was used to predict the child’s maximal oxygen uptake (VO2max) using established algorithms.1

*Equipment:* Flat surface, marking cones, 20 m measuring tape, CD or pre-recorded audio tape, CD or audio tape player
Modified Canadian Aerobic Fitness Test (mCAFT) - (used in Canadian sample only)

Procedure: The stepping sequence is completed on a double 20.3 cm step and consists of 3 minute stepping sequences. The mCAFT is structured so that, in most cases, the participant’s first 3 minute stepping session is at a cadence intensity of 65-70% of the average aerobic power expected of a person 10 years or older. Instructions and time signals are given on a CD as to when to start and stop stepping and for the counting of the 10 second measurement of post-exercise heart rate. If the predetermined ceiling post-exercise heart rate (220-age) is not attained or exceeded after the first 3 minute stepping stage, participants performed a second 3 minute stepping stage. Participants completed up to three of these progressively more demanding 3 minute bouts of exercise until their post-exercise heart rate exceeded 220-age. Children aged 6-14 started at what is stage five for women, to a maximum of three stepping stages. This ceiling for the mCAFT is set at 85% of the predicted maximum heart rate. The final stage reached is used to predict the child’s VO2max using established algorithms.3

Equipment: Ergometer steps, mCAFT CD and player, heart rate monitor
References


Appendix F
Detailed Short Course Itinerary
Schedule of Events for CAMBIO’s Obesity Short Course: Fall Session November 6-11, 2009 (≈48 hrs of in-class time, workshops, and fieldwork)

<table>
<thead>
<tr>
<th>Day 1 – November 6, 2009</th>
</tr>
</thead>
</table>
| 6:00-7:45 pm | • Overview of CAMBIO (~15 minutes) – [Lead: Dr. Juan López]  
| |   • Purpose of course (~15 minutes) [Lead: Gabriela Ibarguchi]  
| |   • Introductions (~30 minutes)  
| |   • Session specific questionnaire (CITI)  
| |   • Pre-course questionnaire (~1h)  
| 7:45 pm | • Dinner and social event [Dr. Juan López to organize social event]  

STUDENTS: use evening to start readings and look over material; ensure that CITI Ethics Course is completed.

<table>
<thead>
<tr>
<th>Day 2 – November 7, 2009</th>
</tr>
</thead>
</table>
| 9:00-10:30 am | • Beginning the research process: nature and purpose of research, developing questions, ethics [Instructor: Dr. Ian Janssen]  
| |   • Session specific questionnaire  
| 10:30-11:00 | • Coffee break  
| 11:00-1:30 | • Conducting literature searches [Instructors: Toño Jiménez and Dra. Edtna Jáuregui]  
| |   • 60 minutes of instruction  
| |   • 90 minutes of participation  
| |   • Session specific questionnaire  
| 1:30-2:30 | • Lunch  
| 2:30-3:00 | • Recreation event  
| 3:00-4:30 | • Developing the research plan [Instructor: Dr. Ian Janssen]  
| |   • Selecting research approach  
| |   • Selecting instruments (validity/reliability, feasibility, etc.)  
| |   • Writing a research plan  
| |   • Session specific questionnaire  
| 4:30-5:00 | • Coffee break  
| 5:00-6:30 | • Reading & evaluating research reports [Instructor: Gabriela Ibarguchi]  
| |   • Session specific questionnaire  
| 6:30-7:00 | • Introduction to Research Component of short course and CPAFLA (Canadian Physical Activity and Fitness Lifestyle Appraisal) [Instructor: Dr. Ian Janssen]  
| 6:45-7:30 | • Development of Research Teams/Groups  
| 7:00-7:30 | • Organization of Research Teams/Groups [Lead: Gabriela Ibarguchi]  
| 7:30 | • Dinner and social event [student groups 1 and 2 to organize social event]  

<table>
<thead>
<tr>
<th>Day 3 – November 8, 2009</th>
</tr>
</thead>
</table>
| 9:00-10:30 am | • Musculoskeletal Fitness tests including sit-and-reach, and grip strength [Instructor: Karla Galaviz]  

180
Day 4 – November 9, 2009 (Fieldwork and data collection at School #1&2)

**Day**

- 7:00-7:30 am  
  - Breakfast
- 7:30-8:00
  - Travel to school site
- 8:00-8:30
  - Set-up and preparation
- 8:30-1:00
  - Data collection for morning classes
- 1:00-2:30
  - Lunch (bagged lunch at school site)
- 2:30-6:30
  - Data collection for afternoon classes
- 6:30-7:00
  - Clean-up
- 7:00-7:30
  - Travel back to hotel venue
- 7:30-
  - Dinner (no social event)
<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00-7:30 am</td>
<td>Breakfast</td>
</tr>
<tr>
<td>7:30-8:00</td>
<td>Travel to school site</td>
</tr>
<tr>
<td>8:00-8:30</td>
<td>Set-up and preparation</td>
</tr>
<tr>
<td>8:30-1:00</td>
<td>Data collection for morning classes</td>
</tr>
<tr>
<td>1:00-2:30</td>
<td>Lunch (bagged lunch at school site)</td>
</tr>
<tr>
<td>2:30-6:30</td>
<td>Data collection for afternoon classes</td>
</tr>
<tr>
<td>6:30-7:00</td>
<td>Clean-up</td>
</tr>
<tr>
<td>7:00-7:30</td>
<td>Travel back to hotel venue</td>
</tr>
<tr>
<td>7:30-</td>
<td>Dinner</td>
</tr>
</tbody>
</table>

**Day 5 – November 10, 2009 (Fieldwork and data collection at School #3&4)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-10:30</td>
<td>Data Entry [Instructor: Dr. Ian Janssen]</td>
</tr>
<tr>
<td></td>
<td>30 minutes of instruction</td>
</tr>
<tr>
<td></td>
<td>60 minutes practical (students to enter data collected in field research)</td>
</tr>
<tr>
<td>10:30-11:00</td>
<td>Coffee break</td>
</tr>
<tr>
<td>11:00-1:30</td>
<td>Data entry (students to enter data collected in field research)</td>
</tr>
<tr>
<td></td>
<td><strong>Session specific questionnaire</strong></td>
</tr>
<tr>
<td>1:30-2:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:30-3:00</td>
<td>Recreation event</td>
</tr>
<tr>
<td>3:00-4:00</td>
<td>Data cleaning</td>
</tr>
<tr>
<td></td>
<td>30 minutes of instruction [Instructor: Dr. Ian Janssen]</td>
</tr>
<tr>
<td></td>
<td>30 minutes of participation (students to clean data collected in field research)</td>
</tr>
<tr>
<td></td>
<td><strong>Session specific questionnaire</strong></td>
</tr>
<tr>
<td>4:00-4:30</td>
<td>Creating data dictionary [Instructor: Dr. Ian Janssen]</td>
</tr>
<tr>
<td>4:30-5:00</td>
<td>Coffee break</td>
</tr>
<tr>
<td>5:00-6:00</td>
<td>Creating data dictionary (students to create data dictionary for field research)</td>
</tr>
<tr>
<td></td>
<td><strong>Session specific questionnaire</strong></td>
</tr>
<tr>
<td>6:00-7:30</td>
<td>Wrap of Session #1 and Instructions for Session #2 [Leads: Gabriela Ibarguchi and Donna Ivimey]</td>
</tr>
<tr>
<td>7:30</td>
<td>Dinner and social event [Karla Galaviz to organize social event]</td>
</tr>
</tbody>
</table>
**Schedule of Events for CAMBIO’s Obesity Short Course: Winter Session February 20-23, 2010**

(*~28 hrs of in-class time, workshops, and independent work*)

<table>
<thead>
<tr>
<th>Day 1 – February 20, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00-12:30</td>
</tr>
<tr>
<td>- Welcome and Orientation and outline for Session 2 [Dr. Juan López, Dr. Ian Janssen]</td>
</tr>
<tr>
<td>12:30- 2:30</td>
</tr>
</tbody>
</table>
|   - SPSS part 1 - Overview of software [Instructor: Dr. Luis Ortíz]  
   - *Session specific questionnaire* |
| 2:30-3:30                |
|   - Lunch and break      |
| 3:30-5:00                |
|   - SPSS part 2 - Example statistics [Instructor: Dr. Luis Ortíz]  
   - *Session specific questionnaire* |
| 5:00-5:30                |
|   - Break                |
| 5:30-7:00                |
|   - SPSS part 2 - Example statistics [Instructor: Dr. Luis Ortíz]  
   - *Session specific questionnaire* |
| 7:30                      |
|   - Dinner               |

<table>
<thead>
<tr>
<th>Day 2 – February 21, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-10:30</td>
</tr>
<tr>
<td>- SPSS part 2 - Example statistics [Instructor: Dr. Luis Ortíz]</td>
</tr>
<tr>
<td>10:30-11:00</td>
</tr>
<tr>
<td>- Coffee break</td>
</tr>
<tr>
<td>11:00-1:00</td>
</tr>
<tr>
<td>- SPSS part 2 - Example statistics [Instructor: Dr. Luis Ortíz]</td>
</tr>
<tr>
<td>1:00-1:30</td>
</tr>
</tbody>
</table>
|   - Overview of Field Work data file (data collected from schools in November) [Instructor: Dr. Luis Ortíz, Dr. Ian Janssen]  
   - *Session specific questionnaire* |
| 1:30-2:30                 |
|   - Lunch                 |
| 2:30-3:00                 |
|   - Recreation event      |
| 3:00-6:00                 |
|   - SPSS labs (practice running and interpreting data and statistics from field work)  
   - *Session specific questionnaire* |
| 6:00-7:30                 |
|   - Free time             |
| 7:30                      |
|   - Dinner and social event |

<table>
<thead>
<tr>
<th>Day 3 – February 22, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-9:45</td>
</tr>
</tbody>
</table>
|   - Scientific writing style [Instructor: Dr. Robert Milena]  
   - *Session specific questionnaire* |
| 9:45-10:30                |
|   - Putting together a paper [Instructor: Dr. Ian Janssen]  
   - *Session specific questionnaire* |
<p>| 10:00-11:00               |
|   - Coffee break          |
| 12:00-12:30               |
|   - Overview of writing assignment [Instructor: Dr. Ian Janssen, Gaby Ibarguchi] |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30-1:30</td>
<td>• Students to formulate their research questions</td>
</tr>
<tr>
<td>1:30-2:30</td>
<td>• Lunch</td>
</tr>
<tr>
<td>2:30-3:00</td>
<td>• Recreation event</td>
</tr>
</tbody>
</table>
| 3:00-7:30 | • Students to formulate research questions, develop Introduction & Methods for paper with help from faculty  
            • *Session specific questionnaire*                                                       |
| 7:30     | • Dinner                                                                                     |
| 8:30     | • Work on preparing their paper and analyses to conduct with partners (own time)             |

**Day 4 – February 23, 2010**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>• Full day to run statistics, start to write and put together paper.</td>
</tr>
<tr>
<td></td>
<td>• Students to work independently or in small groups (maximum of 3).</td>
</tr>
<tr>
<td></td>
<td>• Faculty available to meet, discuss, help, etc.</td>
</tr>
<tr>
<td></td>
<td>• <em>Session specific questionnaire</em></td>
</tr>
<tr>
<td></td>
<td>• <em>Post-course questionnaire</em></td>
</tr>
</tbody>
</table>


Las preguntas siguientes se refieren a la sesión “módulo CITI”/The following questions relate to the “CITI on-line module: Short Course Ethics” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “módulo CITI”/Please rate the amount of new information that you learned from the “CITI on-line module: Short Course Ethics”.

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session.

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “módulo CITI”?/In your current position, how likely are you to use the information presented on the “CITI on-line module: Short Course Ethics”?

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “módulo CITI” en los próximos 6 meses/I expect to use the information learned from the “CITI on-line module: Short Course Ethics” within the next 6 months

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “módulo CITI” ser credible/I found the information presented at the “CITI on-line module: Short Course Ethics” to be credible

   1 = No es muy creíble/not very credible
   7 = Muy creíble/very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “módulo CITI” en un curso corto future/I am interested in learning more about the topics presented on the “CITI on-line module: Short Course Ethics” at a future short course

   1 = No es muy interesado/not very interested
   7 = Muy interesado/very interested

   1  2  3  4  5  6  7
Sesión 1, Día 1: *el proceso de investigación*  

**3° Curso Anual sobre Obesidad: Formulario de Evaluación de Sesión/**  
3rd Annual CAMBIO Obesity Research Short Course: Session Evaluation Form

Las preguntas siguientes se refieren a la sesión “*el proceso de investigación*” / The following questions relate to the “Research Process” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “*el proceso de investigación*” / Please rate the amount of new information that you learned at the session on “*The Research Process*”.

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session  
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session.

   1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “*el proceso de investigación*”? / In your current position, how likely are you to use the information presented at the session “*The Research Process*”?

   1 = No es muy probable / not very likely  
   7 = Muy probable / very likely

   1 2 3 4 5 6 7

3. Espero utilizar la información adquirida en la sesión “*el proceso de investigación*” en los próximos 6 meses / I expect to use the information learned at the session “*The Research Process*” within the next 6 months.

   1 = No es muy probable / not very likely  
   7 = Muy probable / very likely

   1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “*el proceso de investigación*” ser credible / I found the information presented at the session “*The Research Process*” to be credible.

   1 = No es muy creíble / not very credible  
   7 = Muy creíble / very credible

   1 2 3 4 5 6 7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “*el proceso de investigación*” en un curso corto futuro / I am interested in learning more about the topics presented at the session “*The Research Process*” at a future short course.

   1 = No es muy interesado / not very interested  
   7 = Muy interesado / very interested

   1 2 3 4 5 6 7
Las preguntas siguientes se refieren a la sesión “búsquedas de literatura científica”:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “búsquedas de literatura científica”:

   1 = Yo no aprendí nueva información en esta sesión
   7 = Yo aprendí mucho nueva información en esta sesión

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “búsquedas de literatura científica”?

   1 = No es muy probable
   7 = Muy probable

3. Espero utilizar la información adquirida en la sesión “búsquedas de literatura científica” en los próximos 6 meses:

   1 = No es muy probable
   7 = Muy probable

4. Encontré la información presentada en la sesión “búsquedas de literatura científica” ser credible:

   1 = No es muy credible
   7 = Muy credible

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “búsquedas de literatura científica” en un curso corto futuro:

   1 = No es muy interesado
   7 = Muy interesado
Las preguntas siguientes se refieren a la sesión “desarrollar un plan de la investigación”/The following questions relate to the “Research Plan” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “desarrollar un plan de la investigación”/Please rate the amount of new information that you learned at the session on “The Research Plan”.

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session.

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “un plan de la investigación”?/In your current position, how likely are you to use the information presented at the session “The Research Plan”?

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “desarrollar un plan de la investigación” en los próximos 6 meses/I expect to use the information learned at the session “The Research Plan” within the next 6 months.

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “desarrollar un plan de la investigación” ser credible/I found the information presented at the session “The Research Plan” to be credible.

   1 = No es muy creíble/not very credible
   7 = Muy creíble/very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “desarrollar un plan de la investigación” en un curso corto future/I am interested in learning more about the topics presented at the session “The Research Plan” at a future short course.

   1 = No es muy interesado/not very interested
   7 = Muy interesado/very interested

   1  2  3  4  5  6  7
Las preguntas siguientes se refieren a la sesión “leer y evaluar informes de la literatura científica y de la investigación”/The following questions relate to the “Reading and Evaluating Research Reports” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “leer y evaluar informes de la literatura científica y de la investigación”/ Please rate the amount of new information that you learned at the session on “Reading and Evaluating Research Reports”.

   |   |   |   |   |   |   |   |
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
   | Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session |
   | Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session |

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “leer y evaluar informes de la literatura científica y de la investigación”?/In your current position, how likely are you to use the information presented at the session “Reading and Evaluating Research Reports”?

   |   |   |   |   |   |   |   |
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
   | No es muy probable / not very likely |
   | Muy probable / very likely |

3. Espero utilizar la información adquirida en la sesión “leer y evaluar informes de la literatura científica y de la investigación” en los próximos 6 meses / I expect to use the information learned at the session “Reading and Evaluating Research Reports” within the next 6 months.

   |   |   |   |   |   |   |   |
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
   | No es muy probable / not very likely |
   | Muy probable / very likely |

4. Encontré la información presentada en la sesión “leer y evaluar informes de la literatura científica y de la investigación” sercredibles / I found the information presented at the session “Reading and Evaluating Research Reports” to be credible.

   |   |   |   |   |   |   |   |
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
   | No es muy creíble / not very credible |
   | Muy creíble / very credible |

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “leer y evaluar informes de la literatura científica y de la investigación” en un curso corto futuro / I am interested in learning more about the topics presented at the session “Reading and Evaluating Research Reports” at a future short course.

   |   |   |   |   |   |   |   |
   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
   | No es muy interesado / not very interested |
   | Muy interesado / very interested |
Las preguntas siguientes se refieren a la sesión “examen de aptitud” / The following questions relate to the “Fitness Testing” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “examen de aptitud” / Please rate the amount of new information that you learned at the session on “Fitness Testing”:
   
   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “examen de aptitud”? / In your current position, how likely are you to use the information presented at the session “Fitness Testing”?
   
   1 = No es muy probable / not very likely
   7 = Muy probable / very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “examen de aptitud” en los próximos 6 meses / I expect to use the information learned at the session “Fitness Testing” within the next 6 months.
   
   1 = No es muy probable / not very likely
   7 = Muy probable / very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “examen de aptitud” ser credible / I found the information presented at the session “Fitness Testing” to be credible.
   
   1 = No es muy credible / not very credible
   7 = Muy credible / very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “examen de aptitud” en un curso corto future / I am interested in learning more about the topics presented at the session “Fitness Testing” at a future short course.
   
   1 = No es muy interesado / not very interested
   7 = Muy interesado / very interested

   1  2  3  4  5  6  7
Sesión 2, Día 2: las medidas antropométricas

Las preguntas siguientes se refieren a la sesión “las medidas antropométricas” / The following questions relate to the “Anthropometric Measures” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “las medidas antropométricas” / Please rate the amount of new information that you learned at the session on “Anthropometric Measures”.

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session

   1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “las medidas antropométricas”? / In your current position, how likely are you to use the information presented at the session “Anthropometric Measures”?

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1 2 3 4 5 6 7

3. Espero utilizar la información adquirida en la sesión “las medidas antropométricas” en los próximos 6 meses / I expect to use the information learned at the session “Anthropometric Measures” within the next 6 months.

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “las medidas antropométricas” ser credible/I found the information presented at the session “Anthropometric Measures” to be credible.

   1 = No es muy creíble/not very credible
   7 = Muy creíble/very credible

   1 2 3 4 5 6 7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “las medidas antropométricas” en un curso corto future/I am interested in learning more about the topics presented at the session “Anthropometric Measures” at a future short course.

   1 = No es muy interesado/not very interested
   7 = Muy interesado/very interested

   1 2 3 4 5 6 7
Las preguntas siguientes se refieren a la sesión “prueba de estado físico aeróbica”/ The following questions relate to the “Aerobic Fitness Test” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “prueba de estado físico aeróbica”/ Please rate the amount of new information that you learned at the session on “Aerobic Fitness Test”?

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “prueba de estado físico aeróbica”?/ In your current position, how likely are you to use the information presented at the session “Aerobic Fitness Test”?

   1 = No es muy probable/not very likely
   7 = Muy probable/ very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “prueba de estado físico aeróbica” en los próximos 6 meses/ I expect to use the information learned at the session “Aerobic Fitness Test” within the next 6 months.

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “prueba de estado físico aeróbica” ser credible/ I found the information presented at the session “Aerobic Fitness Test” to be credible.

   1 = No es muy creíble/not very credible
   7 = Muy creíble/very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “prueba de estado físico aeróbica” en un curso corto futuro/ I am interested in learning more about the topics presented at the session “Aerobic Fitness Test” at a future short course.

   1 = No es muy interesado/not very interested
   7 = Muy interesado/very interested

   1  2  3  4  5  6  7
Las preguntas siguientes se refieren a la sesión “inspección de conducta de salud” / The following questions relate to the “Health Behaviour Survey” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “inspección de conducta de salud” / Please rate the amount of new information that you learned at the session on “Health Behaviour Survey”.

1. Yo no aprendí nueva información en esta sesión /I did not learn very much new information at this session
7 = Yo aprendí mucho nueva información en esta sesión/I learned a great deal of new information at this session

1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “inspección de conducta de salud”? / In your current position, how likely are you to use the information presented at the session “Health Behaviour Survey”?

1 = No es muy probable/not very likely
7 = Muy probable/very likely

1 2 3 4 5 6 7

3. Espero utilizar la información adquirida en la sesión “inspección de conducta de salud” en los próximos 6 meses / I expect to use the information learned at the session “Health Behaviour Survey” within the next 6 months.

1 = No es muy probable/not very likely
7 = Muy probable/very likely

1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “inspección de conducta de salud” ser credible / I found the information presented at the session “Health Behaviour Survey” to be credible.

1 = No es muy credibile/not very credible
7 = Muy credibile/very credible

1 2 3 4 5 6 7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “inspección de conducta de salud” en un curso corto future / I am interested in learning more about the topics presented at the session “Health Behaviour Survey” at a future short course.

1 = No es muy interesado/not very interested
7 = Muy interesado/very interested

1 2 3 4 5 6 7
Las preguntas siguientes se refieren a la sesión “registro de datos” / The following questions relate to the “Data Recording” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “registro de datos” / Please rate the amount of new information that you learned at the session on “Data Recording”.

   1 = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7 = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session

   1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “registro de datos”? / In your current position, how likely are you to use the information presented at the session “Data Recording”?

   1 = No es muy probable / not very likely
   7 = Muy probable / very likely

   1 2 3 4 5 6 7

3. Espero utilizar la información adquirida en la sesión “registro de datos” en los próximos 6 meses / I expect to use the information learned at the session “Data Recording” within the next 6 months.

   1 = No es muy probable / not very likely
   7 = Muy probable / very likely

   1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “registro de datos” ser credible / I found the information presented at the session “Data Recording” to be credible.

   1 = No es muy creíble / not very credible
   7 = Muy creíble / very credible

   1 2 3 4 5 6 7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “registro de datos” en un curso corto future / I am interested in learning more about the topics presented at the session “Data Recording” at a future short course.

   1 = No es muy interesado / not very interested
   7 = Muy interesado / very interested

   1 2 3 4 5 6 7
Las preguntas siguientes se refieren a la sesión “entrada de datos”

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “entrada de datos”
   1  = Yo no aprendi nueva información en esta sesión / I did not learn very much new information at this session
   7  = Yo aprendi mucho nueva información en esta sesión/I learned a great deal of new information at this session

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “entrada de datos”?
   1  = No es muy probable/not very likely
   7  = Muy probable/very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “entrada de datos” en los próximos 6 meses
   1  = No es muy probable/not very likely
   7  = Muy probable/very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “entrada de datos” ser credible/I found the information presented at the session “Data Entry” to be credible.
   1  = No es muy creíble/not very credible
   7  = Muy creíble/very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “entrada de datos” en un curso corto future/I am interested in learning more about the topics presented at the session “Data Entry” at a future short course.
   1  = No es muy interesado/not very interested
   7  = Muy interesado/very interested

   1  2  3  4  5  6  7
Las preguntas siguientes se refieren a la sesión “limpieza de datos”/
The following questions relate to the “Data Cleaning” session:

1. Valoré por favor la cantidad de nueva información en que usted aprendió en la sesión “limpieza de datos”/ Please rate the amount of new information that you learned at the session on “Data Cleaning”.

   1  = Yo no aprendí nueva información en esta sesión / I did not learn very much new information at this session
   7  = Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “limpieza de datos”? / In your current position, how likely are you to use the information presented at the session “Data Cleaning”?

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “limpieza de datos” en los próximos 6 meses / I expect to use the information learned at the session “Data Cleaning” within the next 6 months.

   1 = No es muy probable/not very likely
   7 = Muy probable/very likely

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “limpieza de datos” ser credible / I found the information presented at the session “Data Cleaning” to be credible.

   1 = No es muy credible/not very credible
   7 = Muy credible/very credible

   1  2  3  4  5  6  7

5. Estoy interesado en aprender más sobre los temas presentados en la sesión “limpieza de datos” en un curso corto future / I am interested in learning more about the topics presented at the session “Data Cleaning” at a future short course.

   1 = No es muy interesado/not very interested
   7 = Muy interesado/very interested

   1  2  3  4  5  6  7
Las preguntas siguientes se refieren a la sesión “diccionario de datos” / The following questions relate to the “Data Dictionary” session:

1. Valore por favor la cantidad de nueva información en que usted aprendió en la sesión “diccionario de datos” / Please rate the amount of new information that you learned at the session on “Data Dictionary”.

<table>
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<tbody>
<tr>
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<tr>
<td>7</td>
<td>Yo aprendí mucho nueva información en esta sesión / I learned a great deal of new information at this session</td>
</tr>
</tbody>
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2. ¿En su ocupación actual, cuán probable es que utilice la información presentada en la sesión “diccionario de datos”? / In your current position, how likely are you to use the information presented at the session “Data Dictionary”? |

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</tr>
</tbody>
</table>

3. Espero utilizar la información adquirida en la sesión “diccionario de datos” en los próximos 6 meses / I expect to use the information learned at the session “Data Dictionary” within the next 6 months.

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<td>7</td>
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</table>

4. Encontré la información presentada en la sesión “diccionario de datos” ser credible / I found the information presented at the session “Data Dictionary” to be credible.

<table>
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<tr>
<td>7</td>
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5. Estoy interesado en aprender más sobre los temas presentados en la sesión “diccionario de datos” en un curso corto future / I am interested in learning more about the topics presented at the session “Data Dictionary” at a future short course.

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<tr>
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<td>7</td>
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</table>
Las preguntas siguientes se refieren a la sesión “SPSS parte 1 - visión general del software” / The following questions relate to the “SPSS part 1 - software overview” session

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “SPSS parte 1 - visión general del software” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “SPSS part 1 software overview” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “SPSS parte 1 - visión general del software”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “SPSS part 1 - software overview”? (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

3. Espero utilizar la información adquirida en la sesión “SPSS parte 1 - visión general del software” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “SPSS part 1 - software overview” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “SPSS parte 1 - visión general del software” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “SPSS part 1 - software overview” to be credible (1 = “not very credible” and 7 = “very credible”)

   1  2  3  4  5  6  7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “SPSS parte 1 - visión general del software” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “SPSS part 1 - software overview” at a future short course (1 = “not very interested” and 7 = “very interested”)

   1  2  3  4  5  6  7

Comentarios:

199
Las preguntas siguientes se refieren a la sesión “SPSS parte 2 - ejemplo estadístico” / The following questions relate to the “SPSS part 2 - example statistics” session:

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “SPSS parte 2 - ejemplo estadístico” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “SPSS part 2 - example statistics” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

   1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “SPSS parte 2 - ejemplo estadístico”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “SPSS part 2 - example statistics”? (1 = “not very likely” and 7 = “very likely”)

   1 2 3 4 5 6 7

3. Espero utilizar la información obtenida en la sesión “SPSS parte 2 - ejemplo estadístico” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”)/ I expect to use the information learned at the session “SPSS part 2 - example statistics” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

   1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “SPSS parte 2 - ejemplo estadístico” creíble (1 = “no es muy creíble” y 7 = “muy creíble”)/ I found the information presented at the session “SPSS part 2 - example statistics” to be credible (1 = “not very credible” and 7 = “very credible”)

   1 2 3 4 5 6 7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “SPSS parte 2 - ejemplo estadístico” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”)/ I am interested in learning more about the topics presented at the session “SPSS part 2 - example statistics” at a future short course (1 = “not very interested” and 7 = “very interested”)

   1 2 3 4 5 6 7

Comentarios:
Las preguntas siguientes se refieren a la sesión “laboratorio de SPSS” / The following questions relate to the “SPSS lab” session:

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “laboratorio de SPSS” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “SPSS lab” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

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2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “laboratorio de SPSS”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “SPSS lab”? (1 = “not very likely” and 7 = “very likely”)

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3. Espero utilizar la información obtenida en la sesión “laboratorio de SPSS” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “SPSS lab” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

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4. Encontré la información presentada en la sesión “laboratorio de SPSS” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “SPSS lab” to be credible (1 = “not very credible” and 7 = “very credible”)

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5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “laboratorio de SPSS” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “SPSS lab” at a future short course (1 = “not very interested” and 7 = “very interested”)

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Comentarios:
Las preguntas siguientes se refieren a la sesión “estilo de redacción científica” / The following questions relate to the “scientific writing style” session:

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “estilo de redacción científica” (1 = “no aprendi nueva información en esta sesión” y 7 = “aprendi mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “scientific writing style” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “estilo de redacción científica”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “scientific writing style”? (1 = “not very likely” and 7 = “very likely”)

1 2 3 4 5 6 7

3. Espero utilizar la información obtenida en la sesión “estilo de redacción científica” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “scientific writing style” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “estilo de redacción científica” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “scientific writing style” to be credible (1 = “not very credible” and 7 = “very credible”)

1 2 3 4 5 6 7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “estilo de redacción científica” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “scientific writing style” at a future short course (1 = “not very interested” and 7 = “very interested”)

1 2 3 4 5 6 7

Comentarios:
Las preguntas siguientes se refieren a la sesión “organización de la documentación” / The following questions relate to the “putting together a paper” session:

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “organización del documento” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “putting together a paper” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “organización de la documentación”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “putting together a paper”? (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

3. Espero utilizar la información obtenida en la sesión “organización de la documentación” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “putting together a paper” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “organización de la documentación” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “putting together a paper” to be credible (1 = “not very credible” and 7 = “very credible”)

   1  2  3  4  5  6  7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “organización de la documentación” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “putting together a paper” at a future short course (1 = “not very interested” and 7 = “very interested”)

   1  2  3  4  5  6  7

Comentarios:
Las preguntas siguientes se refieren a la sesión “revision del trabajo escrito” / The following questions relate to the “overview of writing assignment” session:

1. Por favor evalúe la cantidad de nueva información que usted aprendió en la sesión “revision del trabajo escrito” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “overview of writing assignment” (1 = “I did not learn very much new information at this session” y 7 = “I learned a great deal of new information at this session”)

   1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “revision del trabajo escrito”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “overview of writing assignment”? (1 = “not very likely” and 7 = “very likely”)

   1 2 3 4 5 6 7

3. Espero utilizar la información obtenida en la sesión “revision del trabajo escrito” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “overview of writing assignment” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

   1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “revision del trabajo escrito” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “overview of writing assignment” to be credible (1 = “not very credible” and 7 = “very credible”)

   1 2 3 4 5 6 7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “revision del trabajo escrito” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “overview of writing assignment” at a future short course (1 = “not very interested” and 7 = “very interested”)

   1 2 3 4 5 6 7

Comentarios:
Las preguntas siguientes se refieren a la sesión “la pregunta de investigación, introducción y métodos” / The following questions relate to the “research question, introduction, and methods” session:

1. Por favor evalúe la cantidad de nueva información en que usted aprendió en la sesión “la pregunta de investigación, introducción y métodos” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “research question, introduction, and methods” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

1 2 3 4 5 6 7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “la pregunta de investigación, introducción y métodos”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “research topic, introduction, and methods”? (1 = “not very likely” and 7 = “very likely”)

1 2 3 4 5 6 7

3. Espero utilizar la información obtenida en la sesión “la pregunta de investigación, introducción y métodos” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “research question, introduction, and methods” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

1 2 3 4 5 6 7

4. Encontré la información presentada en la sesión “la pregunta de investigación, introducción y métodos” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “research question, introduction, and methods” to be credible (1 = “not very credible” and 7 = “very credible”)

1 2 3 4 5 6 7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “la pregunta de investigación, introducción y métodos” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “research question, introduction, and methods topics” at a future short course (1 = “not very interested” and 7 = “very interested”)

1 2 3 4 5 6 7

Comentarios:
Las preguntas siguientes se refieren a la sesión “trabajo independiente” / The following questions relate to the “independent work” session:

1. Por favor evalúe la cantidad de nueva información en que usted aprendió en la sesión “trabajo independiente” (1 = “no aprendí nueva información en esta sesión” y 7 = “aprendí mucha nueva información en esta sesión”) / Please rate the amount of new information that you learned at the session on “independent work” (1 = “I did not learn very much new information at this session” and 7 = “I learned a great deal of new information at this session”)

   1  2  3  4  5  6  7

2. ¿En su ocupación actual, cuán probable es que usted utilice la información presentada en la sesión “trabajo independiente”? (1 = “no es muy probable” y 7 = “muy probable”) / In your current position, how likely are you to use the information presented at the session “independent work”? (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

3. Espero utilizar la información obtenida en la sesión “trabajo independiente” en los próximos 6 meses (1 = “no es muy probable” y 7 = “muy probable”) / I expect to use the information learned at the session “independent work” within the next 6 months (1 = “not very likely” and 7 = “very likely”)

   1  2  3  4  5  6  7

4. Encontré la información presentada en la sesión “la trabajo independiente” creíble (1 = “no es muy creíble” y 7 = “muy creíble”) / I found the information presented at the session “independent work” to be credible (1 = “not very credible” and 7 = “very credible”)

   1  2  3  4  5  6  7

5. Estoy interesado/interesada en aprender más sobre los temas presentados en la sesión “trabajo independiente” en un curso corto futuro (1 = “no estoy interesado/interesada” y 7 = “estoy muy interesado/interesada”) / I am interested in learning more about the topics presented at the session “independent work” at a future short course (1 = “not very interested” and 7 = “very interested”)

   1  2  3  4  5  6  7

Comentarios:
Appendix H
Pre- and Post-Course Questionnaire
Formación académica y profesional/Academic and Professional Background

1. ¿Qué nivel de educación posee usted? (seleccione todos los que correspondan con un circulo) / Please indicate which education programs you have completed (circle all that apply)
   a. Preparatoria/High School
   b. Escuela Técnica o Instituto de Formación Profesional/College Diploma
   c. Licenciatura/Undergraduate Degree
   d. Maestría/Master’s Degree
   e. Doctorado/Doctorate Degree
   f. Estudios en Medicina (Licenciatura con especialización)/Medical Degree
   g. Otro (por favor especifique)/Other (please specify)

2. Por favor indique si usted está matriculado actualmente en cualquiera de los siguientes programas (seleccione todos los programas en que esté matriculado con un circulo) / Please indicate if you are currently enrolled in any of the following education programs (circle all that apply)
   a. Escuela Técnica o Instituto de Formación Profesional/College Diploma
   b. Licenciatura/Undergraduate Degree
   c. Maestría/Master’s Degree
   d. Doctorado/Doctorate Degree
   e. Estudios en Medicina (Licenciatura con especialización)/Medical Degree
   f. Otro (por favor especifique)/Other (please specify)

3. Por favor indique si usted planea matricularse dentro de los dos próximos años en cualquiera de los siguientes programas educacionales (seleccione todos los que se correspondan con un circulo) / Please indicate if you are planning to enrol within the next 2 years in any of the following education programs (circle all that apply)
   a. Escuela Técnica o Instituto de Formación Profesional/College Diploma
   b. Licenciatura/Undergraduate Degree
   c. Maestría/Master’s Degree
d. Doctorado/Doctorate Degree  
e. Estudios en Medicina (Licenciatura con especialización)/Medical Degree  
f. Otro (por favor especifique)/Other (please specify)

4. ¿Cual es su profesión actual? (puede seleccionar más de una) / What is your current profession? (you may circle more than one)  
a. Especialista o Profesionista en Actividad Física/Fitness Professional  
b. Estudiante de posgrado/Graduate Student  
c. Médico/Medical Doctor  
d. Enfermera/Nurse  
e. Maestro(a) o Profesor(a) en Educación Física/Physical Educator  
f. Entrenador Deportivo/Physical Trainer  
g. Profesor(a) de Universitario(a)/University Professor  
h. Investigador(a)/Researcher  
i. Otro (por favor especifique)/Other (please specify)

5. ¿Cuáles términos se corresponden con su función actual en investigación sobre obesidad? (Seleccione todos los que se correspondan) / Which terms apply to your current role in obesity research? (Circle as many as applicable)  
a. Buscar apoyos económicos para investigación/Solicitar subsidios/Seek research funding/apply for grants  
b. Diseñar proyectos de investigación/Design research projects  
c. Implementar proyectos de investigación/Implement research projects  
d. Recopilar información para proyectos de investigación/Collect data for research projects  
e. Analizar información/Analysis de datos de investigación/Analyse research data  
f. Escribir artículos de investigación/Write research papers  
g. Presentar resultados de investigación en conferencias/Present research results at conferences  
h. Diseñar intervenciones/Design interventions  
i. Implementar intervenciones/Implement interventions  
j. Evaluar intervenciones/Evaluate interventions
k. Influir en políticas (por ejemplo a nivel institucional, local, estatal, nacional o internacional)/Influence policy (for example, at the institutional, local, state, national or international levels)

l. Supervisar estudiantes de posgrado/Supervise graduate students

m. Impartir cursos/Teach courses

n. Dirigir organizaciones o instituciones de investigación/Manage research organization or institutes

6. ¿Cuáles de los siguientes términos describen el tipo de investigación sobre obesidad que usted realiza en su ocupación actual? (seleccione todos los que se correspondan) / Which of the following terms describe the type of obesity research that you are involved with in your current position (check as many as apply)

a. Investigación Clínica (tratamiento e intervención hospitalaria y clínica de enfermedades/Clinical Research (hospital and clinic-based disease treatment and intervention)

b. Investigación Basada en la Población (explora la forma en que nuestro medio social y físico repercute en nuestra salud. El objetivo final es utilizar esta información para mejorar la salud de la población o determinadas sub-poblaciones a través de una mejor comprensión de la manera en que los factores sociales, culturales, ambientales, ocupacionales y económicos determinan nuestro estado de salud)/ Population-Based Research (explores the way in which our social and physical environment impacts our health. The ultimate goal is to use this information to improve the health of the population, or defined sub-populations, through a better understanding of the ways in which social, cultural, environmental, occupational, and economic factors determine our health status)

c. Ciencia Básica (actividades basadas en el laboratorio investigando el funcionamiento normal y anormal en el sistema molecular, celular y orgánico y a todos los niveles del cuerpo)/Basic Science (laboratory-based activities investigating normal and abnormal functioning at the molecular, cellular, organ system and whole body levels)

d. Servicios de Salud e Investigación de la Política de Salud (investiga la eficiencia y efectividad de los profesionales de la salud y del sistema de cuidado de la salud a través de cambios en la práctica y política)/Health Services & Healthy Policy Research (investigates the efficiency and effectiveness of health professionals and the health care system through changes to practice and policy)

e. No estoy involucrado en ninguna actividad investigativa en mi ocupación actual/I am not involved in any research activities in my current position
The Research Process/ El Proceso de Investigación

7. Por favor indique en una escala del 1 al 5 el nivel de conocimientos que usted posee en relación al **proceso de investigación** donde 1 = “no conozco sobre este tema” y 5 = “Sé mucho sobre este tema” / Please rate your Current Knowledge of the research process on a scale of 1 to 5 where 1 = I have no knowledge and 5 = I am very knowledgeable

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8. ¿Cuántos cursos sobre **el proceso de investigación** ha tomado en el pasado (antes de esta encuesta)? / How many courses about the research process have you taken in the past (before this survey)?

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9. ¿En su ocupación actual, que porcentaje de tiempo usted le dedica al tema de la **investigación**? / In your current position, what percentage of time do you devote to the topic of **research**?

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Para las preguntas siguientes, indique por favor el número que se corresponde mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

10. Yo poseo habilidades y conocimientos suficientes para describir los **procesos de investigación** a mis compañeros y colegas / I possess sufficient skills and knowledge to describe research processes to my peers and colleagues

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11. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un **estudio de investigación** / I possess sufficient skills and knowledge to design and implement a research study

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12. Yo poseo habilidades y conocimientos suficientes para evaluar un **estudio de investigación** / I possess sufficient skills and knowledge to evaluate a research study

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13. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio de investigación / I possess sufficient skills and knowledge to apply for funding for a research study

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14. Yo poseo suficiente habilidades y conocimientos para publicar los resultados de un estudio de investigación / I possess sufficient skills and knowledge to publish the results of a research study

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15. Yo poseo suficientes conocimientos para enseñar a estudiantes de posgrado sobre investigación / I possess sufficient knowledge to teach graduate students about research

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**Búsqueda de Literatura/Conducting a Literature Search**

16. Por favor indique en una escala del 1 al 5 el nivel actual de conocimientos que usted posee en la realización de búsquedas de literatura donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of ‘Conducting Literature Searches’ on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

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17. ¿Cuántos cursos relacionados con la realización de búsquedas de literatura ha tomado en el pasado (antes de ésta encuesta)? / How many courses on conducting literature searches have you taken in the past (before this survey)?

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18. ¿En su ocupación actual, que porcentaje de tiempo usted le dedica a la realización de búsquedas de literatura? / In your current position, what percentage of time do you devote to conducting literature searches?

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Para las preguntas siguientes, indique por favor el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)
19. Yo poseo las habilidades y conocimientos suficientes para describirle a mis compañeros y colegas **como se realiza una búsqueda de literatura** / I possess sufficient skills and knowledge to describe how to **conduct a literature search** to my peers and colleagues

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20. Yo poseo las habilidades y conocimientos suficientes para diseñar e implementar una **búsqueda de literatura** / I possess sufficient skills and knowledge to design and conduct a **literature search**

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21. Yo poseo las habilidades y conocimientos suficientes para evaluar **una búsqueda de literatura** / I possess sufficient skills and knowledge to evaluate a **literature search**

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22. Yo poseo las habilidades y conocimientos suficientes para solicitar financiamiento para realizar **una búsqueda de literatura** / I possess sufficient skills and knowledge to apply for funding to **conduct a literature search**

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23. Yo poseo las habilidades y conocimientos suficientes para publicar los resultados de **una búsqueda de literatura** / I possess sufficient skills and knowledge to publish the results of a **literature search**

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24. Yo poseo los conocimientos suficientes para enseñar a estudiantes de posgrado sobre la realización de **búsquedas de literatura** / I possess sufficient knowledge to teach graduate students about **conducting a literature search**

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Desarrollo de un Plan de Investigación/Developing a Research Plan

25. Por favor indique en una escala del 1 al 5 el nivel actual de conocimiento que usted posee en el desarrollo de un plan de investigación donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of Developing a Research Plan on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

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26. ¿Cuántos cursos sobre el desarrollo de un plan de investigación ha tomado en el pasado (antes de esta encuesta)? / How many courses on developing research plans have you taken in the past (before this survey)?

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27. ¿En su ocupación actual, que porcentaje de tiempo usted dedica al desarrollo de un plan de investigación? / In your current position, what percentage of your time do you devote to developing research plans?

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Para las preguntas siguientes, indique por favor el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

28. Yo poseo suficiente habilidades y conocimientos para describir como desarrollar un plan de investigación a mis compañeros y colegas / I possess sufficient skills and knowledge to describe how to develop a research plan to my peers and colleagues

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29. Yo poseo suficiente habilidades y conocimientos para diseñar e implementar un plan de investigación / I possess sufficient skills and knowledge to design and implement a research plan

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<td>Strongly disagree</td>
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<td>Completamente de acuerdo</td>
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<td>strongly agree</td>
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30. Yo poseo suficiente habilidades y conocimientos para evaluar un plan de investigación / I possess sufficient skills and knowledge to evaluate a research development plan

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<td>strongly agree</td>
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32. Yo poseo las habilidades y conocimientos suficientes para solicitar financiamiento para **desarrollar un plan de investigación** / I possess sufficient skills and knowledge to apply for funding for to **develop a research plan**

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<td>Strongly disagree</td>
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<td>strongly agree</td>
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33. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un plan de investigación / I possess sufficient skills and knowledge to publish the results of a **research plan**

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<td>strongly agree</td>
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34. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes de posgrado sobre como desarrollar planes de investigación / I possess sufficient knowledge to teach graduate students about **developing research plans**

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**Lectura y Evaluación de Artículos de Investigación y Bibliografía Científica /Reading and Evaluating Scientific Literature and Research Reports**

35. Por favor indique en una escala del 1 al 5 el nivel de conocimientos actual que usted posee sobre la Lectura y Evaluación de Artículos de Investigación y Bibliografía Científica donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your current knowledge of Reading and Evaluating Scientific Literature and Research Reports on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

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<tr>
<td>No conozco sobre este tema</td>
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<td></td>
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<td>Sé mucho sobre este tema</td>
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</table>

36. ¿Cuántos cursos sobre Lectura y Evaluación de Artículos de Investigación y Bibliografía Científica ha tomado en el pasado (antes de esta encuesta)? / How many courses on Reading and Evaluating Scientific Literature and Research Reports have you taken in the past (before this survey)?

| 0 | 1 | 2 | 3 | 4+ |

37. ¿En su ocupación actual, con que frecuencia usted le dedica a la Lectura y Evaluación de Artículos de Investigación y Bibliografía Científica? / In your current position, how often do you **Read and Evaluate Scientific Literature and Research Reports**?

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<td>51-75%</td>
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Para las preguntas siguientes, indique por favor el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

38. Yo poseo las habilidades y conocimientos suficientes para debatir con mis compañeros y colegas sobre Lectura y Evaluación de Artículos de Investigación y Bibliografía Científica / I possess sufficient skills and knowledge to discuss evaluating scientific literature and research reports to my peers and colleagues.

1  2  3  4  5
En gran desacuerdo
Strongly disagree
Completamente de acuerdo
strongly agree

39. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar una evaluación sobre bibliografía científica y Artículos de Investigación / I possess sufficient skills and knowledge to design and implement a scientific literature/research report review.

1  2  3  4  5
En gran desacuerdo
Strongly disagree
Completamente de acuerdo
strongly agree

40. Yo poseo habilidades y conocimientos suficientes para evaluar bibliografía científica y Artículos de Investigación / I possess sufficient skills and knowledge to evaluate scientific literature and research reports.

1  2  3  4  5
En gran desacuerdo
Strongly disagree
Completamente de acuerdo
strongly agree

41. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento destinados a la evaluación de Artículos de Investigación y bibliografía científica / I possess sufficient skills and knowledge to apply for funding to evaluate scientific literature and research reports.

1  2  3  4  5
En gran desacuerdo
Strongly disagree
Completamente de acuerdo
strongly agree

42. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de una evaluación de Artículos de Investigación y bibliografía científica / I possess sufficient skills and knowledge to publish the results of a scientific literature/research report evaluation.

1  2  3  4  5
En gran desacuerdo
Strongly disagree
Completamente de acuerdo
strongly agree
43. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes de posgrado sobre la evaluación de bibliografía científica y Artículos de Investigación / I possess sufficient knowledge to teach graduate students about evaluating scientific literature and research reports

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**Evaluación de la Fuerza Musculoesquelética / Musculoskeletal Strength Measurements**

44. Por favor, indique en una escala del 1 al 5 el nivel de conocimiento que usted posee sobre la Evaluación de la Fuerza Musculoesquelética donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your current knowledge of Musculoskeletal Strength Measurements on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

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<td>No conozco sobre este tema</td>
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<td>Sé mucho sobre este tema</td>
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45. ¿Cuántos cursos sobre la Evaluación de la fuerza musculoesquelética ha tomado en el pasado? (antes de esta encuesta) / How many courses on musculoskeletal strength measurements have you taken in the past (before this survey)?

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46. ¿En su ocupación actual, que porcentaje de tiempo usted le dedica a la evaluación de la fuerza musculoesquelética? / In your current position, what percentage of time do you devote to measuring musculoskeletal strength?

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Para las siguientes preguntas, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

47. Yo poseo habilidades y conocimientos suficientes para describirle a mis colegas y compañeros como evaluar la fuerza musculoesquelética / I possess sufficient skills and knowledge to describe how to take musculoskeletal strength measurements to my peers and colleagues

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<td>En gran desacuerdo</td>
<td>Strongly disagree</td>
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<td>Completamente de acuerdo</td>
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<td>Strongly agree</td>
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</table>
48. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un estudio sobre la evaluación de la fuerza musculoesquelética / I possess sufficient skills and knowledge to design and implement a study of musculoskeletal strength measurements

En gran desacuerdo 2 3 4 5 Completamente de acuerdo
Strongly disagree          strongly agree

49. Yo poseo suficiente habilidades y conocimientos para evaluar un estudio sobre la evaluación de la fuerza musculoesquelética / I possess sufficient skills and knowledge to evaluate a study of musculoskeletal strength measurements

En gran desacuerdo 2 3 4 5 Completamente de acuerdo
Strongly disagree          strongly agree

50. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento destinado a un estudio sobre la evaluación de la fuerza musculoesquelética / I possess sufficient skills and knowledge to apply for funding for a study of musculoskeletal strength measurements

En gran desacuerdo 2 3 4 5 Completamente de acuerdo
Strongly disagree          strongly agree

51. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio sobre la evaluación de la fuerza musculoesquelética / I possess sufficient skills and knowledge to publish the results of a study of musculoskeletal strength measurements

En gran desacuerdo 2 3 4 5 Completamente de acuerdo
Strongly disagree          strongly agree

52. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes posgrado sobre la evaluación de la fuerza musculoesquelética / I possess sufficient knowledge to teach graduate students about musculoskeletal strength measurements

En gran desacuerdo 2 3 4 5 Completamente de acuerdo
Strongly disagree          strongly agree

Mediciones Antropométricas / Anthropomorphic Measurements

53. Por favor, indique en una escala del 1 al 5 su nivel actual de conocimientos sobre mediciones antropométricas donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of anthropomorphic measurements on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

No conozco sobre este tema 2 3 4 5 Sé mucho sobre este tema
54. ¿Cuántos cursos sobre mediciones antropométricas ha tomado en el pasado (antes de esta encuesta)?
/ How many courses on anthropomorphic measurements have you taken in the past (before this survey)?

0 1 2 3 4+ 5

55. En su ocupación actual, que porcentaje de tiempo usted dedica a las mediciones antropométricas?
/ In your current position, what percentage of your time do you devote to the topic of anthropomorphic measurements?

1 2 3 4 5
0-10% 11-25% 26-50% 51-75% 76-100%

Para las preguntas siguientes, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

56. Yo poseo habilidades y conocimientos suficientes para describirle a mis compañeros y colegas las mediciones antropométricas / I possess sufficient skills and knowledge to describe anthropomorphic measurements to my peers and colleagues

1 2 3 4 5
En gran desacuerdo Strongly disagree Completamente de acuerdo strongly agree

57. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un estudio sobre mediciones antropométricas / I possess sufficient skills and knowledge to design and implement a study of anthropomorphic measurements

1 2 3 4 5
En gran desacuerdo Strongly disagree Completamente de acuerdo strongly agree

58. Yo poseo habilidades y conocimientos suficientes para evaluar un estudio sobre mediciones antropométricas / I possess sufficient skills and knowledge to evaluate a study of anthropomorphic measurements

1 2 3 4 5
En gran desacuerdo Strongly disagree Completamente de acuerdo strongly agree

59. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio sobre mediciones antropométricas / I possess sufficient skills and knowledge to apply for funding for a study of anthropomorphic measurements

1 2 3 4 5
En gran desacuerdo Strongly disagree Completamente de acuerdo strongly agree
60. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio sobre *mediciones antropométricas* / I possess sufficient skills and knowledge to publish the results of a study of *anthropomorphic measurements*

    1 2 3 4 5
    En gran desacuerdo  
    Strongly disagree

    Completamente de acuerdo  
    strongly agree

61. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes posgrado sobre *mediciones antropométricas* / I possess sufficient knowledge to teach graduate students about *anthropomorphic measurements*

    1 2 3 4 5
    En gran desacuerdo  
    Strongly disagree

    Completamente de acuerdo  
    strongly agree

Pruebas de Aptitud Física Aeróbica/Aerobic Fitness Tests

62. Por favor indique en una escala del 1 al 5 su nivel de conocimientos sobre las pruebas de aptitud física aeróbica donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of *aerobic fitness tests* on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

    1 2 3 4 5
    No conozco sobre este tema

    Sé mucho sobre este tema

63. ¿Cuántos cursos sobre pruebas de aptitud física aeróbica ha tomado en el pasado (antes de esta encuesta)? / How many courses on *aerobic fitness tests* have you taken in the past (before this survey)?

    0 1 2 3 4+

64. ¿En su ocupación actual, que porcentaje de tiempo usted dedica a las pruebas de aptitud física aeróbica? / In your current position, what percentage of your time do you devote to the topic of *aerobic fitness tests*?

    1 2 3 4 5
    0-10%  11-25%  26-50%  51-75%  76-100%

Para las preguntas siguientes, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)
65. Yo poseo suficiente habilidades y conocimientos para describir **las pruebas de aptitud física aeróbica** a mis compañeros y colegas / I possess sufficient skills and knowledge to describe **aerobic fitness tests** to my peers and colleagues

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<td>Strongly disagree</td>
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<td>Completemente de acuerdo</td>
<td>strongly agree</td>
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66. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un estudio sobre **pruebas de aptitud física aeróbica** / I possess sufficient skills and knowledge to design and implement a study of **aerobic fitness tests**

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<td>Strongly disagree</td>
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<td>Completemente de acuerdo</td>
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67. Yo poseo habilidades y conocimientos suficientes para evaluar **pruebas de aptitud física aeróbica** / I possess sufficient skills and knowledge to evaluate a study of **aerobic fitness tests**

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<td>67</td>
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<td>Strongly disagree</td>
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<td>Completemente de acuerdo</td>
<td>strongly agree</td>
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68. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio sobre **pruebas de aptitud física aeróbica** / I possess sufficient skills and knowledge to apply for funding for a study of **aerobic fitness tests**

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<td>En gran desacuerdo</td>
<td>Strongly disagree</td>
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<td>Completemente de acuerdo</td>
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69. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio sobre **pruebas de aptitud física aeróbica** / I possess sufficient skills and knowledge to publish the results of a study of **aerobic fitness tests**

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<td>69</td>
<td>En gran desacuerdo</td>
<td>Strongly disagree</td>
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<td>Completemente de acuerdo</td>
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70. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes posgrado sobre **pruebas de aptitud física aeróbica** / I possess sufficient knowledge to teach graduate students about **aerobic fitness tests**

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<td>En gran desacuerdo</td>
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Encuesta sobre Comportamiento de la Salud/Health Behaviour Survey

71. Por favor, indique en una escala del 1 al 5 su nivel actual de conocimientos con relación a las encuestas sobre el comportamiento de la salud donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of health behaviour surveys on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = I am very knowledgeable”

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<tr>
<td></td>
<td>No conozco sobre este tema</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Sé mucho sobre este tema</td>
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72. ¿Cuántos cursos sobre encuestas sobre el comportamiento de la salud ha tomado en el pasado (antes de esta encuesta)? / How many courses on health behaviour surveys have you taken in the past (before this survey)?

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73. ¿En su ocupación actual, que porcentaje de tiempo usted dedica a las encuestas sobre el comportamiento de la salud? / In your current position, what percentage of your time do you devote to the topic of health behaviour surveys?

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Para las preguntas siguientes, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

74. Yo poseo habilidades y conocimientos suficiente para describir a mis compañeros y colegas las encuestas sobre el comportamiento de la salud / I possess sufficient skills and knowledge to describe health behaviour surveys to my peers and colleagues

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<td>Strongly disagree</td>
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75. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar encuestas sobre el comportamiento de la salud / I possess sufficient skills and knowledge to design and implement a study of health behaviour surveys

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76. Yo poseo habilidades y conocimientos suficientes para evaluar **un estudio relacionado con encuestas sobre el comportamiento de la salud** / I possess sufficient skills and knowledge to evaluate a study of **health behaviour surveys**

1  2  3  4  5
En gran desacuerdo          Complemente de acuerdo
Strongly disagree          strongly agree

77. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio relacionado con encuestas sobre el comportamiento de la salud / I possess sufficient skills and knowledge to apply for funding for a study of **health behaviour surveys**

1  2  3  4  5
En gran desacuerdo          Complemente de acuerdo
Strongly disagree          strongly agree

78. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio relacionado con encuestas sobre el comportamiento de la salud / I possess sufficient skills and knowledge to publish the results of a study of **health behaviour surveys**

1  2  3  4  5
En gran desacuerdo          Complemente de acuerdo
Strongly disagree          strongly agree

79. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes de posgrado acerca de encuestas sobre el comportamiento de la salud / I possess sufficient knowledge to teach graduate students about **health behaviour surveys**

1  2  3  4  5
En gran desacuerdo          Complemente de acuerdo
Strongly disagree          strongly agree

**Creación de Bases de Datos para Investigación/Creating Research Databases**

80. Por favor, indique en una escala del 1 al 5 su nivel actual de conocimientos sobre la creación de bases de datos para investigación donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of **creating research databases** on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

1  2  3  4  5
No conozco sobre este tema          Sé mucho sobre este tema
Strongly disagree          strongly agree

81. ¿Cuántos cursos sobre creación de bases de datos para investigación ha tomado en el pasado (antes de esta encuesta)? / How many courses on **creating research databases** have you taken in the past (before this survey)?

0  1  2  3  4+
82. ¿En su ocupación actual, que porcentaje de tiempo usted dedica a la creación de bases de datos para investigación? / In your current position, what percentage of your time do you devote to the topic of creating research databases?

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Para las preguntas siguientes, por favor indique el número que corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

83. Yo poseo habilidades y conocimientos suficientes para describir a mis compañeros y colegas como crear bases de datos para investigación / I possess sufficient skills and knowledge to describe how to create research databases to my peers and colleagues

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84. Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un estudio utilizando bases de datos para investigación / I possess sufficient skills and knowledge to design and implement a study using research databases

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85. Yo poseo habilidades y conocimientos suficientes para evaluar un estudio sobre bases de datos para investigación / I possess sufficient skills and knowledge to evaluate a study of research databases

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86. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio dedicado a la creación de bases de datos para investigación / I possess sufficient skills and knowledge to apply for funding for a study of research databases

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87. Yo poseo habilidades y conocimientos suficientes para publicar los resultados del estudio de bases de datos para investigación / I possess sufficient skills and knowledge to publish the results of a study of research databases

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88. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes posgrado sobre la creación de bases de datos para investigación / I possess sufficient knowledge to teach graduate students about creating research databases

1  2  3  4  5
En gran desacuerdo  2  3  4  5 1
Strongly disagree

Software Estadístico/Statistical Software

89. Por favor, indique en una escala del 1 al 5 su nivel actual de conocimientos sobre programas - software estadísticos donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your Current Knowledge of statistical software on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”

1  2  3  4  5
No conozco sobre este tema  1  2  3  4  5
Sé mucho sobre este tema

90. ¿Cuántos cursos sobre software estadístico ha tomado en el pasado (antes de esta encuesta)? / How many courses on statistical software have you taken in the past (before this survey)?

0  1  2  3  4+

91. ¿Ha utilizado usted un software estadístico? (por favor seleccione con un circulo una opción) / Have you ever used statistical software? (please circle one)

Si  NO

92. Si su respuesta es afirmativa, por favor nombre el paquete estadístico / If yes, please name the software package: __________________________

93. En su ocupación actual, que porcentaje de su tiempo usted le dedica al uso del software estadístico / In your current position, what percentage of your time do you devote to the use of statistical software?

1  2  3  4  5
0-10%  11-25%  26-50%  51-75%  76-100%

Para las preguntas siguientes, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

94. Yo poseo habilidades y conocimientos suficiente para describir a mis compañeros y colegas un software estadístico / I possess sufficient skills and knowledge to describe statistical software to my peers and colleagues

1  2  3  4  5
En gran desacuerdo  1  2  3  4  5
Strongly disagree

Completamente de acuerdo
Strongly agree
95. **Yo poseo habilidades y conocimientos suficientes para diseñar e implementar un estudio sobre software estadístico / I possess sufficient skills and knowledge to design and implement a study of statistical software**

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96. **Yo poseo habilidades y conocimientos suficientes para evaluar estudio sobre un software estadístico / I possess sufficient skills and knowledge to evaluate a study of statistical software**

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97. **Yo poseo habilidades y conocimientos suficiente para solicitar financiamiento para un estudio sobre software estadístico / I possess sufficient skills and knowledge to apply for funding for a study of statistical software**

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98. **Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio sobre software estadístico / I possess sufficient skills and knowledge to publish the results of a study of statistical software**

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99. **Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes posgrado sobre el uso del software estadístico / I possess sufficient knowledge to teach graduate students about using statistical software**

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**Redacción Científica / Scientific Writing**

100. **Por favor, indique en una escala del 1 al 5 su nivel actual de conocimientos sobre redacción científica donde 1 = “no conozco sobre este tema” y 5 “Sé mucho sobre este tema” / Please rate your current knowledge of scientific writing on a scale of 1 to 5 where 1 = “I have no knowledge” and 5 = “I am very knowledgeable”**

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<td>Sé mucho sobre este tema</td>
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101. ¿Cuántos cursos sobre **redacción científica** ha tomado en el pasado (antes de esta encuesta)? / How many courses on **scientific writing** have you taken in the past (before this survey)?

0 1 2 3 4+  

102. ¿En su ocupación actual, qué porcentaje de tiempo usted dedica a la **redacción científica**? / In your current position, what percentage of your time do you devote to **scientific writing**?

1 2 3 4 5  
0-10% 11-25% 26-50% 51-75% 76-100%  

Para las preguntas siguientes, por favor indique el número que se corresponda mejor con su respuesta (1 en gran desacuerdo, 5 completamente de acuerdo) / For the following questions, please check the number which best corresponds to your answer (1 strongly disagree, 5 strongly agree)

103. Yo poseo habilidades y conocimientos suficientes para **describir** a mis compañeros y colegas **como se deben redactar documentos científicos** / I possess sufficient skills and knowledge to describe **how to write a scientific paper** to my peers and colleagues

1 2 3 4 5  
En gran desacuerdo  
Completamente de acuerdo  
Strongly disagree  
strongly agree  

104. Yo poseo habilidades y conocimientos suficientes para **escribir un documento científico para ser publicado** / I possess sufficient skills and knowledge to write **a scientific paper for publication**

1 2 3 4 5  
En gran desacuerdo  
Completamente de acuerdo  
Strongly disagree  
strongly agree  

105. Yo poseo habilidades y conocimientos suficientes para evaluar un documento científico publicado / I possess sufficient skills and knowledge to evaluate a **published scientific paper**

1 2 3 4 5  
En gran desacuerdo  
Completamente de acuerdo  
Strongly disagree  
strongly agree  

106. Yo poseo habilidades y conocimientos suficientes para solicitar financiamiento para un estudio sobre **cómo se debe redactar un documento científico** / I possess sufficient skills and knowledge to apply for funding for a study of **how to write a scientific paper**

1 2 3 4 5  
En gran desacuerdo  
Completamente de acuerdo  
Strongly disagree  
strongly agree  

227
107. Yo poseo habilidades y conocimientos suficientes para publicar los resultados de un estudio sobre **como debe ser redactado un documento científico** / I possess sufficient skills and knowledge to publish the results of a study of **how to write a scientific paper**

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108. Yo poseo habilidades y conocimientos suficientes para enseñar a estudiantes de posgrado sobre **como debe ser redactado un documento científico** / I possess sufficient knowledge to teach graduate students about **how to write a scientific paper**

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109. ¿Cuántos documentos científicos ha publicado usted (como autor o coautor) en revistas que son evaluadas por la comunidad científica? / How many papers have you published (as author or co-author) in peer-review journals?

| 0 | 1 | 2 | 3 | 4+ |

**Datos demográficos** /**Demographic Information**:

110. Edad / Age:

111. Género / Sex:

**FIN / END**

GRACIAS / THANK YOU
Appendix I
Follow-up Questionnaire
Código: las primeras letras de su apelido materno y los últimos 4 dígitos de su teléfono

Código: ______________________

3º Curso Corto Anual sobre Obesidad
3rd Annual Short Course on Obesity

Cuestionario de seguimiento/Follow up questionnaire

1. ¿Qué nivel de educación tiene? (seleccione todos los que correspondan) / Please indicate which education programs you have completed (circle all that apply).
   - [ ] Preparatoria/High School
   - [ ] Escuela Técnica o Instituto de Formación Profesional/College Diploma
   - [ ] Licenciatura/Undergraduate Degree
   - [ ] Maestría/Master's Degree
   - [ ] Doctorado/Doctorate Degree
   - [ ] Estudios en Medicina (Licenciatura con especialización)/Medical Degree
   - [ ] Otros: Favor de especificar/Other (please specify): ______________________

2. Por favor, indique si usted está matriculado actualmente en cualquiera de los siguientes programas (seleccione todos los programas en que esté matriculado) / Please indicate if you are currently enrolled in any of the following education programs (circle all that apply)
   - [ ] Preparatoria/High School
   - [ ] Escuela Técnica o Instituto de Formación Profesional/College Diploma
   - [ ] Licenciatura/Undergraduate Degree
   - [ ] Maestría/Master's Degree
   - [ ] Doctorado/Doctorate Degree
   - [ ] Estudios en Medicina (Licenciatura con especialización)/Medical Degree
   - [ ] Otros: Favor de especificar/Other (please specify): ______________________

3. Por favor, indique si usted está planificando matricularse dentro de los dos próximos años en cualquiera de los siguientes programas educacionales (seleccione todos los que correspondan) / Please indicate if you are planning to enroll within the next 2 years in any of the following education programs (circle all that apply).
   - [ ] Preparatoria/High School
   - [ ] Escuela Técnica o Instituto de Formación Profesional/College Diploma
   - [ ] Licenciatura/Undergraduate Degree
   - [ ] Maestría/Master's Degree
   - [ ] Doctorado/Doctorate Degree
   - [ ] Estudios en Medicina (Licenciatura con especialización)/Medical Degree
   - [ ] Otros: Favor de especificar/Other (please specify): ______________________
4. ¿Qué profesión tiene? (puede escoger más de una) / What is your current profession? (you may circle more than one):
- [ ] Especialista o Profesionista en Actividad Física / Fitness Professional
- [ ] Estudiante de posgrado / Graduate Student
- [ ] Médico / Medical Doctor
- [ ] Enfermero(a) / Nurse
- [ ] Maestro(a) o Professor(a) en Educación Física / Physical Educator
- [ ] Entrenador(a) en Deporte / Physical Trainer
- [ ] Profesor(a) de Universidad / University Professor
- [ ] Investigador(a) / Researcher
- [ ] Otro: Favor de especificar / Other (please specify): 

5. ¿Cuáles términos se corresponden con su función actual en la investigación sobre obesidad? (Seleccione todos los que correspondan) / Which terms apply to your current role in obesity research? (Circle as many as applicable):
- [ ] Buscar financiamiento para investigaciones o solicitar subsidios / Seek research funding or apply for grants
- [ ] Diseñar proyectos de investigación / Design research projects
- [ ]Implementar proyectos de investigación / Implement research projects
- [ ] Recopilar información/datos para proyectos de investigación / Collect data for research projects
- [ ] Analizar información/datos para investigación / Analyse research data
- [ ] Escribir manuscritos de investigación / Write research papers
- [ ] Presentar resultados de investigaciones en conferencias / Present research results at conferences
- [ ] Diseñar intervenciones / Design interventions
- [ ]Implementar intervenciones / Implement interventions
- [ ]Evaluar intervenciones / Evaluate interventions
- [ ]Influir en políticas (por ejemplo a niveles institucional, local, estatal, nacional o internacional) / Influence policy (for example, at the institutional, local, state, national or international levels)
- [ ] Supervisar estudiantes de posgrado / Supervise graduate students
- [ ] Impartir cursos / Teach courses
- [ ]Dirigir organizaciones o instituciones de investigación / Manage research organization or institute
6. ¿Cuáles de los siguientes términos describen el tipo de investigación sobre obesidad que usted realiza en su ocupación actual? (seleccione todos los que correspondan) / Which of the following terms describe the type of obesity research that you are involved with in your current position (check as many as apply):

- [ ] Investigación Clínica (tratamiento e intervención hospitalarias y clínicas de la enfermedad) / Clinical Research (hospital and clinic-based disease treatment and intervention)
- [ ] Investigación Basada en la Población (explora la forma en que nuestro medio social y físico repercute en nuestra salud. El objetivo final es utilizar esta información para mejorar la salud de la población o sub-poblaciones definidas a través de una mejor comprensión de la manera en que los factores sociales, culturales, ambientales, ocupacionales y económicos determinan nuestro estado de salud) / Population-Based Research (explores the way in which our social and physical environment impacts our health. The ultimate goal is to use this information to improve the health of the population, or defined sub-populations, through a better understanding of the ways in which social, cultural, environmental, occupational, and economic factors determine our health status)
- [ ] Ciencia Básica (actividades basadas en el laboratorio investigando el funcionamiento normal y anormal en el sistema molecular, celular y orgánico y a todos los niveles del cuerpo) / Basic Science (laboratory-based activities investigating normal and abnormal functioning at the molecular, cellular, organ system and whole body levels)
- [ ] Servicios de Salud e Investigación de la Política de Salud (investiga la eficiencia y efectividad de los profesionales de la salud y del sistema de cuidado de la salud a través de cambios en la práctica y política) / Health Services & Healthy Policy Research (investigates the efficiency and effectiveness of health professionals and the health care system through changes to practice and policy)
- [ ] No estoy involucrado en ninguna actividad investigación en mi ocupación actual / I am not involved in any research activities in my current position

7. ¿Qué formación estadística tiene usted? (marque todas las que correspondan) / What statistics training do you have (circle all that apply)?

- [ ] CAMBIO Curso corto sobre obesidad / CAMBIO obesity short course
- [ ] Cursos universitarios / University course
- [ ] Otros (especifique) / Other (please specify)
8. ¿Qué software estadístico usted conoce? What statistical software are you familiar with?
   - SPSS
   - Statistica
   - Excel
   - Epi-Info
   - Stata
   - Otros (especificar)/Other (please specify)

9. ¿Qué tan importante es para usted el publicar artículos científicos en revistas indexadas? How important to you is publishing scientific articles in peer-reviewed journals?
   - No es importante/Not important
   - No muy importante/Not very important
   - Neutro/Neutral
   - Algo importante/Somewhat important
   - Muy importante/Very important

10. ¿Cuántos manuscritos científicos ha escrito usted (como autor o coautor)? How many scientific articles have you written (as author or co-author)?
    - 0
    - 1
    - 2
    - 3
    - 4+

11. ¿Cuántos manuscritos científicos ha enviado usted (como autor o coautor) a revistas indexadas? How many scientific articles have you submitted (as author or co-author) to peer-review journals?
    - 0
    - 1
    - 2
    - 3
    - 4+

12. ¿Cuántos manuscritos científicos ha publicado usted (como autor o coautor) en revistas de indexadas? How many scientific articles have you published (as author or co-author) in peer-review journals?
    - 0
    - 1
    - 2
    - 3
    - 4+

13. ¿Cuántas conferencias científicas ha asistido desde el curso corto? How many scientific conferences have you attended since the short course?
    - 0
    - 1
    - 2
    - 3
    - 4+

14. ¿Cuántas conferencias científicas ha usted enviado trabajos de investigación relacionados con la obesidad? How many scientific conferences have you submitted obesity related research?
    - 0
    - 1
    - 2
    - 3
    - 4+

15. ¿En cuántas conferencias científicas ha usted presentado trabajos de investigación relacionados con la obesidad? How many scientific conferences have you presented obesity related research?
    - 0
    - 1
    - 2
    - 3
    - 4+
10. En los últimos 12 meses con qué frecuencia ha: In the last 12 months how often have you:

<table>
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<th>Un par de veces al año/ A few times a year</th>
<th>Mensualmente/ Monthly</th>
<th>Semanalmente/ Weekly</th>
<th>Todos los días/ Daily</th>
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<tr>
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<tr>
<td>Desarrollado un plan de investigación/ Developed a research plan</td>
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<tr>
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<tr>
<td>Llevado a cabo pruebas de aptitud física y medidas antropométricas/ Conducted fitness testing and anthropometric measures</td>
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<td>Llevado a cabo análisis estadísticos/ Conducted statistical analyses</td>
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<td>Llevado a cabo análisis estadísticos con SPSS/ Conducted statistical analyses using SPSS</td>
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</table>
3º Curso Corto Anual sobre Obesidad
3rd Annual Short Course on Obesity

Cuestionario de seguimiento/Follow up questionnaire

17. Por favor escriba las tres principales barreras que existen dentro de su organización para realizar investigaciones y aplicar las habilidades aprendidas durante la 3ra Edición del Curso Corto. Please list 3 major barriers that exist within your organization to conducting research and applying the skills learned during the 3rd Annual Obesity Short Course

1. 

2. 

3. 

18. ¿Recomendaría el Curso Corto sobre Obesidad a un colega? Would you recommend the Obesity Short Course to a colleague?

☐ Sí/Yes ☐ No/No

19. ¿Hay algo más que le gustaría compartir? Is there anything else you would like to share?

Gracias/Thank you

Por favor devolver el cuestionario haciendo clic en el botón 'submit by email' o guardando el formulario completo y enviándolo a marianne.heroux@queensu.ca o lvimey@queensu.ca. Please return questionnaire by clicking on the 'submit by email' button or by saving your completed form and sending it to marianne.heroux@queensu.ca or lvimey@queensu.ca

Submit by Email
August 8, 2009

Dr. Ian Janssen
School of Kinesiology and Health Studies
Queen’s University

GREB Ref #GPHE-065-09
Title: “The Physical Activity Transition in Mexican School Children”

Dear Dr. Janssen:

The General Research Ethics Board (GREB) has given expedited approval to your proposal titled “The Physical Activity Transition in Mexican School Children”. In accordance with the Tri-Council Guidelines (article D.1.6) and Senate Terms of Reference (article G), your project has been approved for one year. At the end of each year, GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB; of any adverse event(s) that occur during this approval period (details available on webpage www.queensu.ca/vpr/greb/adverseforms.html). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that any adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be approved by the GREB. Examples of required approvals are: changes in study procedures or implementations of new aspects into the study procedures that affect human subjects. These changes must be sent to Linda Frid at the Office of Research Services or FRID@queensu.ca prior to implementation. Ms. Frid will seek the approval of the GREB reviewer(s) who originally assessed your application or the GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, PhD
Professor and Chair
General Research Ethics Board

Copies: Dr. Mary Louise Adams, Chair Unit REB
Dr. Juan Lopez-Taylor, Co-Applicant
Dr. Mark Tremblay, Co-Applicant
Dr. Edna Jauregui, Co-Applicant

JS/kr
DICTAMEN DE EVALUACIÓN

En la ciudad de Guadalajara, Jalisco a los 11 once e días del mes de abril de dos mil once, en las instalaciones del Centro Universitario de Ciencias de La Salud de la Universidad de Guadalajara, se reunieron los miembros de las Comisiones de Ética, Investigación y Bioseguridad para dictaminar sobre las evaluaciones emitidas por sus pares del proyecto: “Determinación de la actividad física en escolares de primaria”, del cual es responsable la Dra. Edna Jáuregui Ulloa

Los miembros de las comisiones acordaron que de acuerdo a las evaluaciones emitidas por sus pares, el proyecto presenta los requisitos necesarios en cuanto a su presentación, calidad y contenido asignando el número de registro de este Centro Universitario C. I. 12609

ATENTAMENTE
“PIENSA Y TRABAJA”
Guadalajara, Jalisco, 11 de abril de 2011.

DR. EN C. ADRIÁN DARIÉ-NÁVARRO
COORDINADOR DE INVESTIGACIÓN

ADN/Dinlab

COORDINACIÓN DE INVESTIGACIÓN
Centro Universitario de Ciencias de la Salud
UNIVERSIDAD DE GUADALAJARA
January 21, 2011

Ms. Mariane Heroux
278 Raglan Road
Kingston, ON
K7K 1L9

FILE: CISS-RDC-HEROUX/ 484360

Dear Ms. Heroux:

Thank you for submitting an application to the CISS Access to the RDC Program, a joint initiative between Statistics Canada, the Social Sciences and Humanities Research Council and the Canadian Institutes of Health Research. The RDC Access Granting Committee has now completed the review of your proposal and has approved it. We will now notify Statistics Canada so that it can do the required security check.

We also ask that you contact the RDC analyst and make an appointment to begin the administrative processes to gain access to the centre. Your centre can be found at the following website: http://www.statcan.ca/english/rdc/network.htm.

You have 1 year from the date of approval of your proposal in order to initiate access to the RDC. If you are unable to commence your research projects within the first 12 months after your project has been approved for RDC access, please contact the RDC analyst to make special arrangements.

If you have not contacted your RDC analyst within the first 12 months after your proposal has been approved, you will need to re-apply to SSHRC in order to re-gain access to the RDC. The reviews of the applications were based on SSHRC peer review procedures. Each proposal was evaluated on the basis of four main criteria: scientific merit and viability of the proposed research; the viability of the methods to be applied given the data on which the analysis will be performed; a demonstrated need for access to detailed micro data; and, the expertise and ability of the researchers to carry out the work.

You will find enclosed an evaluation submitted to SSHRC. Should you have further questions, please feel free to contact the officer responsible for the administration of the CISS Access to the RDC Program, Mika Oehling, at (613) 992-4227 or by email at mresearchdata@sshrc.ca.

Sincerely,

Murielle Gagnon
Director
Strategic Programs and Joint Initiatives

cc: Beverley Hunt, Research Data Centres Headquarters Operations

Encl.
January 6, 2011

Ms. Mariane Héroux
Ph.D. Candidate
School of Kinesiology and Health Studies
Queen's University

GREB ref. #: GPHE-079-10
Title: "Assessing the Effectiveness of the 3rd Annual CAMBIO Obesity Short Course"

Dear Ms. Héroux:

The General Research Ethics Board (GREB) has reviewed and approved your request for renewal of ethics clearance for the above-named study. This renewal is valid for one year from February 4, 2011. Prior to the next renewal date you will be sent a reminder memo and form to reapply.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB if applicable, of any adverse event(s) that occur during this one year period (details available at webpage [http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html] - Adverse Event Report Form). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes in study procedures or implementations of new aspects into the study procedures on the Ethics Change Form that can be found at [http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html] - Research Ethics Change Form. These changes must be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or [irvinge@queensu.ca](mailto:irvinge@queensu.ca) prior to implementation. Mrs. Irving will forward your request for protocol changes to the appropriate GREB reviewers and / or the GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

[Signature]

Joan Stevenson, Ph.D.
Professor and Chair
General Research Ethics Board

e.c.: Dr. Ian Janssen, Supervisor
      Dr. Spencer Moore, Chair, Unit REB
      Josie Birchall, Dept. Admin.

JS/gi
DICTAMEN DE EVALUACIÓN

En la ciudad de Guadalajara, Jalisco a los 11 once e días del mes de abril de dos mil once, en las instalaciones del Centro Universitario de Ciencias de la Salud de la Universidad de Guadalajara, se reunieron los miembros de las Comisiones de Ética, Investigación y Bioseguridad para dictaminar sobre las evaluaciones emitidas por sus pares del proyecto: “ASSESSING THE EFFECTIVENESS OF THE 3rd. ANNUAL CAMBIO OBESITY SHORT COURSE”, (EVALUACIÓN DE LA EFEKTIVIDAD DEL 3ER. CURSO CORTO ANUAL DE OBESIDAD CAMBIO”), del cual es responsable la Dra. En C. Edna Jáuregui Ulicca

Los miembros de las comisiones acordaron que de acuerdo a las evaluaciones emitidas por sus pares, el proyecto presenta los requisitos necesarios en cuanto a su presentación, calidad y contenido asignando el número de registro de este Centro Universitario C. I. 12609

ATENTAMENTE
“PIENSA Y TRABAJA”
Guadalajara, Jalisco, 11 de abril de 2011.

DR. EN C. ADRIÁN ANÁLISIS NAVARRO
COORDINADOR DE INVESTIGACIÓN

ADN/mtbf

UNIVERSIDAD DE GUADALAJARA
Appendix K
Sample Multi-Level Regression Output
Example from manuscript 1: Relationship between youth eating behaviours and the presence of 1-2, 3-4, or 5+ food retailers within 1 km from Canadian schools compared to youth attending schools with no food retailers within 1 km.

MODEL 4 Multi-level EATING OUT all retailers CANADA

The GLIMMIX Procedure

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| Number of Observations Read | 15648 |
| Number of Observations Used  | 15532 |
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Convergence criterion (PCONV=1.11022E-8) satisfied.

## Fit Statistics

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## Covariance Parameter Estimates

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### Solutions for Fixed Effects

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### Odds Ratio Estimates

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Effects of continuous variables are assessed as one unit offsets from the mean. The AT suboption modifies the reference value and the UNIT suboption modifies the offsets.

245
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<th>Den DF</th>
<th>F Value</th>
<th>Pr &gt; F</th>
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Appendix L
Sample Pearson Correlation Output
Example from manuscript 2: Correlation between body composition measures in Kenyan boys

The SAS System

The CORR Procedure

gender=1 GROUP=KENYA

3 Variables: BMI WC Tricep_SF

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<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
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Pearson Correlation Coefficients, N = 86
Prob > |r| under H0: Rho=0

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Appendix M
Sample Linear Regression Output
Example from manuscript 2: Relationship between BMI and VO\textsubscript{2}\text{max} in Kenyan boys

The REG Procedure
Model: MODEL1
Dependent Variable: BMI

\texttt{gender=1 \texttt{GROUP=}KENYA}

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<td>Number of Observations with Missing Values</td>
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Analysis of Variance

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<td>426.55066</td>
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Root MSE | 2.01574 | R-Square | 0.2094 |
Dependent Mean | 16.21105 | Adj R-Sq | 0.1903 |
Coef Var | 12.43439 |

Parameter Estimates

| Variable  | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| 95% Confidence Limits |
|-----------|-------|----|--------------------|----------------|---------|------|------------------------|
| VO2MAX    | VO2MAX | 1  | -0.17282           | 0.04043        | -4.27   | <.0001 | -0.25323 - -0.09240 |
| age       | age   | 1  | 0.27362            | 0.22714        | 1.20    | 0.2318 | -0.17816 - 0.72539    |

250
Appendix N
Sample Frequency Output
Example from manuscript 3: Likert scale response frequencies from 1 year follow-up questionnaire

**The SAS System**

**The FREQ Procedure**

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Appendix O
Sample T-Test Output
Example from manuscript 3: Differences in participants perceived writing skills from pre- to post-course

The SAS System

The TTEST Procedure

Variable: writing

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| Method | Variances | DF  | t Value | Pr > |t| |
|--------|-----------|-----|---------|-------|---|
| Pooled | Equal     | 28  | -2.17   | 0.0390|
| Satterthwaite | Unequal | 27.921 | -2.17 | 0.0390|

Equality of Variances

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