Notice of the Final Oral Examination for the Degree of Doctor of Philosophy of

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MHHS (Youngstown State University, 2013)
BA (Kansas Wesleyan University, 2010)

“An investigation of overweight and obesity and potential social and behavioural contributors in an ethnically diverse cohort of British Columbian children and youth”

Social Dimensions of Health Program

August 29, 2017
9:00 A.M.
Clearihue Building
Room B007

Supervisory Committee:
Dr. Patti-Jean Naylor, Department of Exercise Science, Physical and Health Education, University of Victoria (Co-Supervisor)
Dr. Scott Hofer, Department of Psychology, UVic (Co-Supervisor)
Dr. Ryan Rhodes, Department of Psychology, UVic (Member)
Dr. Heather MacDonald, Department of Orthopedics, University of British Columbia (Additional Member)

External Examiner:
Dr. Joyce Obeid, Department of Pediatrics, McMaster University

Chair of Oral Examination:
Dr. Ulrich Mueller, Department of Psychology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

Obesity during childhood and adolescence is a serious public health concern in Canada and globally. Obesity is a complex disease with genetic, environmental, social, and behavioural determinants. However, our understanding of obesity and its development is limited by a reliance on proxy measurements of adiposity such as body mass index (BMI) and cross-sectional study designs that limit our ability to assess temporality. In this dissertation, I present the first set of body fat percent (BF%) accrual and velocity percentile curves for Canadian children and youth, investigate the relationship between BMI- and BF%-based definitions of obesity, and examine the longitudinal influence of sedentary time, moderate-to-vigorous physical activity (MVPA) and caloric intake on the development of BF%.

My analyses are based on the UBC Healthy Bones III Study (HBSIII), a mixed longitudinal study of boys and girls aged 8-12 years at baseline, measured between 1999 and 2012. In HBSIII, adiposity was measured directly as BF% from total body dual energy x-ray absorptiometry (DXA) scans and MVPA and sedentary time were measured objectively using accelerometers.

For the first study in my dissertation, I used generalized additive models for location scale and shape (GAMLSS) to develop sex- and ethnic-specific BF% accrual and velocity percentile curves. I present separate curves for Asian and Caucasian boys and girls aged 9-19 years at the 3rd, 10th, 25th, 50th, 75th, 95th, and 97th centiles. In this descriptive study, I found materially different shaped BF% percentile curves for Asian and Caucasian girls but not for boys.

Second, I examined the relationship between BMI- and BF%-based definitions of obesity for Asian and Caucasian boys and girls aged 9-19 years. I used multivariable regression models, sensitivity and specificity analysis, receiver operating characteristic (ROC) curves, and Youden’s Index to explore this relationship. I found that BMI identified <50% of those classified with obesity based on BF%, and that classification performance of BMI differed significantly by age and sex subgroups for Asian and Caucasians.

In my third analysis, I explored the longitudinal relationship between BF% and sedentary time, MVPA, and caloric intake as boys and girls mature. I fit polynomial multilevel models using MO (years from age at peak height velocity, APHV) as the time variable. Rate of change in BF% across maturity differed between boys and girls and differences in MVPA, sedentary time, and caloric intake between individuals influenced BF% at APHV (MO=0) and rate of change in BF% across maturity.

Together, these studies advance our understanding of how body fat accrues as children and youth mature, and highlight the heterogeneity in predictors of adiposity and adiposity measurement accuracy across age, sex, and ethnic groups.