

Non-linear association between objective physical activity and mental health in a population-based study of Canadian adults

Bernard P, Doré I, Romain AJ, Hains-Monfette G, Kingsbury C, Sabiston CM

Department of Physical Activity Sciences, Université du Québec à Montréal
Research Center, University Institute of Mental Health at Montreal

UQÀM

Département des sciences
de l'activité physique

FACULTÉ DES SCIENCES
Université du Québec à Montréal



Institut universitaire
en santé mentale
de Montréal

CRCHUM
RESEARCH CENTRE



UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY &
PHYSICAL EDUCATION

Disclosure Statement

- I have no affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

Global Mental Health 1



No health without mental health

Martin Prince, Vikram Patel, Shekhar Saxena, Mario Maj, Joanna Maselko, Michael R Phillips, Atif Rahman

About 14% of the global burden of disease has been attributed to neuropsychiatric disorders, mostly due to the [Lancet 2007; 370: 859-77](#)

No health without public
mental health: the case
for action

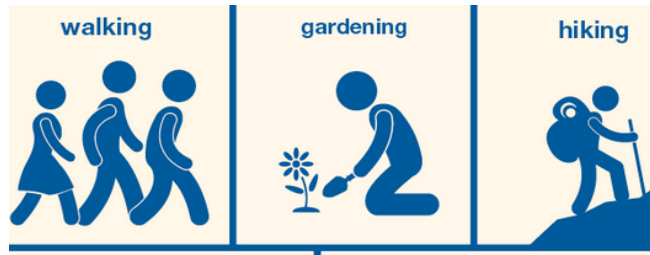
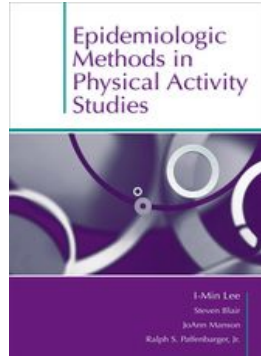


Mental health

“a state of well-being in which every individual realises his/her potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his/her community” WHO 2001

Physical activity

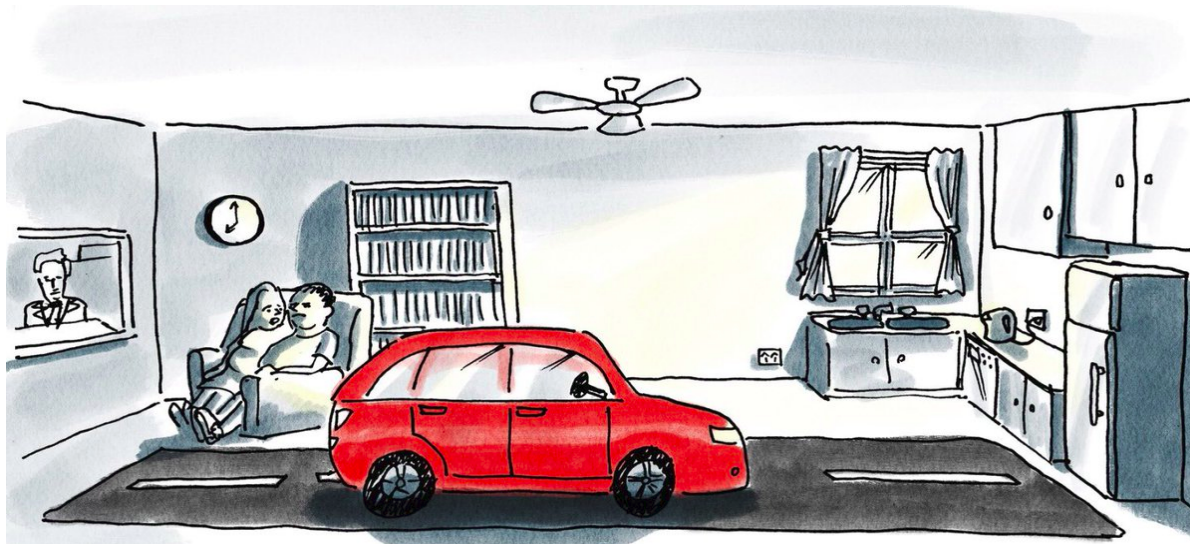
“any bodily movement produced by skeletal muscles that result in increased energy expenditure » (Caspersen, 1985)



INTENSITY

Sedentary behavior

“any waking behavior characterized by an energy expenditure ≤ 1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture.” (Tremblay et al. 2017)



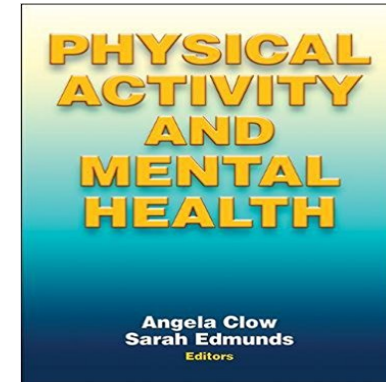
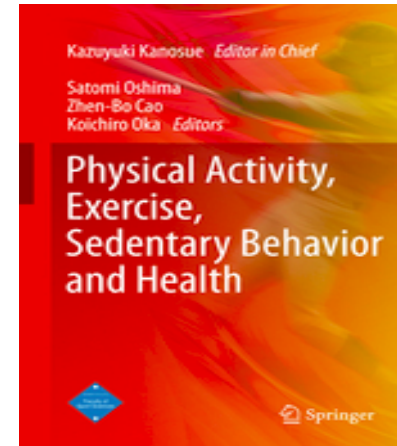
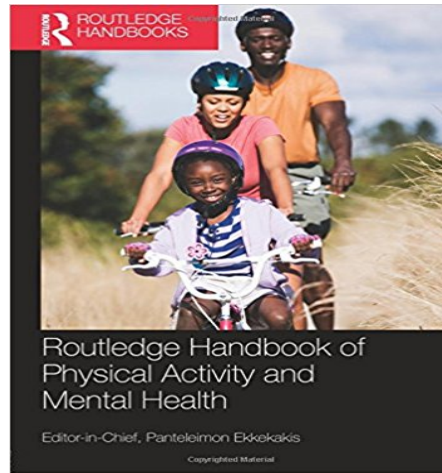
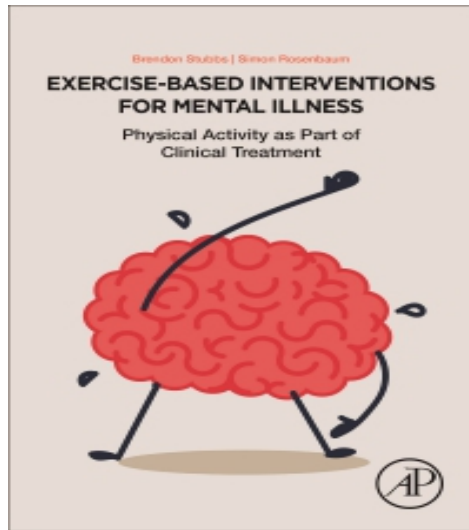
“Honey, can you drive to the fridge and pick up some milk?”

FoYSTER

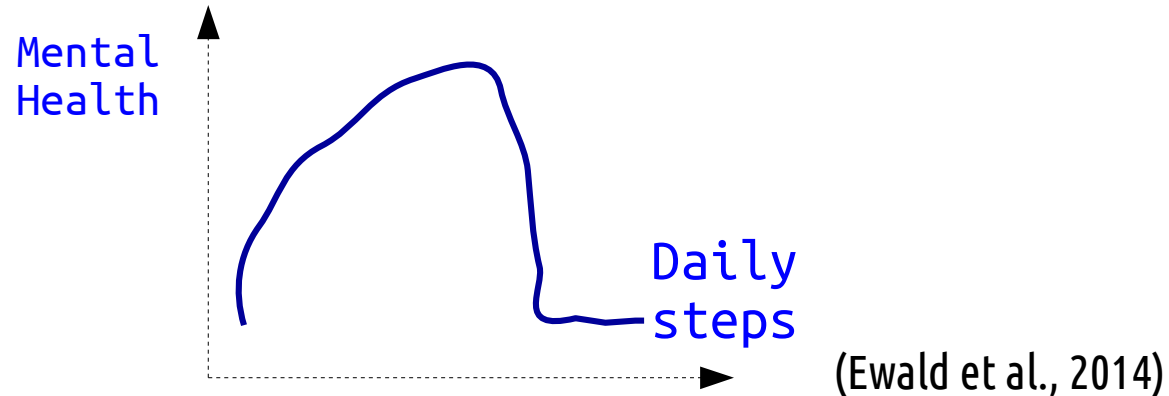
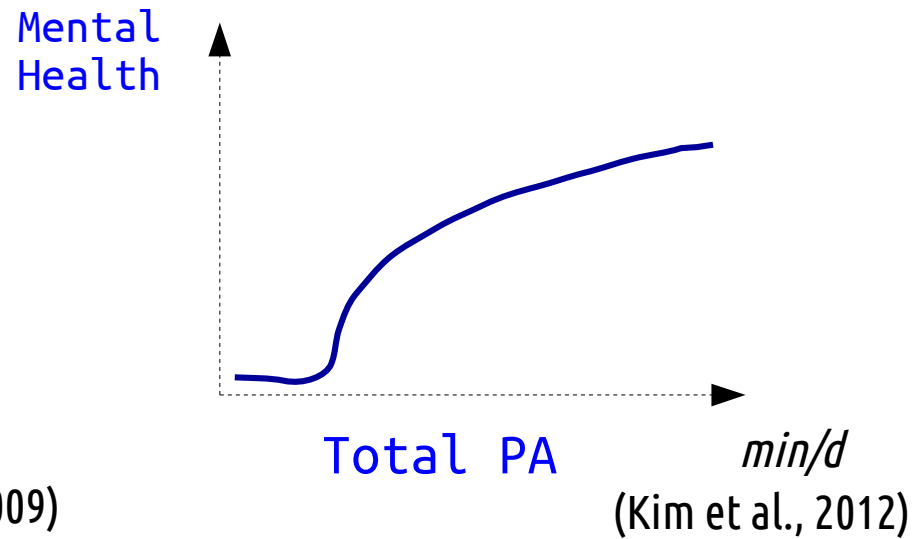
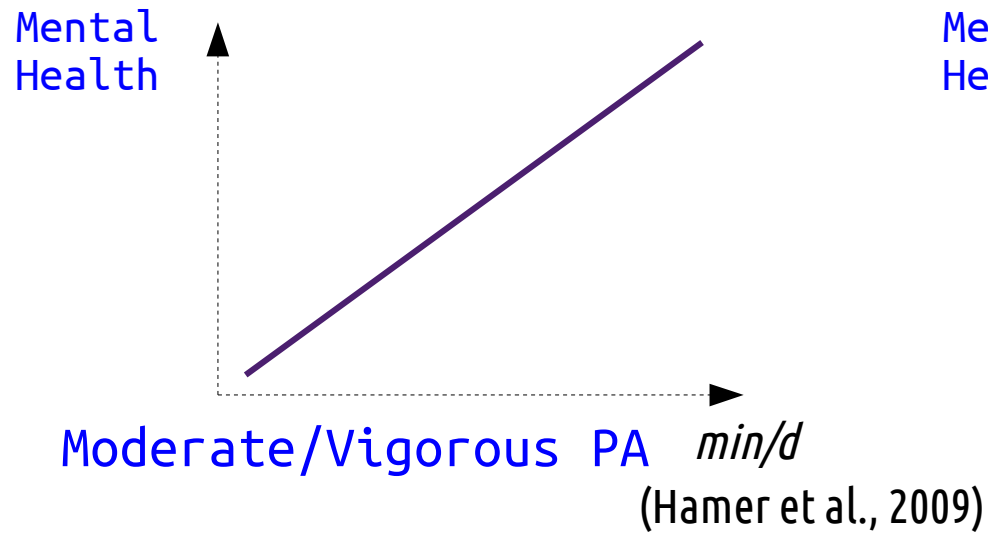


Extensive research has shown that self-reported/objective physical activity is associated with both increased mental health and reduced mental disorders using cross-sectionally and prospectively study designs. (Schuch et al. 2018 ; White et al., 2017)

Five investigations suggest that higher sedentary duration is associated with poorer mental health in adults (Hamer et al. 2010, Puig et al. 2015)



To inform public health interventions, the doses of physical activity providing mental health benefits needs to be identified.



Limitations

Inconsistencies about the shape of the dose–response relationship may be due to **physical activity assessment**



No previous study about **MVPA-LPA combination** and mental health.

Physical activity – mental health association may differ according to sedentary time levels



Objectives

The study aims were to examine :

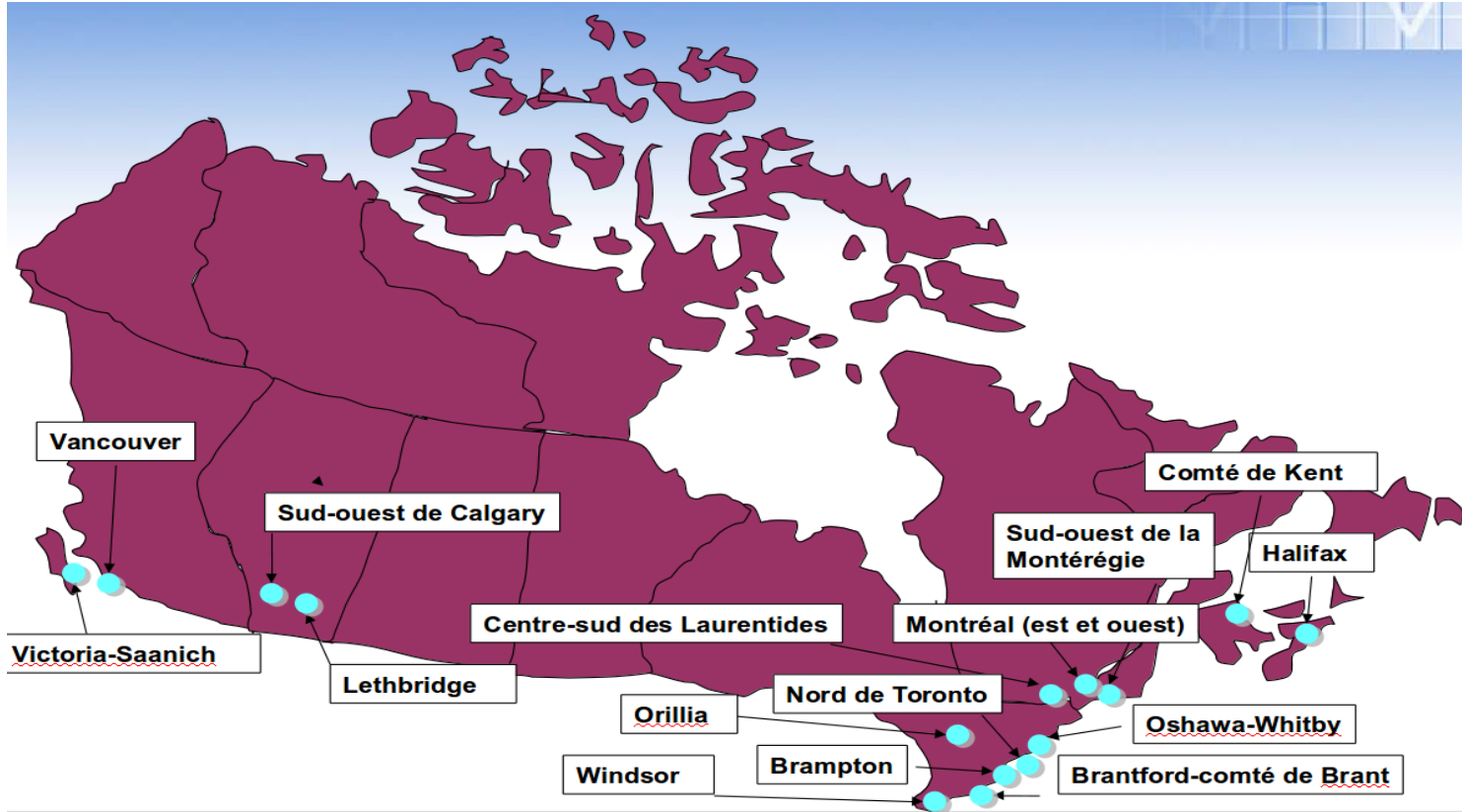
1- the shape of the associations between physical activity across intensity levels (MVPA,LPA), daily steps and mental health

2- whether combinations between physical activity and sedentary time are associated with mental health

3- whether sedentary time modifies the physical activity - mental health associations

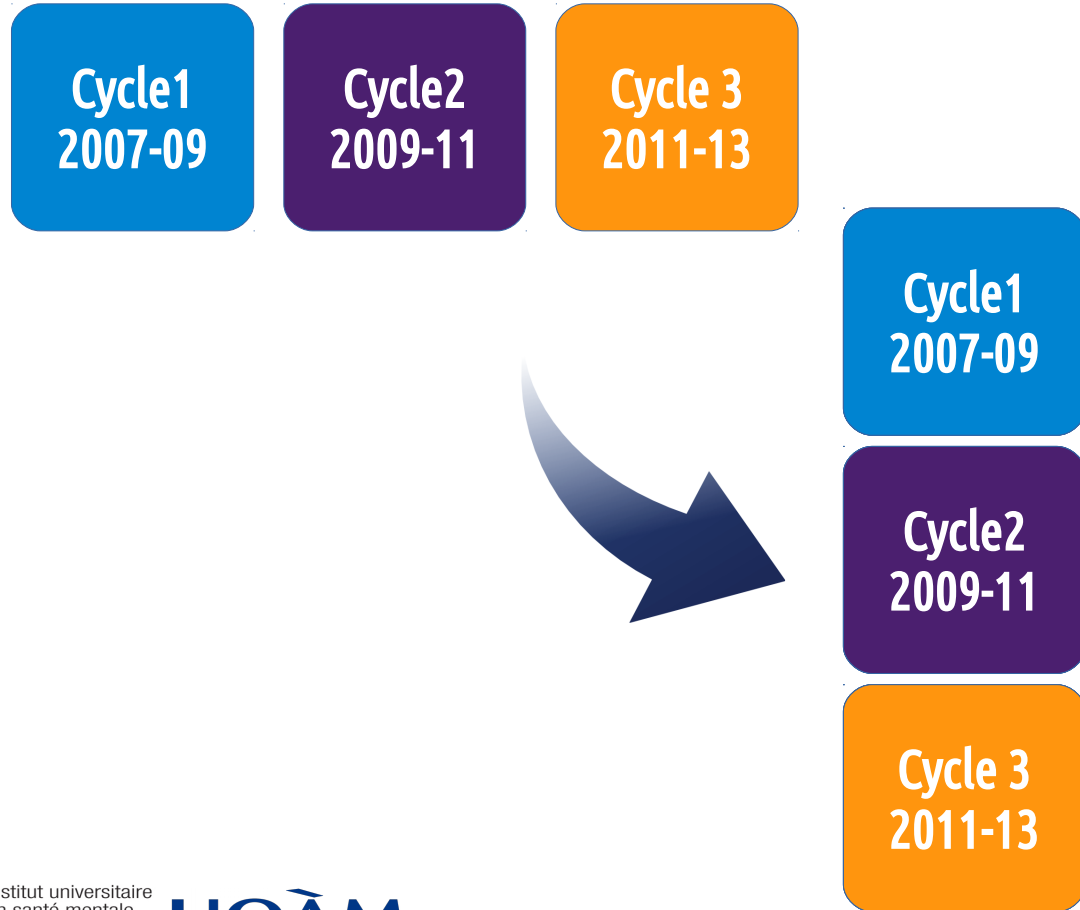
Method

Data from the Canadian Health Measures Survey (CHMS) cycle 1 to 3 (2007 – 2013)



Method

Canadian Health Measures Survey (CHMS)



Method



Participants

Inclusion criteria - aged 18 to 79 years with complete data

Exclusion criteria - pregnant women, participants with functional limitation



Method



Measures of physical activity and sedentary time

Valid accelerometry data = ≥ 4 days (i.e., >10 h of wear time)

Moderate and vigorous PA (≥ 1535 cpm) [min/d] / Light PA (100 to 1534 cpm) [min/d]

Average steps per day

Sedentary behavior (<100 cpm) [min/d]

Self reported mental health

“In general, would you say your mental health is: Excellent (coded as “5”), Very Good, Good, Fair, Poor (coded as “1”)?”.

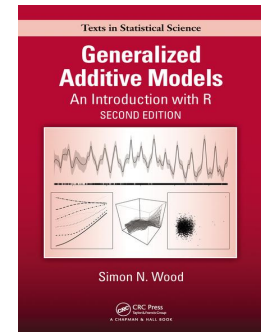
(validity has been supported with various mental health indicators)

Statistical analysis

Generalized additive models (GAMs) (weighted analyses) (*mgcv* package)

Covariates Age, sex, daily smoking, household income, education levels, BMI

Accelerometer wear time, seasons



N = 8150	Total
Age - M (SE)	44.7 (0.4)
Sex (%) [men]	49.7
Current daily smoker (%)	20.5
Marital status (%)	
Living with someone	66.1
Separated, divorced	33.9
Occupation (%) [Yes]	79.2
Self-reported health - M (SE)	2.6 (0.1)
BMI - M (SE)	26 (0.1)
MVPA (min/d) - M (SE)	21 (0.4)
LPA (min/d) - M (SE)	214 (1.5)
Sedentary (min/d) - M (SE)	508 (2.3)
Steps (steps/d) - M (SE)	7817 (69.5)

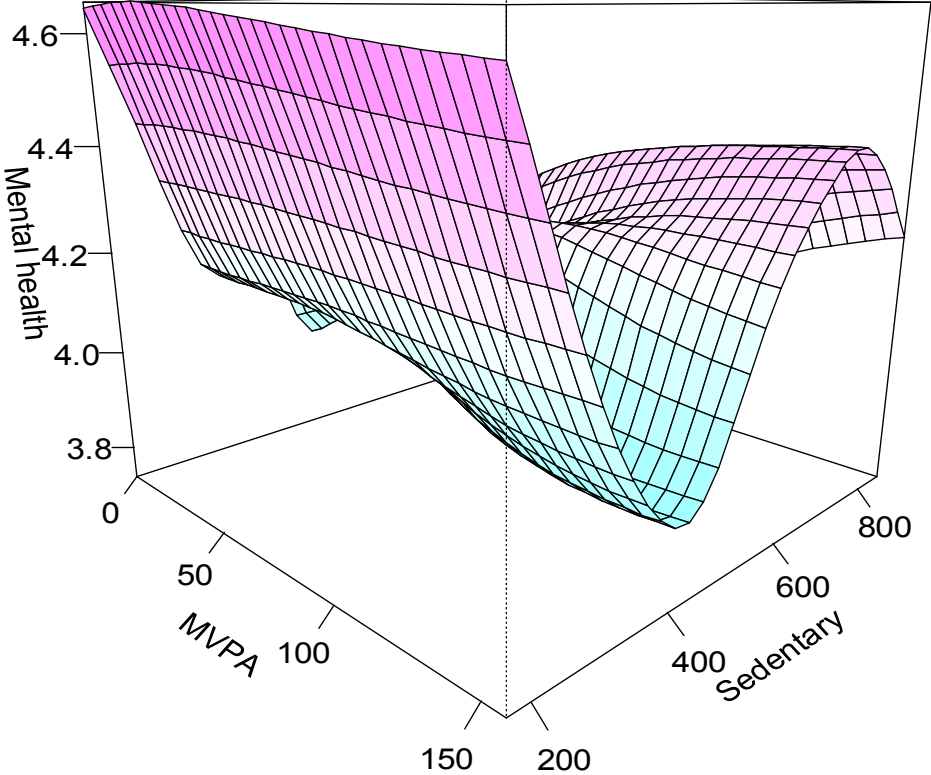
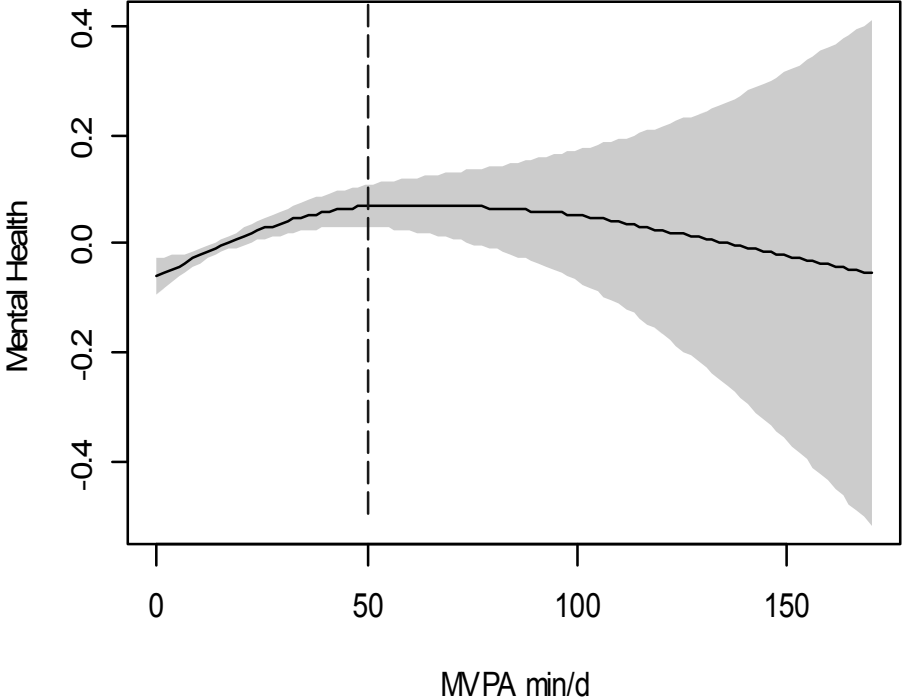
Results



**3h34
8H30**

Results

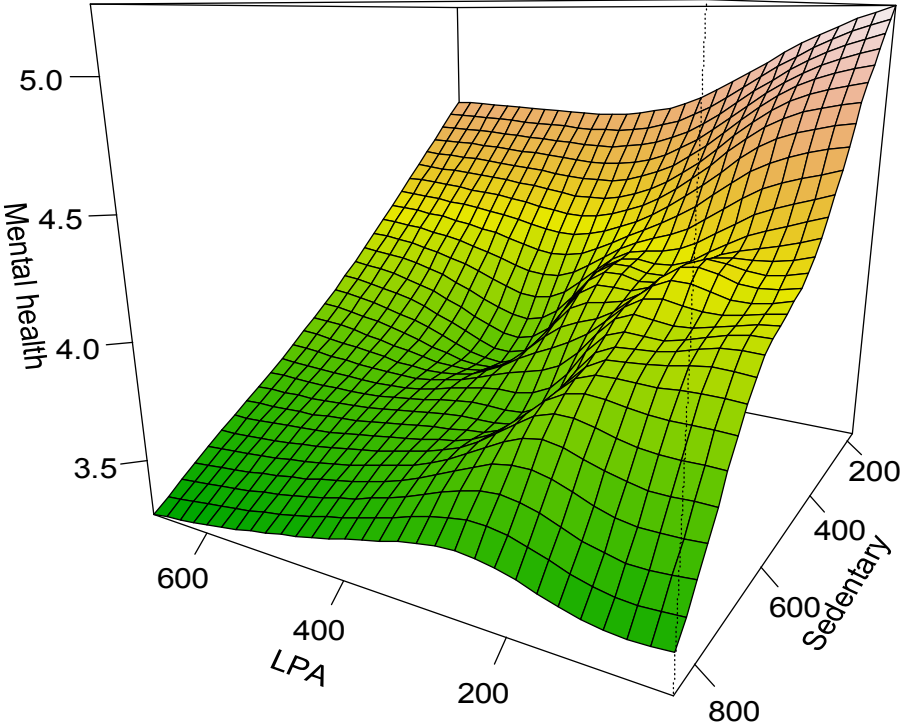
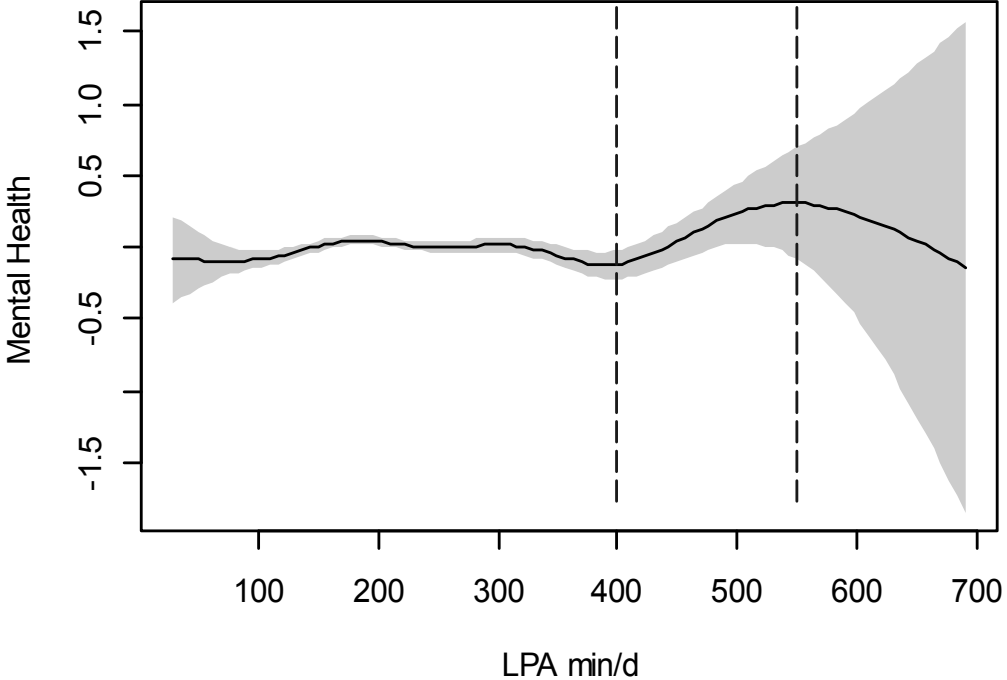
Mental Health and MVPA



All associations $p < .0001$ Adjusted $R^2 = 0.06$
All models were adjusted

Results

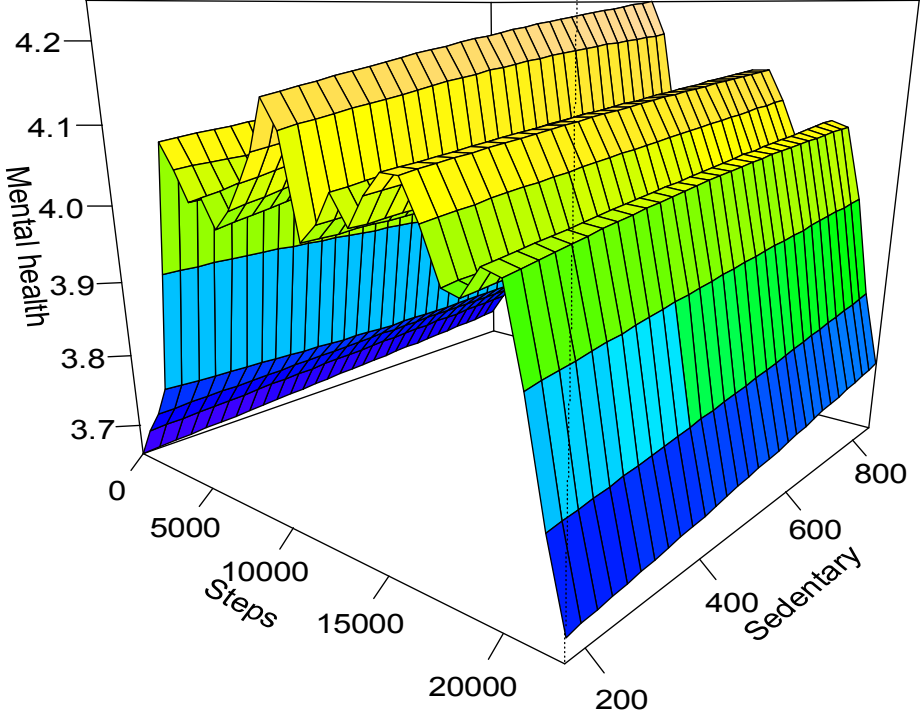
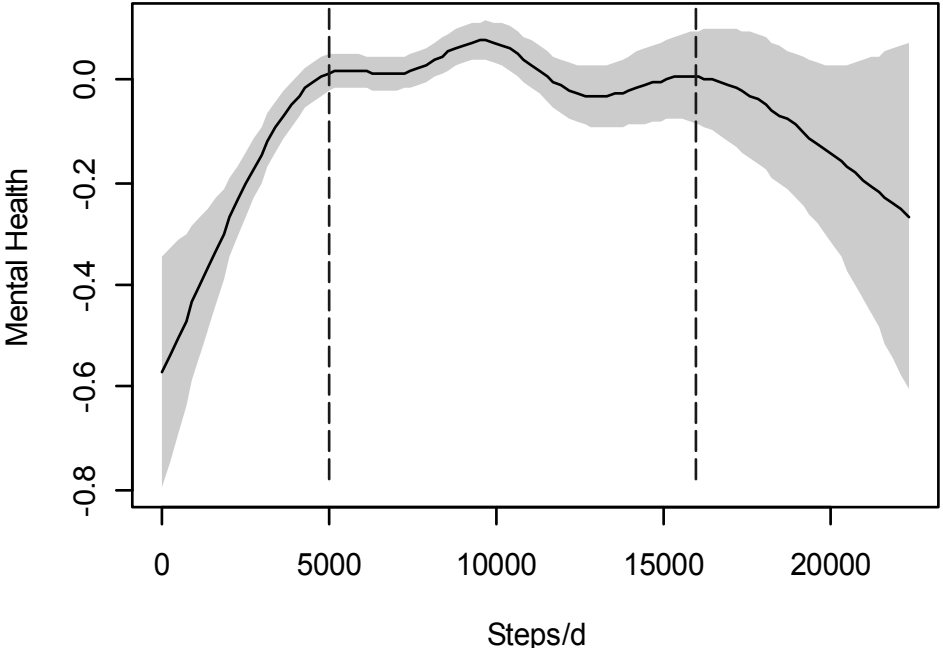
Mental Health and Light PA



All associations $p < .0001$ Adjusted $R^2 = 0.06$
All models were adjusted

Results

Mental Health and Steps



All associations $p < .0001$ Adjusted $R^2 = 0.06$
All models were adjusted

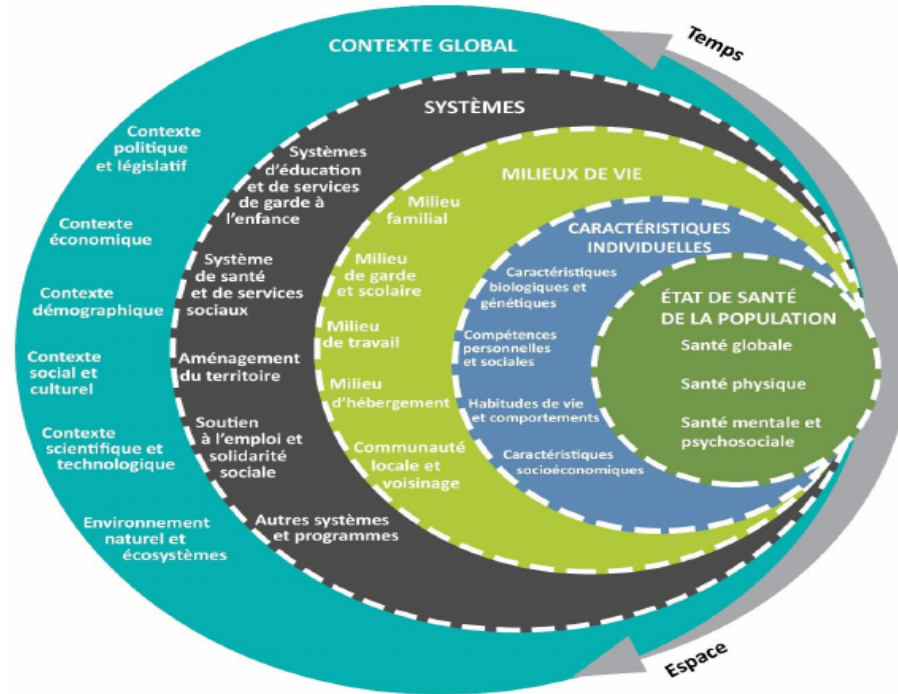
Limitations

Low explained variance

No information were available on the physical activity domains or contexts

Cross-sectional design

Mental health measure



Source :

4 Ministère de la Santé et des Services sociaux du Québec. (2012). *La santé et ses déterminants : mieux comprendre pour mieux agir*. Québec : Ministère de la Santé et des Services sociaux du Québec.

What are the new findings

For better perception of mental health in Canadian adults:

Every daily minutes of MVPA count until 50 minutes

Every daily step counts and more than 5000 is better

More attainable benefits from LPA when combined with MVPA

Move more and sit less for improved mental health



SportRxiv

POWER TO THE PREPRINT

SportRxiv Preprints

<https://dx.doi.org/10.17605/OSF.IO/ZE3QY>

Thank you !

Doré I, Romain AJ, Hains-Monfette G, Kingsbury C, Sabiston CM



Statistics
Canada

Statistique
Canada

**Fonds de recherche
Santé**

Québec



**Réseau de recherche
en santé des populations
du Québec**



Institut universitaire
en santé mentale
de Montréal



@PaquitoBernard

bernard.paquito@uqam.ca

UQAM