

Article details: 2015-0089	
Title	Does where you live matter? Leisure-time physical activity among Canadian youth: a multiple cross-sectional study
Authors	Charles Nadeau MSc, Laurence Letarte BA, Ramona Fratu MSc, E.O.D. Waygood PhD, Alexandre Lebel PhD
Reviewer 1	Dr. Dena Schanzer
Institution	Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control, Ottawa, Ont.
General comments and author response in	<p>General comments:</p> <p>1. Comment: In this study the authors identify factors associated with differences in Leisure-Time Physical Activity (LPA) among Canadian youth from the CCHS from 2003 to 2011. They found statistically significant differences for sex, season, BMI, age, ethnicity and province with some gender specific differences for parents' education and MIZ (urban vs rural). A trend analysis was mentioned in the manuscript but results were not shown other than as an OR estimate.</p> <p>Response: To comply with this comment, all mentions of a trend analysis was removed from the manuscript. Despite not being a focus of the manuscript, it was formerly introduced in the interpretation section to bring the focus on the sex difference as a mean to reinforce the idea to keep a closer consideration for sex specific needs when planning public health interventions.</p> <p>2. Comment: While my main concern with this manuscript is lack of interpretation of the results from a non-standard logistic regression model (or models) and other omitted details, the manuscript is lengthy and could be written in a much more concise style.</p> <p>Response: To comply with this comment, the results section was restructured as indicated previously (see para. 4 of the Editor's comments of Annex 1, p. 3/22). The interpretation section was also modified and now accounts for a greater proportion of the manuscript.</p> <p>3. Comment: The authors used a form of logistic regression using a MCMC method that is referenced. However there seems to be a model hierarchy in that the estimated ORs are the same for models 2, 3 and 4. Hence, I strongly suspect that the interpretation of the ORs is different from a standard logistic regression. The easiest way to explain the difference might be to include the results from a standard logistic regression for the full model, and compare these with the results for the final MCMC model, and then discuss any differences in interpretation.</p> <p>Response: See response to "general comments #3-4-5" included after comment #5.</p> <p>4. Comment: I'd suggest presenting only one MCMC model. Moving the discussion of the model fit to an appendix/supplementary file might be simpler than explaining the significance of the variance/MOR information which is likely too complex for the most of the target audience (and the word count for the main text is limited). From the results shown in figure 1, it seems that province should be included in the logistic regression (if it was, the tables should be revised to clarify the precise model). There are too many neighbourhoods to include ORs for each. In which case, the p-value associated with the level of statistical significance for the neighbourhood effect should be sufficient. The abstract mentions health region (HR) and neighbourhood, though it is not clear exactly how these class (dummy) variables were included in the model (or the associated degrees of freedom). Including the model equation in an appendix/supplementary file may be the most expedient option to provide the necessary detail for those who want it and still respect the word limit for CMAJ-open.</p> <p>Response: See response to "general comments #3-4-5" after comment #5.</p> <p>5. Comment: Household education level is likely strongly correlated with both the social and material deprivation indexes. If the inclusion of any one of these three variables results in statistically significant ORs, then this should be discussed. LPA is likely associated with all three (in a univariate relationship), though the study data cannot differential between the individual contribution of these three effects. I suspect the results of a standard logistic regression would be quite different from what is presented. (i.e., household education would no longer be statistically significant with social and material deprivation included.) If appropriate, this should be noted in the interpretation. Please note that this association can be assessed with a standard logistic regression model, so this question needs to be addressed.</p> <p>Response to general comments #3-4-5  Thanks to Reviewer 1, we recognise the multilevel analysis methodology may be less common than standard logistic regression in public health studies and would need additional explanations. Comments 3, 4 and 5 are associated with the structure of a</p>

multilevel model and we made important changes in the methods section in order to provided clarifications that will benefit the CMAJ audience on both the results of our analyses and the advantages of using a multilevel analysis.

We first added a few lines at the beginning of the method section to clearly inform the reader of the nature of the modelling strategy in order to facilitate the justification of all sections of the methodology, including the hierarchical structure of the data: "The use of multilevel analysis is recommended to consider and analyse the heterogeneity of grouped and non-independent observations. Estimating the impact of contextual features on LPA was thus performed by applying a binomial multilevel logistic model using a random intercept on the three geographic levels: neighborhoods, health region, and provinces." At the 1st level (individuals), variation was constraint to be 1 as in standard logistic regressions (assuming that all remaining variance is simply a function of the binomial distribution), and between individual heterogeneity may not be computed (residuals or error term).

Although the reviewer is right when suggesting the comparison multilevel models to a standard logistic regression may be interesting from a methodological perspective, it goes beyond the scope of the study and we must orient the reader to an excellent methodological paper in which such a comparison is shown and discussed in great details (Subramanian, 2009, cited). This article present detailed analysis which further support our methodological choice.

In the "Statistical analysis" section, we added: "The modelling strategy was based on four incremental models which allow one to interpret the impact of additional variables in the fixed part of the models, on the estimations in the random part of the models (between area variances)". We further changed Tables 2 and Table 3 to clearly identify the fixed and random parts of the models. Interpretation of the fixed part is no different than a standard logistic regression model. Using a random intercept for each geographical level would give the same estimations that using a dummy variable for each neighborhoods and regions, but leaves many more degrees of freedom, thus improving the model. In effect, using a multilevel model prevent using nine dummy variables for the provinces, 111 for health regions and 6003 dummy variables for the health regions.

Since the Deviance Information Criteria (DIC) is a product of the MCMC procedure, the justification for using the MCMC was rephrased and is now clearly linked to the DIC: "The procedure of Markov chain Monte Carlo (MCMC) (24) was performed for each model and the Deviance Information Criteria (DIC) was used to compare each model's goodness of fit (25)"

As Reviewer 1 suggested, a supplementary file (S1) describing the multilevel equation was submitted with the revision.

Specific comments:

1. Comment: Word choice should be reviewed (body fatness, bone wealth, six positions postal code, suburban).

Response:

- "Body fatness" was changed to "adiposity" (in compliance with Janssen, 2007, cited)
- Bone "wealth" has been changed to bone "health"
- Any mention to postal code were removed from the manuscript
- "Suburban" was changed to "urban outskirts"

2. Comment: The terms environmental variables and contextual features are introduced in the introduction. A concrete example is needed.

Response: Two examples, referring to the built environment and the socioeconomic context, were incorporated in the introduction (p.2). More specifically these example are referring to these arguments found in the cited articles:

"From a multilevel perspective it is assumed that individual health is affected not only by individual characteristics but also by the collective context in which individuals interact. In fact, several studies using multilevel analyses have shown a correlation between different contextual area characteristics (e.g., social participation, income inequality, area socioeconomic deprivation, etc.) and individual health" (Merlo, 2011, cited).

"Ecological models take a broad view of health behaviour causation, with the social and physical environment included as contributors to physical inactivity, particularly those outside the health sector, such as urban planning, transportation systems, and parks and trails" (Bauman, 2012, cited).

3. Comment: There are other terms where word choice may be confusing (model fit vs

statistical significance of effects).

Response: "Model fit" was changed to "model's goodness of fit". Every use of the word "significant" was reviewed in order to mean "statistically significant".

4. Comment: Methods: The sub sections on data source and study population should be combined. Did you actually sample the eligible respondents from the CCHS? More likely you extracted eligible respondents.

Response: To comply with this comment, the sub sections on data source, study population and sample size were combined. As Reviewer 1 correctly observed, every eligible respondent (i.e. those for which information on the outcome and all others variables was available) was directly extracted from the CCHS database, rather than a sampling of eligible respondents. No statistical differences were observed between selected and discarded observations regarding the correlation to the outcome.

5. Comment: Despite the somewhat lengthy description of geographic structure, I don't have a good idea of what a 'neighbourhood' is. I'd also suggest condensing this section. From Stat Can's web site, the salient information is that you are using a neighbourhood definition based on CTs and CSDs developed by (13). CTs are geographic units created by Statistics Canada to partition cities and towns (CMA/CA) into regions with a population of between 2,500 and 8,000 persons that are as homogeneous as possible in terms of socioeconomic characteristics, such as similar economic status and social living conditions. Is postal code even relevant to the explanation?

Response: To comply with this comment and avoid possible confusion, all mention of the postal code was removed from the revision. The postal code was used to prevent geographic misclassification due to changes in health regions boundaries during the study period. Details were incorporated in order to provide a clearer description of the hierarchical structure of the data (see section Geographical structure of the revision, p. 4).

6. Comment: MIZ labels seem rather unusual. Stat Can uses 5 MIZ categories, while the authors use 8. According to Stat Can documentation, the typical sub-urban communities are included in the CMA and hence in the first MIZ category.

Response: The 8 categories referred to the variable GEODSAT of the CCHS (micro-data file) where metropolitan areas and census agglomerations include the first three categories labeled as MIZ. MIZ labels were modified to avoid possible confusion between the structure of the variable in the CCHS and the label given by Statistics Canada (p.7):

- Urban: inside census metropolitan areas and census agglomerations (GEODSAT=1, 2 or 3; not part of MIZ)
- Urban outskirts: Statistic Canada MIZ Categories (GEODSAT= 4, 5 or 6; MIZ category= 1, 2 or 3) ; and
- Rural: Statistic Canada MIZ Categories (GEODSAT= 7 or 8; MIZ category= 4 or 5).

7. Comment: LPA: Is your definition of acceptable LPA based on a guideline? If so, this sub section could be condensed considerable with simply referencing many of the details. An example of the definition threshold (30 Kcal/Kg/week) would be helpful.

Response: The outcome is based on the recommended daily level for physical activity based on the New Canadian Physical Activity Guidelines for Youth (aged 12–17 years) (Tremblay, 2011, cited). Details on these guidelines have been indicated previously (see para. 2 of the Editor's comments of Annex 1, p. 2/22). Nevertheless, we believed the explanation of the method used to extrapolate intensity thresholds is necessary to overcome the absence of a measure of intensity reported by the CCHS. We strongly believe that the method we have developed in this study is original because it combines two complementary referenced methods which together help to make the best use of the database for studying LPA.

To further comply with this comment, an example to illustrate the achievement of minimal value (30 kcal/kg/week) was incorporated in the revision:

"To illustrate the achievement of minimal value (30 kcal/kg/week), the classic example is walking briskly (4.3 METs) for 1 hour a day, 7 days a week (Ainsworth, 2011 (cited))."

8. Comment: Table 1 should be moved to the results section.

Response: Incorporated in the revision

9. Comment: Did you develop the deprivation index, or are you using the results from ref 23? If you estimated the PC factor weights, these should be reported, along with the

exact questions. If this information is already available (in the CCHS), this should be clearly stated in the opening sentence of the paragraph and the paragraph condensed. From tables 2 and 3, these deprivation indices don't look like quintiles. Please comment on this.

Response: The deprivation indices were developed and documented by Pampalon (2003, cited). The factor scores characterise an area, and are independent of the CCHS sampling plan. We confirm that deprivation indices indicated are quintiles constructed for all geographical units in each province, making relative deprivation quintiles for each provinces. We also identify the census variables used in the PCA allowing the reader to better understand how the index was constructed and facilitating the interpretation (p.6).

10. Comment: What software was used for the statistical analysis?

Response: MlwiN 2.28, a software specialized to run complex multilevel models. The following precision was added in the revision (see section Statistical analysis of the revision, p. 8):

"To investigate the influence of the contextual variables, a series of multilevel logistic regression analyses were conducted using Bayesian estimation procedure as implemented via Markov chain Monte Carlo (MCMC) methods in MlwiN 2.28 software."

11. Comment: It would be helpful to report the OR for boys vs girls, as the significant contribution of gender alone is otherwise obscured.

Response: All analyses were stratified by sex to control for the differences in physical maturation between girls and boys during the puberty (12-17 years). See also Editor's comments 1 of Annex 1, p. 2/22.

12. Comment: Why were provincial-level residuals used to calculate ORs for each province rather than including province in the model? Can this be explained to CMAJ readers?

Response: See Response to the general comments #3-4-5 of this annex, p. 6/22).

13. Comment: The trend analysis should be included (methods, results and discussion sections) with an estimate of the average annual percentage change (AAPC) and 95%CI.

Response: Trends analysis was not the focus of our study. Since we merged many CCHS cycles, the period when individuals were surveyed was an important potential confounder which needed to be included in the models. To comply with this comment, all mention of a trend analysis was removed from the revised manuscript while OR for cycles are still presented in Tables to show the difference observed between cycles (see further details at para 1 of the General comments of reviewer 1 of this annex, p. 5/22).

14. Comment: Results: The results section should start with comments on Table 1. For consistency, the differences in rates should be translated into an OR before introducing the sex specific analyses.

Response: While Table 1 are simply descriptive statistics and may help to understand the studied population in the method section, we agree it may be part of the results. Table 1 and the following paragraph were moved to the beginning of the results section:

"Table 1 presents summary statistics of the achievement of an energy equivalent of recommended level of physical activity among girls and boys. In the sample studied, 36.9% of the girls achieved the standard, and 51.9% of the boys."

15. Comment: Model 4 "showed the opposite trend" to what?

Response: This observation we made does not help to reach the objective of the study and is not essential. It was removed from the revised manuscript.

16. Comment: All discussions of differences should include the point estimate (OR) and 95% CI and clearly identify the reference group and control variables (other independent variables included in the model).

Response: We revised the way results were reported and incorporated OR and CI when appropriate.

17. Comment: What is the standard logistic regression term equivalent to 'global between-province variation'? Is this term equivalent to the p-value for a province effect? In this case, simply reporting the p-value for the province effect may be

preferable for a CMAJ audience. Depending on how the reference province was chosen, the median of the estimated ORs (MOR) would vary substantially? I don't know what make of the reported MORs. Were province, HR and neighbourhood included in the null model and all other models? If so, the model description (methods section) is should be revised to include this information and tables 2 and 3 revised so that the model structure is clearer.

Response: We hope the explanation offered in the general comments #3-4-5 of this annex (p. 6/22) will help to answer this comment. We may add that the "global between-area variation" is provided by the random part of the model where the variances and associated standard deviation are reported, thus showing the statistical significance (there are no equivalent in the standard logistic regression).

Comment: In what way did Model 4 not fit well? Given that the estimated ORs are identical for models 2, 3 and 4, it is not clear why model 4 was not interpreted? It is evident that the deprivation indices were not statistically significant. Models 2 and 3 seem to add nothing.

Response: Variation of the DIC the 4th model was 2 when introducing neighbourhood deprivation quintiles. As the DIC statistic accounts for the number of parameters in any model, a larger DIC suggests a worse performance. Since the neighbourhood deprivation level is often considered as a possible confounder of many health outcome in social epidemiology, we believed important to show they were not statistically significant in this case. We developed this point in the Interpretation section of the revision (p. 15).

18. Comment: Education is included both a separate independent variable and as part of the material deprivation. Interpretation and discussion of this relationship is required. What is the impact of removing household education from model 4?

Response: Education as independent variable describes the highest education level achieved by one individual (individual level) of the household whereas education as part of material deprivation refers to an average level detected in a specific neighborhood (area-based level). The potential correlation between both was tested and was not significant. This variable was kept in the final model in order to allow the comparison of the random part of each model.

19. Comment: Do we really need the results of models 2 and 3? The need to report these model results is not clear, though I do notice some differences in the results for the province, HR and neighbourhood effects, though the actual p-values are not reported.

Response: This is a very important comment. It shows the objectives of the study were not clear and needed to be rephrased. The main objectives of this study are now: (a) to describe the geographic variations of LPA among young Canadians and (b) to explore how contextual area characteristics explain these variations. To reach these objectives, we needed to allow the comparison of the random part of each model and to quantify the contribution of each group of variables in the modification of the distribution of the area-levels variances (random parts). Controlling for the same confounders in all models is thus essential. We also address this point more specifically in the discussion (p.3)

20. Comment: Readers usually have only a secondary interest in model fit, and most will skip over any discussion of model fit. Could you not restate 'introduction of model 2 and 3 led to a better model fit' as 'For boys the following factors significantly reduced the odds of meeting the recommended LPA level ...'.

Response: To comply with this comment, all unnecessary mention on model's goodness of fit has been removed from the revision to allow a better focus on the main associations with LPA.

21. Comment: The statement 'the time variable showed ... (OR=0.98)' should be revised. What is the time variable? Is the OR estimate per year or per cycle? I'd recommend including a figure/plot for proportion active by cycle.

Response: To comply with this comment and to avoid possible confusion, "time variable" was change to "cycle variable" as OR were estimated by cycle. Although a figure/plot illustrating proportion of active youth by cycle would be of interest, we believe that it is beyond the scope of this study, and some statements referring to "cycle variable" were removed.

22. Comment: In what context was 'no significant variation between provinces' observed, given the differences highlighted in figure 1?

Response: Many changes were done though the manuscript to better explain the

	<p>random part of the models, such as: "The between-area variance structure (random part) was analysed using the median OR. Variation in the median OR was considered significant when 1.96 times its S.E. remained lower than the between area variance" (p.10)</p> <p>Based on this statement, the results of the between-provinces variance showed in Tables 2 (Var=0.028, S.E.=0.019) and 3 (Var=0.016 S.E.=0.013) were not considered significant globally (this was expected since variation between ten observations, or provinces, is limited). However, in Figure 1, we further used the province-level residuals and associated standard error (S.E.) to plot and rank the OR and the 95% confidence interval (CI) for each province individually. This procedure allowed a visualization of provinces that were found to have a significantly different chance of achieving recommended LPA level from the national mean that was initially capture by the random part of the model. Put differently, Figure 1 shows provinces with extreme values. We added details on the province-level residuals analysis at the end of the Methods section of the revised manuscript (p.9).</p> <p>23. Comment: Interpretation: What 'contextual features of the living environment were associated with [being active]?' According to tables 2 and 3, it seems that only household education and not deprivation were associated with being active. Please be more specific.</p> <p>Response: The Results section (Girls and Boys) has been restructured. The ORs with their 95% CI were specified in order to facilitate the reading of these associations. In Table 2, the season and the MIZ showed significant differences in OR of being active. In table 3, the cycle and the season showed significant differences in OR of being active. These significant OR were identified with an asterisk in both tables.</p> <p>24. Comment: The actual trend in the proportion active (average annual percentage change) should be reported, as this is easy enough to calculate, but only with access to the data. The time period associated with 2% reduction in OR is not stated. A 2% difference in the OR will translate into a much small % change. The % difference should also be reported for a trend analysis.</p> <p>Response: As stated previously (General comments of reviewer 1 of this annex, p. 5/22), trends analysis was not the scope of the study. In order to focus of the objectives, most reference to it were removed from the manuscript.</p> <p>25. Comment: How did the 'introduction of area-based indices of material and social deprivation led to poorer fits of the model'? This is contrary to what would be expected for a logistic regression. Do you mean instead that these indicators were not statistically significant? These two indices are likely associated with being active in your data. The word 'association' usually refers to a univariate relationship. You may want to qualify this statement, making it conditional on the model and controlling for household education level. More likely you cannot distinguish the effects of household education level and these two indices on the proportion active. I'd suggest confirming this with a standard logistic regression model that does not include household education level. The usual way of distinguishing between models is to list the variables controlled (after controlling for ..., the OR for physically active was ... for materially privileged versus materially deprived individuals).</p> <p>Response: We confirm that we simply mentioned the introduction of the deprivation index led to a poorer fit of the model. The objectives of the analyses focus more importantly on the modification of the random part of the model than finding significant associations in the fixed part. We hope the explanation provided in "Response to the general comments #3-4-5 of this annex, p. 6/22" clarified this point.</p>
<b>Reviewer 2</b>	Bertrand Nolin PhD
Institution	Kinésiologue, Bureau d'information et d'études en santé des populations, Institut national de santé publique du Québec
General comments and author response	<p>1. Title and abstract</p> <p>Comment 1: No comments</p> <p>2. Introduction</p> <p>Comment 2: Page 3, line 13: (both cardiorespiratory fitness and muscular strength), Replaced by: (both cardiorespiratory and muscular fitness).</p> <p>Response: These precisions were not essential. We removed them to lower word count.</p> <p>Comment 3: Page 3, lines 29-31 .....such as achieving an optimal bone wealth and a good fitness (e.g. aerobic capacity,</p>

muscular strength) (6) Replaced by:  
.....such as achieving an optimal bone health (6).

Response: Incorporated in the revision

Comment: Reference 6 (Replaced by):  
Comité scientifique de Kino-Québec (CSKQ, 2008). L'activité physique et la santé osseuse : Avis du comité. Québec, ministère de l'Éducation, Loisir et du Sport, gouvernement du Québec, 39 p.

Response: Reference replaced in the revision

### 3. Methods

#### 3.1 Data source

Comment 1: Page 4, line 48  
The CCHS is repeated biennially (?) and contains self-reported information...

##### Details

CCHS 2003 and 2005: data were collected over a 12 months period.  
CCHS 2007-2008 and after: data were collected over a 24 months period. (Continuous data collection)

Response: Details incorporated in the revision (p.6)

#### 3.2 Study population and sample size

Comment 1: Page 5, line 8  
..... data on racial origin..

Replaced by:  
..... data on ethnic origin..

Response: Incorporated in the revision (now p.6)

#### 3.3 Geographical structure

Comment 1: No comments

#### 3.4 Outcome

Comment 1: Page 6, lines 43-47  
.....to achieving (or not) the recommended daily level for physical activity performed during leisure-time.

Replaced by:  
.....to achieving (or not) the recommended level for physical activity.

Response: Incorporated in the revision (now p.5)

##### Comment 2: Notes:

a) The recommended level for physical activity can be reached by domestic, occupational, transportation, leisure-time or diverse combinations of this activities. (Also with voluntary activities)

b) Daily level: this information is not available in CCHS 2003 to 2012.

Response: This limitation of the survey has been identified in the limitations section of the revision (p.16).

Comment 3: Page 6, line 48  
To produce health benefits, it was suggested that young people....

Replaced by:  
The guidelines recommend that young people.....

Note: Health benefits are present, even with weekly volumes lower.

Response: Incorporated in the revision

Comment 4: Page 6, line 57  
.....estimated by the average energy expenditure.....

Replaced by:  
.....estimated by an index of energy expenditure.....

Response: Incorporated in the revision

Comment 5: Page 7, line 6  
....duration and intensity of 17 types of self-reported LPA.

Replaced by:  
....duration and intensity of 18 types (more three in the choice of the respondent) of self-reported LPA (16a).

Reference 16a (addition)  
Nolin, B. (2004). Activité physique de loisir : codification et critères d'analyse. Système québécois de surveillance des déterminants de la santé. Québec, Direction recherche, formation et développement, Institut national de santé publique du Québec, 10 p., [www.inspq.qc.ca](http://www.inspq.qc.ca) (See : Nos productions/publications)

Notes:  
a) 17 types of LPA, before 2003, and 18 types of LPA, 2003 and after.  
b) 18 types of LPA, in a list of 21. Three activities (Gardening or yard work, Bowling and Fishing) are excluded from the calculation of the index of energy expenditure. For details, see reference 16a, table 3.

Response: Incorporated in the revision

Comment 6: Page 7, lines 18-20  
.....(METs) attributed to the various activities (17).

Replaced by:  
.....(METs) attributed to the various activities (16a).

Note: Replace the reference 17 by 16a (Nolin, 2004: see above). All the information is in this document.

Response: Incorporated in the revision

Comment 7: Page 7, lines 27-29  
...index of energy expenditure of at least 30 kcal/ kg/ week (18) with a frequency of 5 days/week or more.

Replaced by:  
...index of energy expenditure of at least 30 kcal/ kg/ week (18) with a frequency of 5 times/week or more.

Note: In CCHS 2003-2012, the information is only available in times/week and not in days/week. (Number of times in the last three months / 13 weeks)

Response: Incorporated in the revision (p.5)

Comment 8: Page 7, lines 27-29 (continuation)  
It would be preferable, also, to add an example for a better understanding.

...index of energy expenditure of at least 30 kcal / kg / week (18) with a frequency of 5 times/week or more. To illustrate the achievement of minimal value (30 kcal/kg/week), the classical example is brisk walking (4.3 METs), 1 hour/day (or 1 h/time), 7 days/week (or 7 times/week):  $4.3 \times 1 \times 7 = 30.1$  kcal/kg/week.

Notes:  
a) Brisk walking (4.3 METs): Ainsworth et al, 2011.  
b) Equivalence allowing the calculation above: 1 MET  $\approx$  1 kcal/kg/hour (Ainsworth et al, 2011). So, 4.3 METs  $\approx$  4.3 kcal/kg/hour.

Reference (addition):  
Ainsworth, B. E., W. L. Haskell, S. D. Herrmann, N. Meckes, D. R. Bassett JR, C. Tudor-Locke, J. L. Greer, J. Veizina, M. C. Whitt-Glover and A. S. Leon (2011). 2011 Compendium of Physical Activities: A Second Update of Codes and MET Values. *Med. Sci. Sports Exerc.*, 43 (8): 1575-1581.

Response: Incorporated in the revision (p.5)

Comment 9: Page 7, lines 32-35

....the achievement of recommended daily level of LPA among girls and boys.

Replaced by:

.... the achievement of an energy equivalent of recommended level of physical activity among girls and boys.

Notes:

a) The information on daily level is not available in CCHS 2003-2012.

b) The recommendations concern physical activity (globally) and not specifically LPA.

Response: Incorporated in the revision (p.5)

Comment 10: Outcome: Further information

There is, for a good interpretation of the results, one another important information about the CCHS: No instruction, in the questionnaire, asks to exclude the activities practised in the compulsory physical educational class. For the group of 12 to 17 years, it can have a lot of influence on results obtained.

Example: To the question: «Have you done Basketball during the last three months» and that this activity is practised during his (her) physical educational class; the probability to have a positive answer (yes) is high. (It applies, also, to other activities in the questionnaire: list and activities in the choice)

Thus, we have to keep in mind that the results can include LPA and activities practised during physical educational class (activities practised during free times and compulsory activities).

Response: Incorporated and moved to the limitations section (p.16)

### 3.5 Individual variables

Comment 1: Page 7, line 56

..... racial origin..

Replaced by:

..... ethnic origin..

Response: Incorporated in the revision (p.6)

### 3.6 Cycle and season

Comment 1: Page 8, lines 18-21

The CCHS produces a biennial microdata file combining two years of data collected from January to December.

Replaced by:

The CCHS produces a biennial microdata file combining one year (2003 and 2005) and two years (2007 and after) of data collected from January to December.

Response: Incorporated in the revision (p.6)

### 3.7 Methods (Others sections)

Comment 1: No comments

## 4. Results

Comment 1: No comments

## 5. Interpretation

Comment 1: Page 13, line 56

..... racial origin..

Replaced by:

..... ethnic origin..

Response: Incorporated in the revision

Comment 2: Page 14, line 8

....to accumulate an average of at least 60 minutes....

Replaced by:

..... to accumulate an energy equivalent of at least 60 minutes....

Response: Incorporated in the revision (p.13)

Comment 3: Page 15, lines 11-14

Regardless of sex, winter was observed as a major barrier to performing LPA.

Addition

Winter lower than summer) It, even with the potential addition of the physical education class in the results (during winter).

Explanations: See above, in methods section (Outcome: Further information)

Response: Incorporated and moved to the limitations section of the revision (p.16)

Comment 4: Page 16, lines 4-15

Material and social deprivation:

- a) In the Québec survey: LPA only. (Excluding physical education class)
- b) In CCHS: LPA and, potentially, including physical education class.

This difference, between both surveys, can have an important effect on the association, or not, with this index.

Response: To remain consistent with the study objectives, no in-depth interpretation of model 4 (introducing material and social deprivation) was incorporated in the revision. We are suggesting that more context specific investigations are required to explore the causes of these contrasting results observed at the province level (p.16).

Comment 5: Page 16, lines 49-46

Differences between Quebec and Ontario?

Differences due to LPA? Program in physical education? The two? Other?

Response: This is a good observation, however it is not clear in the CCHS questionnaire how physical education program activities may be incorporated in the participant declaration. We considered this limitation in our interpretation: "no difference is made in the survey whether the activity was performed as part of a compulsory physical education class, even though that might have a significant influence on the studied age group" (p.17).

Comment 6: Page 17, line 16

Limitations: The potential inclusion of physical education class, in the results, is an important limitation for the interpretation of the results.

Example: Association, or not, with material and social deprivation (see above)

Response: Incorporated in the revision (p.16)

Comment 7: Page 17, lines 37-40

For that reason, the level of precision on duration and intensity of physical activity..... In CCHS, the questions are on «Type, frequency and duration». No question on «intensity». (With the Compendium of physical activities, an average value (in METs) is attributed to each activity)

Response: Thanks for noting this point. "Intensity" was replaced by "frequency" (p.16)