Re: "Linking missing data to study outcomes using multiple imputations"

Dear Editor:

In our analysis of data from the Canadian Community Health Survey examining body mass index (BMI) among immigrant and non-immigrant Canadian youth, multiple imputation (MI) was used to address missing data.¹ We believe that our approach to MI did not bias the study's main findings, which showed a statistically significant association between immigrant status and lower levels of BMI and decreased odds of being overweight/obese.¹

We took a number of steps in creating our sample for analyses. First, we restricted it to those participants who had complete data on height, weight, and immigrant status. This reduced the sample by 5.8% (63,509/67,406). Second, in this restricted sample we examined the distribution of missing responses across the remaining study variables. There were no missing data for age, sex, CCHS cycle, province, and Health Region. The variables with the highest proportion of missing data were fruit/vegetable consumption (16.5%) and source of household income (10.3%). A logistic regression analysis was conducted to examine predictors of non-response. Respondents with missing data were more likely to be younger (odds ratio (OR) = 0.93, 95% confidence interval (CI) = 0.88–0.99), to not speak English or French (OR = 1.46, 95% CI 1.25–1.66) and to be overweight/obese (OR = 1.13, 95% CI = 1.09–1.17), and were less likely to be immigrant (OR = 0.74, 95% CI = 0.66–0.81). We agree that the missing at random (MAR) assumption is not testable.² To address this limitation, we followed Allison's recommendations² in our MI model and

included multiple variables that were correlated with the variable being imputed to reduce and/or eliminate the residual dependence of missingness on the variable itself.² In our MI model, the following variables were used as predictors: BMI, immigrant status, province, health region, cycle, age and sex.

In our study, we observed a positive association between energy expenditure and zBMI.¹ Ibrahim draws attention to this finding and puts forth the idea that our approach to MI may be contributing to this unexpected finding. In addition to our response above, we would like to add that we also completed a subanalysis (not reported) restricting the sample to respondents with complete data. Our results and inferences of energy expenditure and zBMI remain the same within this restricted sample, with an effect size of similar magnitude ($\beta = 0.003$, SE = 0.001). We feel confident that our MI procedures were appropriate and the findings arising from our study are valid.

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