Supplementary material: Formulas of multiple regression models

A study on prospective associations between adiposity and 7-year changes in movement behaviors among older women based on compositional data analysis

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To allow interpretation of each movement behavior (i.e. sedentary behavior [SB], light physical activity [LPA] and moderate-to-vigorous physical activity [MVPA]) relative to other movement behaviors, the following 3 multivariate multiple regression models were considered:

$\left(z_1^{(MB_\triangle)}, z_2^{(MB_\triangle)}\right) = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 Adiposity_1 + \boldsymbol{\beta}_2 Adiposity_\triangle + \boldsymbol{\beta}_3 z_1^{(MB_1)} + \boldsymbol{\beta}_4 z_2^{(MB_1)} + \boldsymbol{\beta}_5 Adiposity_1 + \cdots + \boldsymbol{\varepsilon}$, where

$\left(z_1^{(MB_*)}, z_2^{(MB_*)}\right) = \left(\sqrt{\frac{2}{3}} \ln \frac{SB_*}{\sqrt{LPA_* \times MVPA_*}}, \frac{1}{\sqrt{2}} \ln \frac{LPA_*}{MVPA_*}\right)$ in the first model,

$\left(z_1^{(MB_*)}, z_2^{(MB_*)}\right) = \left(\sqrt{\frac{2}{3}} \ln \frac{LPA_*}{\sqrt{SB_* \times MVPA_*}}, \frac{1}{\sqrt{2}} \ln \frac{SB_*}{MVPA_*}\right)$ in the second model and

$\left(z_1^{(MB_*)}, z_2^{(MB_*)}\right) = \left(\sqrt{\frac{2}{3}} \ln \frac{MVPA_*}{\sqrt{SB_* \times LPA_*}}, \frac{1}{\sqrt{2}} \ln \frac{SB_*}{LPA_*}\right)$ in the third model, with

symbol * stands for either $\triangle$ (i.e. the difference between follow-up and baseline) or 1 (i.e. baseline) and $(SB_\triangle, LPA_\triangle, MVPA_\triangle) = \left(\frac{SB_2}{SB_1}, \frac{LPA_2}{LPA_1}, \frac{MVPA_2}{MVPA_1}\right)$, where 2 stands for follow-up.

That is, as a response we set the difference in the movement composition expressed in pivot coordinates (specific isometric log-ratio coordinates) and as an explanatory variable we set the baseline adiposity indicator, the difference in adiposity indicator, baseline movement composition expressed in pivot coordinates plus the additional covariates. A positive beta suggests that an increase in the respective explanatory variable is associated with an expected increase in the time spent in the movement behavior that is in the numerator of the pivot coordinate at the expense of the movement behavior(s) that is(are) in the denominator of the pivot coordinate. A negative beta suggests that an increase in the respective explanatory variable is associated with an expected decrease in the time spent in the movement behavior that is in the numerator of the pivot coordinate in favor of the movement behavior(s) that is(are) in the denominator of the pivot coordinate.