Sociodemographic correlates of physical activity grades in the **Global Matrix 3.0**

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Introduction

Physical inactivity, which is often defined as engaging in insufficient levels of physical activity and not meeting the current physical activity recommendations, has been identified as the fourth leading risk factor of premature mortality in adulthood. Some estimates suggest that 80% of youth (11- to 17-year-olds) worldwide do not accumulate the recommended 60 minutes of daily moderate- to vigorous-intensity physical activity. These high levels of global physical inactivity represent a complex problem for which a single, generic solution may be misguided. Multiple factors from a diverse sample of countries may help inform the development of effective physical activity strategies. Therefore, we examined sociodemographic correlates of physical activity grades from 49 countries across six continents that participated in the Global Matrix 3.0.

Methods

The Global Matrix of physical activity report card grades was launched in 2014 to better understand the global variation in child and youth physical activity. Fifteen countries participated in the Global Matrix 1.0 (Toronto, Canada; 2014); 38 countries in the Global Matrix 2.0 (Bangkok, Thailand; 2016) and 49 countries in the recently held Global Matrix 3.0 (Adelaide, Australia; 2018). Participating countries (figure 1) followed a standardized process to assign letter grades (A, B, C, D, F or Incomplete) to 10 indicators of physical activity, based on the proportion of 5- to 17-year-olds meeting a given benchmark(s). Indicators included: overall physical activity, organized sport and physical activity, active play, active transportation, sedentary behavior, physical fitness, family and peers, school, community and environment, and government. The number of A, B or C grades (i.e. good grades; 229/490) and the number of Incomplete grades (121/490) were tallied for each country. (figure 2). Country-level sociodemographic data were accessed from several online databases and included: distance to the equator, gross national income per capita (GNI), the Gender Inequality Index (GII), the Gini coefficient, life expectancy at birth, public health expenditures (%GNI) and population density. Two generalized linear models were fit with the number of A, B or C grades (model 1) and the number of Incomplete grades (model 2) regressed on multiple sociodemographic predictors. Incidence rate ratios (IRR) were computed from model estimates. An alpha level of 0.20 was set for identifying correlates. Two generalized linear models were fit with the number of A, B or C grades (model 1) and the number of Incomplete grades (model 2) regressed on multiple sociodemographic predictors. Incident rate ratios (IRR) were computed from model estimates. An alpha level of 0.20 was set for identifying correlates.

Results

In model 1 (Cox & Snell's R^2 = 0.37; table 1), four correlates were identified: GNI per capita (IRR = 0.99, CI = 0.99–1.00, p < 0.01), GII (IRR = 0.99, CI = 0.97–1.00, p = 0.10), Gini (IRR = 0.98, CI = 0.97–1.00, p = 0.03) and public health expenditures (IRR = 1.18, CI = 1.07–1.31, p < 0.01). In model 2 (Cox & Snell's R^2 = 0.36; table 2), four correlates were also identified: GII (IRR = 1.03, CI = 1.00–1.07, p = 0.08), Gini (IRR = 1.03, CI = 1.00–1.06, p = 0.09), life expectancy (IRR = 1.05, CI = 1.00–1.11, p = 0.08) and population density (IRR = 1.00, CI = 1.00–1.00, p = 0.01).

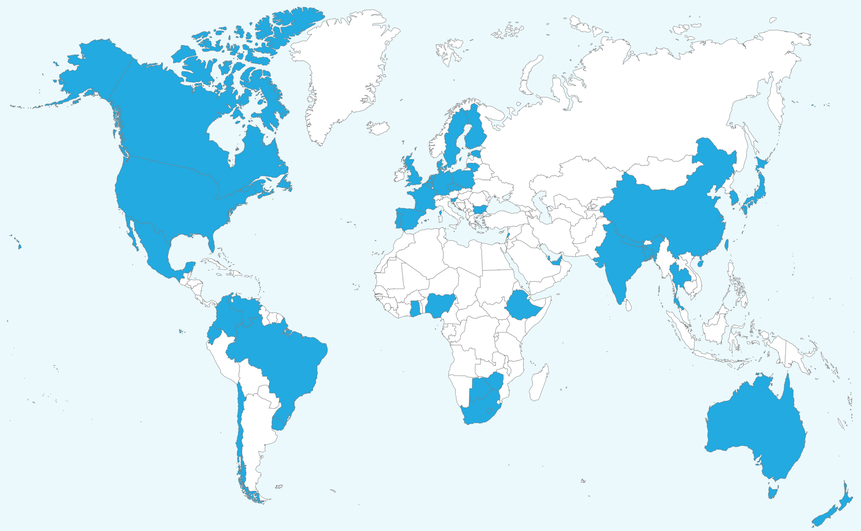

Figure 1. World map of participating countries (shaded) in the Global Matrix 3.0.

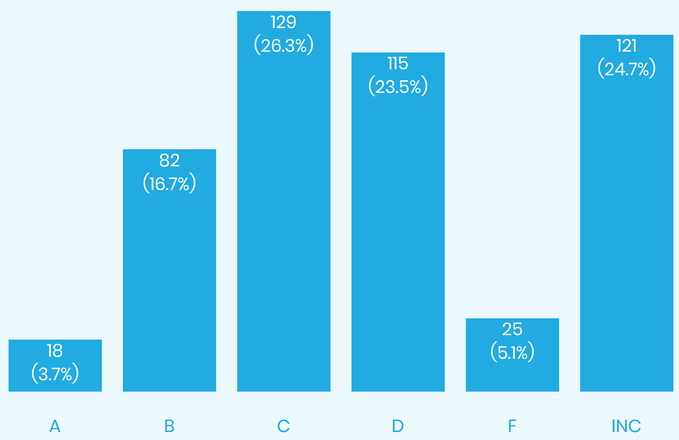

Figure 2. Tally of letter grades from the 49 participating countries in the Global Matrix 3.0 (INC: incomplete).

Table 1. Number of A, B or C grades regressed on sociodemographic predictors using a Poisson model (model 1).

Predictor	IRR	Confidence interval	P
Intercept	7.69	0.35 - 168.64	0.20
Distance to equator (km)	1.00	0.99 - 1.00	0.85
Gross national income per capita	**0.99**	**0.99 - 1.00**	**<0.01**
Gender Inequality Index	**0.99**	**0.97 - 1.00**	**0.10**
Gini	**0.98**	**0.97 - 1.00**	**0.03**
Life expectancy (at birth)	1.00	0.97 - 1.03	0.91
Public health expenditures (% GNI)	**1.18**	**1.07 - 1.31**	**<0.01**
Population density (people/km^2)	1.00	0.99 - 1.00	0.40

IRR: incidence rate ratio; GNI: gross national income

Note: statistically significant correlates with estimates that include 1.00 is a function of rounding to two decimal places.

Table 2. Number of incomplete grades regressed on sociodemographic predictors using a Poisson model (model 2).

Predictor	IRR	Confidence interval	P
Intercept	0.01	0.00 - 0.88	0.05
Distance to equator (km)	1.00	0.99 - 1.00	0.94
Gross national income per capita	1.00	0.99 - 1.00	0.40
Gender Inequality Index	**1.03**	**1.00 - 1.07**	**0.08**
Gini	**1.03**	**1.00 - 1.06**	**0.09**
Life expectancy (at birth)	**1.05**	**1.00 - 1.11**	**0.08**
Public health expenditures (% GNI)	1.11	0.92 - 1.35	0.27
Population density (people/km^2)	**1.00**	**1.00 - 1.00**	**0.01**

IRR: incidence rate ratio; GNI: gross national income

Note: statistically significant correlates with estimates that include 1.00 is a function of rounding to two decimal places.

Conclusion

The correlates identified in these models have small effect sizes in relation to the number of A, B or C physical activity grades and the number of incomplete grades. However, these correlates may be helpful when developing strategies to improve physical activity grades within specific countries. Analyses of raw data from international datasets are needed.

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