

Neighborhood greenspaces contribute to the maintenance of leisure-time physical activity over an eight-year follow-up from ELSA-Brasil

Luciene Almeida

Oswaldo Cruz Foundation (Fiocruz), Brazil

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Introduction

Greenspaces

Amount of vegetation of public spaces, such as parks, gardens, and street trees



Physical Activity (PA)

Cohort Studies

Maintenance, but not initiation of PA

Introduction

Some aspects of the environment associated with greenspaces may influence the physical activity practice

Streetlights



Paved sidewalks



Perceived safety



↑ NSES

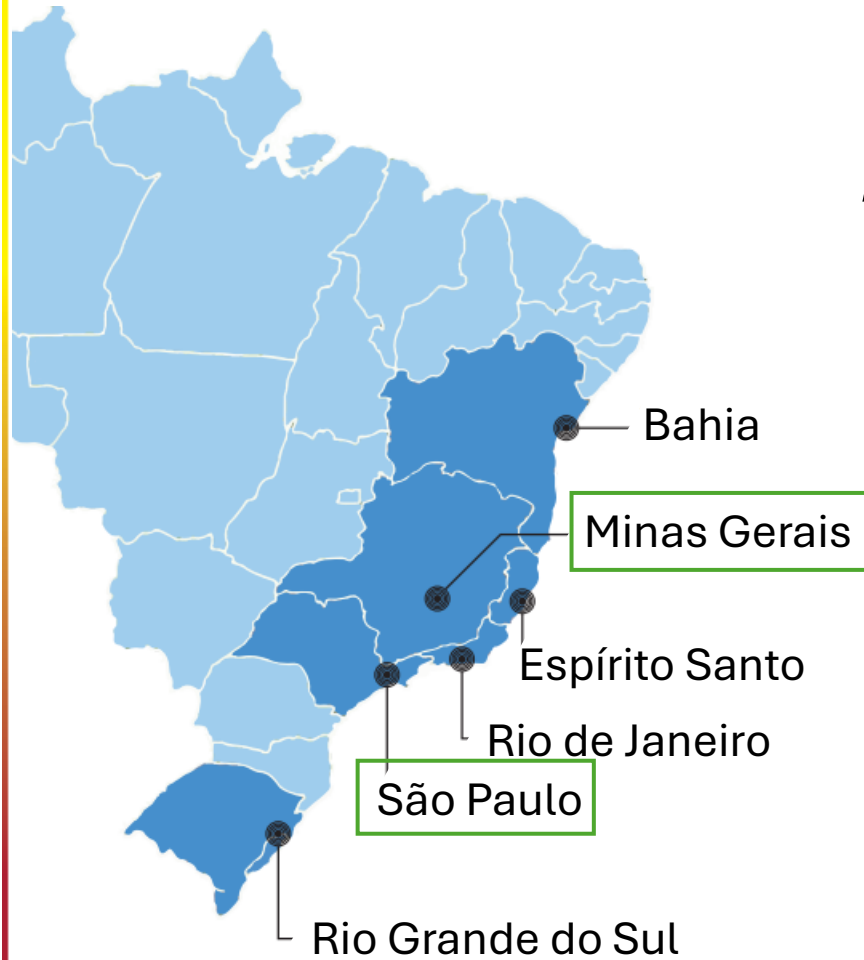
Boing et al., 2021; Schule, Lapham et al., 2016; Moran et al., 2021; O'brien et al., 2019; Schule et al., 2015; Suglia et al., 2016; Zhang et al., 2019; Weimann et al., 2017

Objective

We investigated if greenspaces were associated with leisure-time physical activity and if this association was independent of perceived safety, percentage of sidewalks and streetlights, and neighborhood socioeconomic status

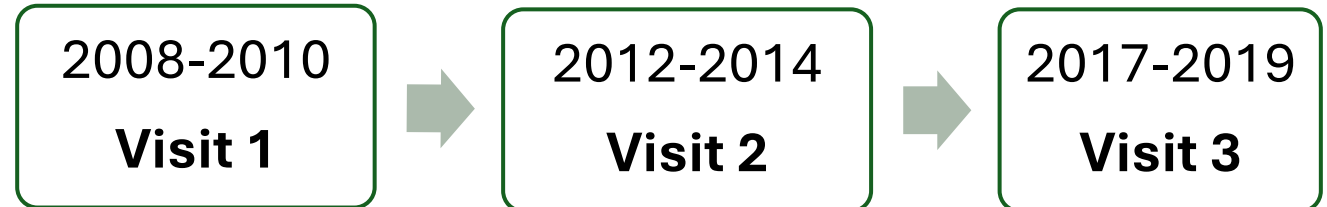
Methods

Population and study design



Brazilian Longitudinal Study of Adult Health
ELSA-Brasil is a cohort study of 15,105 civil servants, aged 35–74, from 6 research centers located in different regions of Brazil

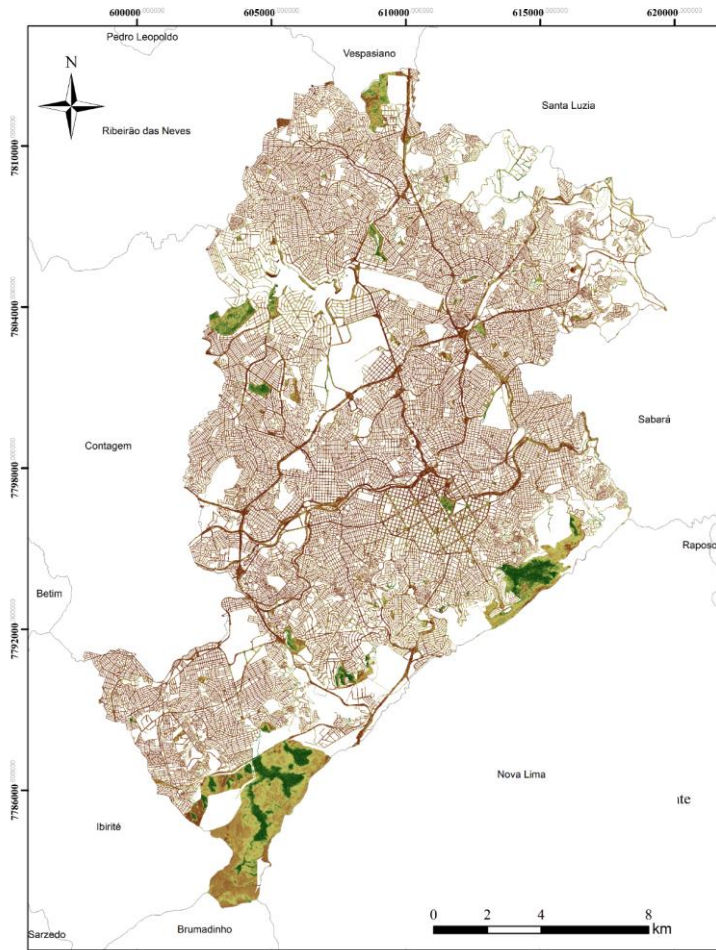
Longitudinal analysis: 4,800 participants



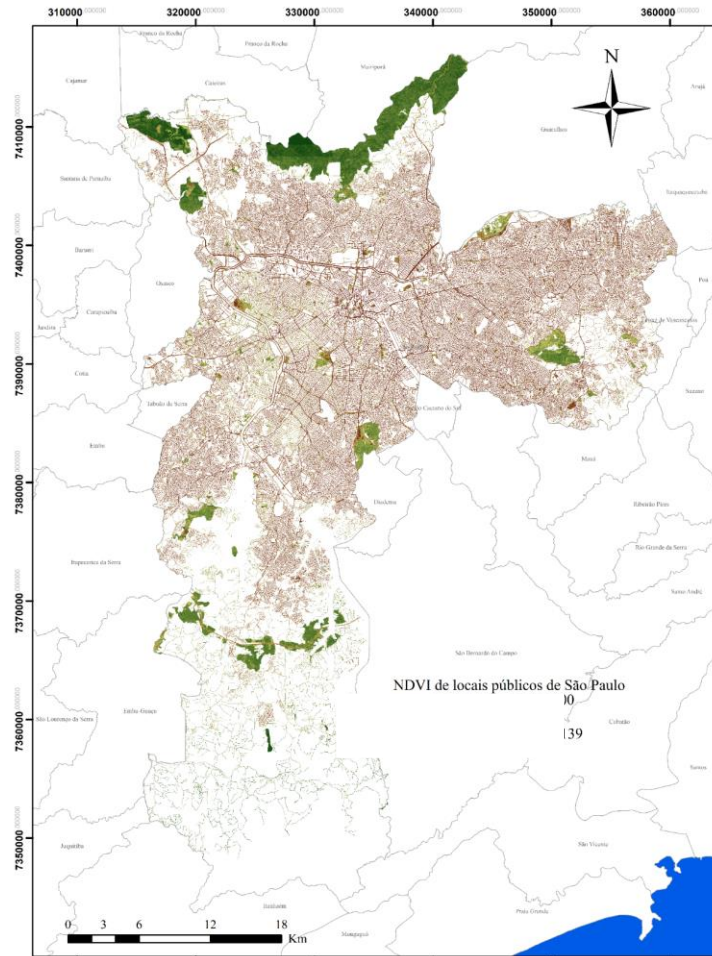
Median follow-up time → 8.2 years (IQR = 8.0–8.5)

Methods

Exposure



Brasil, 2023



Neighborhood Greenspaces

Quintiles of mean positive values of the Normalized Difference Vegetation Index (NDVI)

RapidEye Satellite (2011)
5-m resolution

Neighborhood → 500-m circular buffer

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Methods

Outcome

Frequency of moderate/vigorous physical activity over 3 visits:

none of the visits (reference)

1 or 2 visits

3 visits

IPAQ – long version validated for Brazilian adults

Recreation, sports and leisure physical activity

Methods

Covariates

Individual level (Visit 1)

Sex

Age (Years)

Education (complete college; complete high school; complete elementary school; incomplete elementary school)

Research Center (São Paulo; Belo Horizonte)

Residence in slums (No; Yes)

Perceived safety (Neighborhood scale: 3-9; 10; 12-15)

Contextual level (500-m circular buffer) (2010 Population Census)

% of households with paved sidewalks

% of households with streetlights

Neighborhood average household income per capita → NSES

Methods

Statistical analysis

Multinomial logistic regression model

OR (95%CI)

Model 1: adjusted for sex, age, education, research center and residence in slums;

Model 2: Model 1 + perceived safety;

Model 3: Model 2 + % of households with paved sidewalks;

Model 4: Model 3 + % of households with streetlights;

Model 5: Model 4 + neighborhood average household income per capita.



Results

Table 1 - Longitudinal association of neighborhood greenspaces with physical activity in up to 3 Visits of participants living in Belo Horizonte and São Paulo. ELSA-Brasil, 2008-2010, 2012-2014 and 2017-2019. N = 4800

| | MVPA in 1 or 2 Visits OR (95%CI) | MVPA in 3 Visits OR (95%CI) |
|---|---|--|
| Model 1 – adjusted for sex, age, education, research center and residence in slums | | |
| NDVI | | |
| Quintile 1 | Reference | Reference |
| Quintile 2 | 1.05 (0.86 – 1.28) | 1.10 (0.79 – 1.52) |
| Quintile 3 | 1.05 (0.85 – 1.29) | 1.32 (0.95 - 1.83) |
| Quintile 4 | 1.08 (0.87 – 1.35) | 1.73 (1.24 – 2.43) |
| Quintile 5 | 1.11 (0.89 – 1.39) | 1.73 (1.24 – 2.41) |
| Model 2 – Model 1 + perceived safety | | |
| NDVI | | |
| Quintile 1 | Reference | Reference |
| Quintile 2 | 1.04 (0.86 – 1.27) | 1.10 (0.80 – 1.52) |
| Quintile 3 | 1.04 (0.84 – 1.28) | 1.30 (0.94 – 1.80) |
| Quintile 4 | 1.08 (0.86 – 1.34) | 1.69 (1.21 – 2.37) |
| Quintile 5 | 1.10 (0.88 – 1.37) | 1.69 (1.21 – 2.36) |

Results

Table 1 - Longitudinal association of neighborhood greenspaces with physical activity in up to 3 Visits of participants living in Belo Horizonte and São Paulo. ELSA-Brasil, 2008-2010, 2012-2014 and 2017-2019. N = 4800

| | MVPA in 1 or 2 Visits OR (95%CI) | MVPA in 3 Visits OR (95%CI) |
|--|-------------------------------------|--------------------------------|
| Model 3 – Model 2 + percentage of households with paved sidewalks | | |
| NDVI | | |
| Quintile 1 | Reference | Reference |
| Quintile 2 | 1.03 (0.85 – 1.26) | 1.10 (0.79 – 1.51) |
| Quintile 3 | 1.03 (0.84 – 1.28) | 1.27 (0.91 – 1.76) |
| Quintile 4 | 1.07 (0.86 – 1.34) | 1.66 (1.18 – 2.33) |
| Quintile 5 | 1.07 (0.86 – 1.34) | 1.62 (1.16 – 2.28) |
| Model 4 – Model 3 + percentage of households with streetlights | | |
| NDVI | | |
| Quintile 1 | Reference | Reference |
| Quintile 2 | 1.03 (0.84 – 1.26) | 1.09 (0.79 – 1.52) |
| Quintile 3 | 1.03 (0.84 – 1.27) | 1.27 (0.91 – 1.76) |
| Quintile 4 | 1.07 (0.86 – 1.34) | 1.66 (1.18 – 2.33) |
| Quintile 5 | 1.07 (0.85 – 1.34) | 1.62 (1.16 – 2.28) |

Results

Table 1 - Longitudinal association of neighborhood greenspaces with physical activity in up to 3 Visits of participants living in Belo Horizonte and São Paulo. ELSA-Brasil, 2008-2010, 2012-2014 and 2017-2019. N = 4800

| | MVPA in 1 or 2 Visits OR (95%CI) | MVPA in 3 Visits OR (95%CI) |
|---|-------------------------------------|--------------------------------|
| Model 5 – Model 4 + neighborhood average household income per capita | | |
| NDVI | | |
| Quintile 1 | Reference | Reference |
| Quintile 2 | 0.98 (0.80 – 1.20) | 1.03 (0.74 – 1.43) |
| Quintile 3 | 0.95 (0.76 – 1.18) | 1.13 (0.80 - 1.59) |
| Quintile 4 | 0.99 (0.78 – 1.24) | 1.48 (1.04 – 2.12) |
| Quintile 5 | 0.96 (0.76 – 1.22) | 1.43 (1.00 – 2.04) |

Conclusion

Higher greenspace contributed to the maintenance of physical activities over the eight years of follow-up, regardless of individual sociodemographic characteristics, the perceived safety, the percentage of paved sidewalks and streetlights and the neighborhood socioeconomic status.

The results suggest that urban intervention to increase greenspaces may sustain leisure-time physical activity practice and contribute to reducing health-related inequalities.

Conclusion









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ORIGINAL ARTICLE



Are Neighborhood Greenspaces Associated with Leisure-time Physical Activity? Results from ELSA-Brasil Eight-year Follow-up

Luciene Fátima Fernandes Almeida  · Sandhi Maria Barreto  · Maria Conceição Chagas Almeida  ·
Isabela Judith Bensenor  · Paulo Andrade Lotufo  · Maria Del Carmen Bisi Molina  ·
Letícia de Oliveira Cardoso  · Luana Giatti 

Equigenesis hypothesis
↓
No evidence of effect modification by NSES

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Thank you



Contacts:



elsabrasil.org



(21) 97151-8413 /
99916-4205



elsa@fiocruz.br



@elsabrasilrj

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