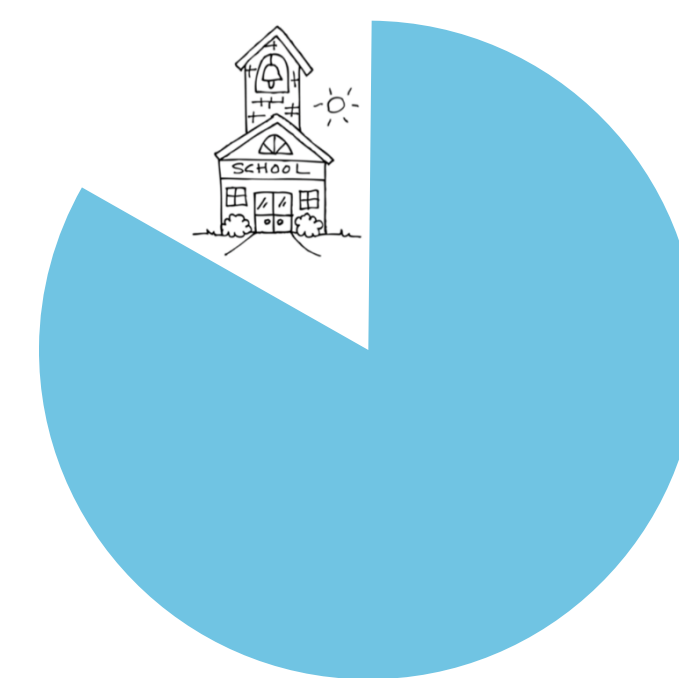


## Introduction

- Children spend 80% of their waking hours outside of school (Meltzoff, 2009)
- By 2050 over 70% of children will live in cities
- Large discrepancies in out of school learning opportunities between children from low- and middle-income families (Hart & Risely, 1995)
- Learning Landscapes build playful learning into the places children and families spend time
  - Parks, bus stops, play grounds, grocery stores
- Cities already spend money building parks, bus stops and playgrounds
  - Sustainable model built into city budget
- Parkopolis is a life-size playful learning board game that targets STEM learning skills
  - Patterns, numeracy and spatial skills, geometry, measurement, and fractions.
- Parkopolis also targets domain-general learning skills
  - Executive functioning, approaches to learning, fluid reasoning
- Intended for installment in low-income neighborhoods to promote parent child interactions and playful learning opportunities



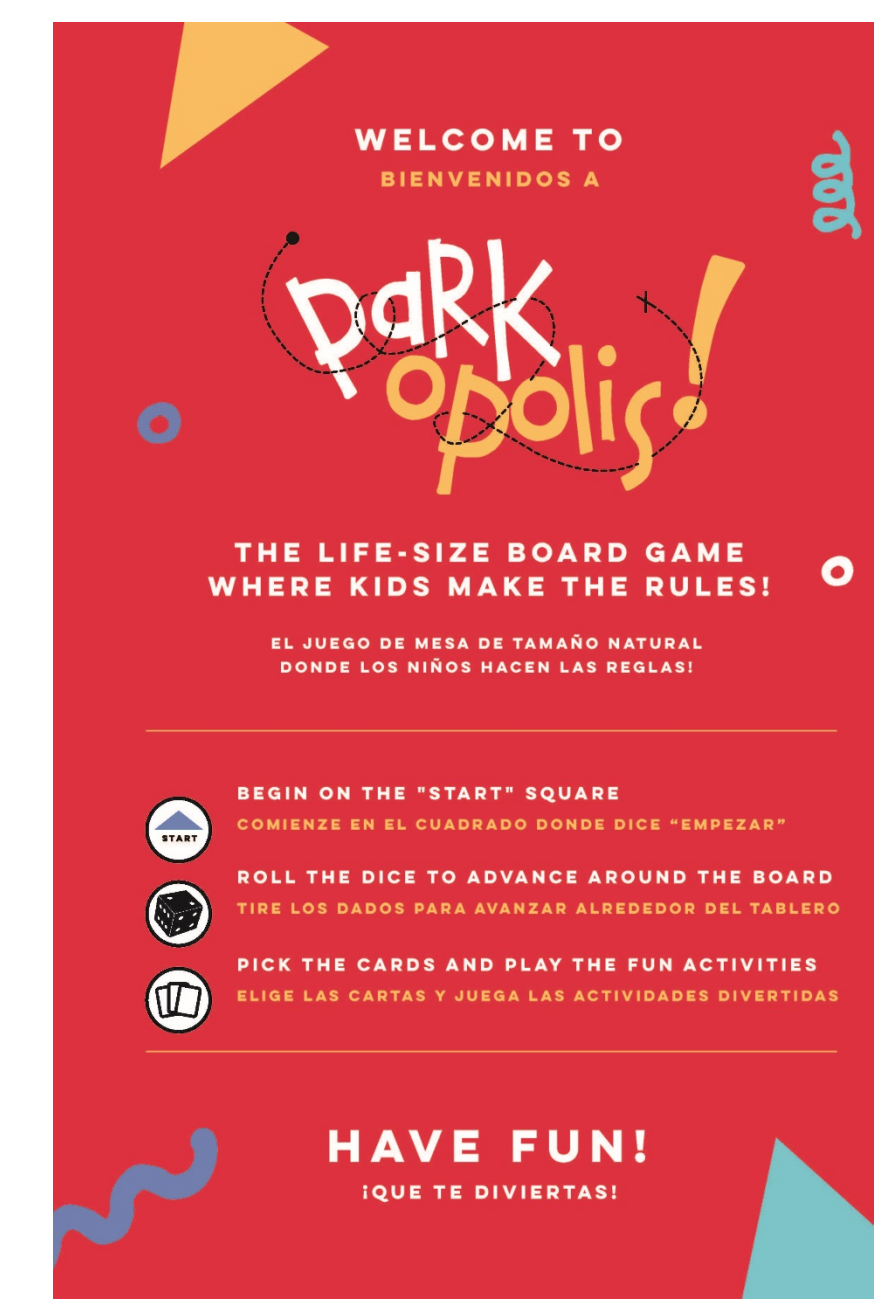
## Method

### Participants:

- Patron at the Please Touch Museum in West Philadelphia
- 111 families
- Most children at the museum range from ages 2-7

### Procedure:

- Observational data collected on 67 Parkopolis groups and 44 control groups
- 5 minute observation cycles (maximum of 3 cycles per group)



## Research Questions & Hypotheses

This study aims to address the following questions:

- Can Parkopolis increase STEM language compared to another STEM focused museum exhibit?

Hypothesis: Compared to the control condition caregivers and children playing Parkopolis will use significantly more STEM language.

- Can Parkopolis increase caregiver's and children's engagement, interactions, 6 C's (communication, collaboration, content, critical thinking, creativity, and confidence), and decrease cell phone usage, compared to a control condition?

Hypothesis: Compared to the control condition caregivers and children playing Parkopolis will show higher levels of engagement, interaction, 6 C's, and decreased cell phone usage.

## Measures

- A Likert scale from 1 (never) to 5 (very often) that captured STEM language including:
  - Numeracy language (whole numbers and fractions), spatial language, reasoning language, measurement language, completing patterns, making predictions, making observations, planning, and questions
- Categorical ratings of the following:
  - Engagement (low, medium, high)
  - Amount of interaction (low, moderate, high)
  - Physical Activity (sedentary, moderate, vigorous)
  - Technology use (yes or no)
  - Valence of Interactions (Negative, Neutral, Positive)
  - 6 C's (communication, collaboration, content, critical thinking, creativity, confidence)

## Results

- Caregivers demonstrated increased:
  - Numeracy Language,  $F(108)=27.21, p<.001$
  - Fraction Language,  $F(108)=6.42, p=.013$
  - Pattern Language,  $F(108)=14.87, p<.001$
  - Planning Language,  $F(108)=16.97, p<.001$
  - Questions,  $F(108)=27.21, p=.004$
  - Physical Activity,  $F(108)=10.74, p=.001$
- Children demonstrated increased:
  - Numeracy Language,  $F(108)=44.85, p<.001$
  - Fraction Language,  $F(108)=1.17, p=.011$
  - Reasoning Language,  $F(108)=6.34, p=.013$
  - Pattern Language,  $F(108)=22.83, p<.001$
  - Physical Activity,  $F(108)=4.76, p=.042$
- As a group caregivers and children demonstrated increased:
  - Content,  $F(108)=13.92, p<.001$
  - Critical Thinking,  $F(108)=3.45, p=.050$
  - Creativity,  $F(108)=3.79, p=.054$
  - Interaction,  $F(108)=2.60, p=.101$

## Discussion

- Results demonstrate that Parkopolis can elicit STEM language, and increase caregiver-child interaction.
- This study highlights the promise of Parkopolis to foster STEM learning in a fun and engaging way during the 80% of time children spend outside of school.
- Our next goal is to build Parkopolis outdoors at a park in a low-income community to test its efficacy in that setting.

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