Interventions for Promoting Active Commuting to School: An Updated Systematic Review

Villa-González E, Barranco-Ruiz Y, Evenson KR, Chillón P

University of Granada, Spain

University of North Carolina, USA
Introduction

Benefits

Body composition
(Lubans et al., 2011)

Cardiorespiratory fitness
(Chillón et al., 2012)

Wellbeing and academic achievement
(Ruiz-Ariza et al., 2015; Martínez-Gómez et al., 2011)

(Panter et al, 2010; Rojas-Ruedas et al., 2013)

PA

(BETTER)

(Barouche et al., 2014)
Introduction

A potential solution?

Active commuting
A systematic review of interventions for promoting active transportation to school

Palma Chillón¹,²⁺, Kelly R Evenson²,³, Amber Vaughn³, Dianne S Ward³,⁴

“More research with higher quality study designs and measures should be conducted to further evaluate interventions and to determine the most successful strategies for increasing active transport to school”.

Introduction
To **update** the previous review published in 2011 (Chillón et al., 2011), following the same methodology and addressing the quality and effectiveness of new studies detected in the more recent scientific literature.
Method

Search Strategy

• Electronic search conducted from 1st February 2010 to December 18th 2016.

• Three categories of search terms were identified:
  • 1) age
  • 2) active transportation
  • 3) interventions

Data base:
Data extraction of the selected manuscripts

<table>
<thead>
<tr>
<th>Author and country (locality)</th>
<th>Sample and age (y)</th>
<th>Intervention study design and duration</th>
<th>Active transportation outcome measure</th>
<th>Other outcome measures</th>
<th>Results from transportation outcomes</th>
<th>Results from other outcomes</th>
</tr>
</thead>
</table>
Quality assessment (De Bourdeaudhuij et al., 2011)

- Effective Public Health Practice Project (EPHPP)
  - Global rating: strong, moderate, or weak

Intervention strategy framework (Bors et al., 2009)

- Active Living by Design (ALBD) Community Action Model
  - Preparation
  - Promotions
  - Programs
  - Policies
  - Physical

Effectiveness assessment (Cohen, 1988)

- Cohen’s d
Results and Discussion

Study selection

Records identified through database searching (n=6888) → Duplicates removed (n=1073)

Titles screened for potential relevance (n=5815) → Excluded publications not relevant (n=5666)

Abstract examined for potential relevance (n=149) → Excluded publications not relevant (n=103)

Full-text potentially relevant publication located and reviewed (n=46) → Partly reviewed and excluded (n=27)

Total studies included from the academic database search (n=19) → Additional records identified through other expertise (n=4)

Synthesis of results (n=23)

N=23

PRISMA guidelines (Moher et al., 2010)
## Results and Discussion

### Study selection

**Example:**

<table>
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<tr>
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<th>Results from other outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Christiansen et al., 2014) Denmark (Region of Southern)</td>
<td>1014 students age 11-14 y: 498 in the experimental group and 516 in the control group.</td>
<td>Experimental (randomized controlled trial) pre-post assessment at 7 experimental and 7 control schools. Duration: 2 years (spring 2010-spring 2012).</td>
<td>Students reported the frequency and mode of commuting to and from school using a 5-day active commuting diary and questionnaires, which were completed the previous day at the first lesson of the next morning.</td>
<td>Gender, perceived route safety, parental encouragement, attitudes toward bicycling, school walkability and distance to school.</td>
<td>The frequency of AST increased 2-year follow-up (baseline 86%; post-test 87%) with no difference between groups.</td>
<td>The students feeling safe on route to school decreased (93% to 90%) in the experimental group and increased in the post-test control group (87% to 89%). 55% of students perceived parental encouragement in the experimental group compared with the control group (51%). 89% of students in the intervention group compared with 85% of students in the control group had a positive attitude towards bicycling at the intervention schools.</td>
</tr>
</tbody>
</table>
Results and Discussion

Study population

Countries of the 23 identified studies

- United States: 50%
- Europe: 36%
- Canada: 9%
- Australia: 5%

Palma Chillón, Ph.D
## Results and Discussion

### Quality assessment

<table>
<thead>
<tr>
<th>Author and country</th>
<th>Intervention details</th>
<th>Effectiveness</th>
<th>Quality assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description of intervention</td>
<td>Cohen’s d</td>
<td>Selection bias</td>
</tr>
<tr>
<td>(Buliumg et al., 2011) Canada</td>
<td>The STP intervention was implemented. The program included 5-stage process: 1) Program Setup; 2) Data Collection and Problem Identification; 3) Action Planning; 4) Implementation; 5) Ongoing Monitoring. School travel plans included interventions which were classified in 4 categories: (1) education, (2) activities and events, (3) capital improvement projects, and (4) enforcement.</td>
<td>0.04*</td>
<td>**</td>
</tr>
</tbody>
</table>

Global rating of the 23 studies

- Moderate: 9%
- Weak: 91%
Quality assessment

- **Selection Bias**: future studies should consider that participants are more likely to be representative of the target population.

- **RCT**: Only three randomized controlled trial design studies (i.e., strong rating) were detected in the current review.

- **Control of confounders**: future studies should include a description of all variables related to the outcome of interest (e.g., distance from home to school).

- **Data Collection**: use of valid and reliable tools for assessing active transportation to school.
Results and Discussion

Intervention description

• Only 4 studies included all five strategies from the Community Action Model

• Dose and content of the interventions: lasting effect if the dose had been larger.

• Interventions focused only on active transportation to school may be more effective than those with a broader focus.
Results and Discussion

Effectiveness

- A total of 14 studies reported increase in the % of active transportation; however, the degree of change varied widely (2% to 101%).

- Based on the calculated Cohen’s d effect size:
  - 9 studies - trivial effect sizes
  - 4 studies - small effect sizes
  - 1 study - large effect
  - 1 study - very large effect

- Studies should report critical data elements (such as the SD)

- Caution should be taken when comparing the effect size from different studies since different formulas were used.
Limitations

• Difficulties assessing the quality of the interventions using the EPHPP tool (it is more focused on experimental studies): it was adapted.

Strengths

• The whole review process extracting the data, and including both the effectiveness and quality assessments.
A total of 23 interventions that promoted active transportation to school among children and adolescents were identified. Most of them showed poor quality of the study components and low effect sizes.

Future intervention studies should increase its quality, including:
- greater sample size
- randomized controlled trial designs
- include mediators
- use valid and reliable instruments.

This will improve the quality of the interventions and generalizability of the results.
Thanks!

International Symposium
Active Living and Environment: Towards a Healthier and More Sustainable Future
Thanks!

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Palma Chillón
pchillon@ugr.es

profith.ugr.es

UNIVERSIDAD DE GRANADA

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