Inadequate Physical Activity and Health Care Expenditures in the United States

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Study Rationale

• Reasons to quantify the economic costs associated with inadequate levels of physical activity:
  – Setting research, policy, and program priorities
  – Use in cost effectiveness analyses
  – Public health planning and resource allocation purposes
US Health Care Costs

$3.3 Trillion per year
Datasets

1. National Health Interview Survey (NHIS), 2004-2010
   – Physical activity, self-reported:
     ▪ Active: ≥ 150 minutes/week moderate-intensity equivalent activity. (34%)
     ▪ Insufficiently active: Some moderate-intensity equivalent activity but not enough to meet the active definition. (20%)
     ▪ Inactive: No moderate-intensity equivalent activity for at least 10 min. (46%)

2. Medical Expenditure Panel Survey (MEPS), 2006-2011
   – Total annual health care expenditures (in 2012 dollars).
Statistical Analysis

- N = 51,165
- Four-part econometric model
- Adjusted for:
  - Age
  - Sex
  - Race/ethnicity
  - Marital status
  - Region
  - Poverty level
  - Health insurance coverage
  - Education
  - Smoking status
  - BMI category
  - Metropolitan statistical
### Health care expenditure difference and percent difference (compared to active)

<table>
<thead>
<tr>
<th>Physical Activity Level</th>
<th>Expenditure Difference (per capita, $)</th>
<th>Percent Difference (per capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>1313</td>
<td>848, 1778</td>
</tr>
<tr>
<td>Insufficiently active</td>
<td>576</td>
<td>224, 927</td>
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Percentage of health care expenditures associated with inadequate levels of physical activity:
- **Overall**: 11.1% (95% CI: 7.3, 14.9)
**Health care expenditure difference and percent difference (compared to active)**

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<td><strong>Excluding adults with reported difficulty walking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive</td>
<td>920</td>
<td>209, 1332</td>
</tr>
<tr>
<td>Insufficiently active</td>
<td>482</td>
<td>142, 882</td>
</tr>
</tbody>
</table>

Percentage of health care expenditures associated with inadequate levels of physical activity:
- Overall: 11.1% (95% CI: 7.3, 14.9)
- Excluding those reporting difficulty walking: 8.7% (5.2, 12.3)
# Limitations and Strengths

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Strengths</th>
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</thead>
<tbody>
<tr>
<td>• Observational data</td>
<td>• Physical activity levels based on current guidelines</td>
</tr>
<tr>
<td>- Self-selection</td>
<td>• Linkage of individual expenditure data and survey data</td>
</tr>
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<td>• Self-reported data</td>
<td>• Large, nationally representative sample</td>
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<tr>
<td>- Underestimation of expenditures</td>
<td>• Data available on many confounders</td>
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<td>• Leisure-time physical activity only</td>
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**Strengths**

- Physical activity levels based on current guidelines
- Linkage of individual expenditure data and survey data
- Large, nationally representative sample
- Data available on many confounders
Conclusions

• During 2006-2011, an estimated 11.1% of aggregate health care expenditures or $117 billion were associated with inadequate levels of physical activity, independent of the influence of BMI.

• Conservatively, if adults with any reported difficulty walking were excluded, 8.7% of aggregate health care expenditures or $79 billion were associated with inadequate levels of physical activity.
Annual US Health Care Costs

- **Physical Inactivity** $117 Billion
  - Carlson 2015, Regression analysis, NHIS/MEPS

- **Obesity** $147 Billion
  - Finkelstein 2009, Regression analysis, MEPS

- **Diabetes** $176 Billion
  - ADA 2013, Complex model, NHIS/MEPS/+++

- **Smoking** $170 Billion
  - Wu 2014, Regression analysis, NHIS/MEPS
Co-Benefits of Active Design: Literature Summary

These settings must be considered in the design of Active Cities.

A short list of features of each setting related to physical activity was identified for each setting, and co-benefits of those features were searched.
Search for co-benefits

- 221 sources were identified, yielding 521 relevant findings
  - 418 findings from higher-quality sources contributed to quasi-quantitative scoring
- All findings are detailed in tables and scored for quality
- Summary tables were developed to illustrate the strength of available evidence
## Co-Benefits of Designing Activity-Friendly Environments

<table>
<thead>
<tr>
<th></th>
<th>Physical Health</th>
<th>Mental Health</th>
<th>Social Benefits</th>
<th>Environmental Sustainability</th>
<th>Safety / Injury Prevention</th>
<th>Economic Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open spaces / Parks / Trails</td>
<td>57.5+ 3.5(0)</td>
<td>93+</td>
<td>42.5+ 4(0)</td>
<td>20+ 4(0)</td>
<td>23+</td>
<td>19+ 4(0)</td>
</tr>
<tr>
<td>Urban Design</td>
<td>105+ 54(0)</td>
<td>31+ 4-</td>
<td>80.5+ 29(0)</td>
<td>265.5+ 45.5(0) 3.5-</td>
<td>13.5(0) 18.5-</td>
<td>69+ 10.5(0) 4-</td>
</tr>
<tr>
<td>Transport Systems</td>
<td>7+ 3.5-</td>
<td>3+ 3.5(0)</td>
<td>23+</td>
<td>70+ 21(0) 3-</td>
<td>67+ 14(0) 4-</td>
<td>56+ 3.5(0) 4-</td>
</tr>
<tr>
<td>Schools</td>
<td>19.5+ 3.5(0)</td>
<td>21+</td>
<td>11+</td>
<td>21.5+</td>
<td>4+ 3-</td>
<td>15+</td>
</tr>
<tr>
<td>Workplaces / Buildings</td>
<td>55+ 3.5(0)</td>
<td>18.5+ 4-</td>
<td>20.5+</td>
<td></td>
<td></td>
<td>48+ 3.5(0)</td>
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</table>
Our review was incorporated into this guidebook

- Written for city leaders, like Mayors
  - Why active cities?
  - How to create active cities
  - Examples from around the world
- Download for free

http://www.designedtomove.org/resources
Creating Active Cities Is Good for Health and the Economy