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URBAN HEALTH

# Knowledge Hub Booklet

## v1.1

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We have conducted a review of **longitudinal observational epidemiological studies**, mostly quasi-experimental, analysing the association between changes in the physical urban environment and the incidence of non-communicable diseases (NCDs), specifically type 2 diabetes mellitus (T2DM) and cardiovascular diseases (CVDs), as well as associated risk behaviours.

The aim of this booklet is not only to provide a synthesis of the available evidence on the real impact of interventions, but also to serve as an empirical basis for developing our own quasi-experimental study. We have first included a section containing the most comprehensive umbrella review conducted to date on the subject (Zhang et al., 2022), as well as the seven systematic reviews analysed by the authors, which predominantly include quasi-experimental and longitudinal observational studies. We have then provided primary studies, many of which are part of the best available evidence identified by the reviews. The vast majority of interventions covered by the included studies are plausibly causal of increased physical activity, although there are also studies on healthy eating habits, and even one quasi-experimental study analysing the impact of a smoking ban on a beach, as well as two studies analysing the impact of alcohol availability. Only one study (McGavock et al., 2022) strictly meets the criteria of quasi-experimental study design and analyses the impact on health outcomes (incidence of NCDs) rather than behavioural outcomes, using aggregate health registry data at territorial level. This scarcity is most likely due to the difficulty of following cohorts for long enough for detectable effects to appear, coupled with the demands of statistical power and the location of the endpoints considered in the causal chain.

This booklet will be updated periodically throughout the project's life cycle.

## Glossary

**BMI:** Body Mass Index.

**CVD:** Cardiovascular Disease.

**GIS:** Geographic Information System.

**HR:** Hazard Ratio.

**IRR:** Incidence Rate Ratio.

**MET:** Metabolic Equivalent.

**MVPA:** Moderate to Vigorous Physical Activity.

**OR:** Odds Ratio.

**PA:** Physical Activity.

**QoL:** Quality of Life

**SES:** Socio-Economic Status.

**SOPARC:** System for Observing Play and Recreation in Communities.



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# Umbrella and systematic reviews of quasi- experimental and observational studies

## Background

**Urban form** influences PA and health; **walkable, green** neighborhoods support **PA**, yet causal evidence on **specific urban interventions** is **scarce** and **scattered**. Pre-post designs help isolate intervention effects. This **umbrella review** aggregates systematic reviews of built-environment changes that target PA to inform healthier city design.

## Objectives

To **synthesise evidence** from **systematic reviews of intentional urban built-environment interventions**—accompanied by pre-post-measurement—on their effects on PA, and to identify **intervention types** most promising for promoting population PA.

## Design

**Data:** PRISMA 2020/JBI **umbrella review**; seven databases (2010–2022). Included **seven systematic reviews (217 primary studies)**.

**Eligibility:** Urban built-environment interventions with pre-post PA measurement.

**Outcome:** PA as usage, combined PA, and active travel.

**Analysis:** Qualitative synthesis classifying built-environment changes as positive/null/negative; “promising” if  $\geq 60\%$  positive; JBI quality appraisal (3 high, 4 moderate).

## Results

Across 274 built-environment changes, 54.4% were positive for PA, 40.9% null, 4.8% negative.

**Most promising:** park renovations; adding exercise equipment; new (pocket) parks; improving cycling environments; improving walking & cycling environments; multi-component initiatives for active travel; and enhancing availability/accessibility of destinations.

**Walking-only** upgrades showed **mixed effects**.

**Comprehensive, multi-component actions** tended to perform **better**.

## Background

Observational evidence links **neighbourhood design** with **children's activity**, diet, obesity and mental health. This review synthesises **intervention studies modifying urban environments** to test causal impacts. Strengths include a multi-database search; key limitations are opportunistic, non-randomised designs, subjective outcomes, and scarce follow-up, which weaken inference.

## Objectives

To examine evidence from **intervention studies** that altered urban environments and reported at least one **health behaviour** or **physical/mental health outcome** among **children** and **young** people, presenting a narrative synthesis.

## Design

**Data:** Embase, Geobase, Medline, PsycINFO, TRIS, Web of Science (to 29 Oct 2014).

**Population:** Children/young people in high-income urban settings.

**Outcomes:** Health behaviours (e.g., active travel) and physical/mental health.

**Design:** Eligible intervention studies (RCTs to before-after).

**Analysis:** Narrative synthesis. Risk of bias assessed with a validated tool. PRISMA guidelines followed.

## Results

Included 33 studies (27 interventions).

**Urban design** changes can improve **child safety** and support **active travel**, with the clearest gains from road-traffic calming .

**Park/playground refurbishments** seldom boosted use or physical activity .

**Multi-component**, community-wide programmes show promise for weight outcomes .

Overall **certainty** is **low** given non-randomised designs, subjective measures, short follow-up, and heterogeneity.

Mental health impacts were not evaluated .

## Background

As urbanisation accelerates, preserving and enhancing **urban green space** (UGS) may support **health, wellbeing, social cohesion** and **environmental quality**. However, actionable guidance on how to design or promote UGS to realise these benefits remains limited. This **meta-narrative synthesis** integrates diverse traditions and examines advantages, limitations, and equity implications of UGS interventions.

## Objectives

To **synthesise evidence** on the **health, wellbeing, social, environmental** and **equity effects** of **UGS interventions** (and influencing factors), convene an expert panel to contextualise findings, and formulate recommendations for policy, practice and research.

## Design

**Review type:** Meta-narrative (RAMESES).

**Data:** 8 databases + hand-search. 6997 records screened. 38 studies included.

**Population:** Any age, urban settings.

**Interventions:** Physical UGS change alone or with promotion.

**Outcome:** Health, wellbeing, social, environmental, equity.

**Analysis:** Narrative synthesis. Quality/risk-of-bias assessment. PROGRESS-plus for equity. Expert workshop for peer review.

## Results

Dual-approach park and **greenway/trail interventions** (physical change + promotion) showed **strong effects** on **park use** and **PA** (7/7; 3/3).

**Greening vacant lots** improved **health/wellbeing** (e.g., stress↓) and **social outcomes** (crime↓, safety↑) (4/4).

**Street trees** (3/4) and **green-built storm-water** projects (6/7) improved **environmental outcomes**.

**Single-component park/trail** changes were often **ineffective** (7/12 null). Evidence on equity impacts was insufficient.

## Background

**Physical inactivity** contributes to chronic disease and premature mortality. **Built-environment features**—accessibility, land-use mix, and transport systems—shape PA by influencing destinations and travel modes. **Longitudinal evidence** is needed to inform **causal links** and guide planning for compact, activity-supportive cities.

## Objectives

To **systematically review longitudinal studies** and **natural experiments** assessing how **changes** in the **built environment**—particularly accessibility, land-use mix, and new walking/cycling/public transport infrastructure—affect overall, transport-related and leisure **PA**.

## Design

**Data:** Six databases to 11 December 2015. 51 studies included.

**Population:** General populations in high-income countries.

**Design:** Prospective cohorts and natural experiments.

**Exposure:** Changes in built environment—particularly accessibility, land-use mix, and new walking/cycling/public transport infrastructure.

**Outcome:** Overall, transport and leisure physical activity.

**Analysis:** Narrative synthesis of adjusted longitudinal associations; study quality.

## Results

**Built-environment change** was consistently linked to higher PA.

New **walking/cycling/public transport infrastructure** increased overall and transport activity; e.g., proximity to a new busway predicted greater active-travel gains (OR = 1.80) and better transit access increased transport walking (OR = 1.44–2.33).

Greater **destination accessibility** and land-use mix boosted walking. **Park upgrades** often helped.

Evidence on street connectivity/density was mixed.

## Background

**Environmental changes** that encourage **walking** and **cycling** can improve population health, yet effects reported in evaluations are often modest or mixed and difficult to generalise. This review combines **evidence of effectiveness** with **theory-informed explanation**, focusing on intervention functions and contextual conditions to clarify how built-environment changes may shift behaviour.

## Objectives

To synthesise evaluative studies of **environmental interventions** targeting **walking/cycling**, and related sources, to: estimate **effects** on **walking, cycling** and **PA**; identify contexts and mechanisms (accessibility, safety, experience) that trigger change; and develop generalisable, policy-relevant explanations of what works, for whom, and under which conditions.

## Design

**Review type:** Narrative/realist synthesis (registered protocol).

**Data:** Mined eight databases of reviews. 13 evaluative studies plus 46 related sources.

**Population:** Adults/general urban populations.

**Interventions:** Physical changes targeting walking/cycling (paths, lanes, routes).

**Outcomes:** Use, walking, cycling, total PA.

**Analysis:** Context-mechanism-outcome extraction, credibility scoring (0–5), and harvest plots.

## Results

Six of 13 evaluations reported **significant positive effects**. Two showed positive effects of uncertain significance. Five were inconclusive or mixed.

Mean credibility score was 3.4. 70% scored  $\leq 3$ , while 4/13 scored  $\geq 4$  and three of these showed positive effects.

Three recurrent functions emerged: enhancing **accessibility/connectivity**, improving **traffic/personal safety**, and improving **user experience**.

Targeting **accessibility** and **safety** appeared **most effective** across contexts.

## Background

Evidence suggests **causal links** between **built environments** and **PA**—especially active transport. Yet prior reviews rarely examined costs or equity, and often struggled to isolate environmental effects from co-interventions. This review updates the field and foregrounds intervention affordability and **differential impacts** by **SES** and **ethnicity**.

## Objectives

To identify **local-level environmental interventions** that increase **PA/active transport**, and to assess intervention costs and differential effects by ethnicity and SES while isolating **built-environment impacts** from concurrent “soft” programmes.

## Design

**Data:** Scopus, Ovid (all), ProQuest Science/Social Science, TRID. June 2015. 12,082 records → 28 studies.

**Population:** Children and adults in community settings.

**Exposure:** Objective built-environment changes/features.

**Outcomes:** PA, active transport, setting use.

**Analysis:** Narrative synthesis. EPHPP quality/risk-of-bias. Equity analyses (ethnicity/SES).

## Results

**Walkability components**, higher-quality **parks/playgrounds**, and **active-transport infrastructure** generally increased activity and/or use. Example associations included uptake of cycling with greater residential density (OR = 1.54, 95% CI [1.04, 2.26]) and recreational cycling with higher street connectivity (OR = 1.20, 95% CI [1.06, 1.35]).

**Benefits** may preferentially accrue to **advantaged** groups.

Most studies were **US-based** (71%) and **weak quality** (75%).

**Cost reporting** (7 studies) was sparse and heterogeneous.

## Background

Environmental and policy shifts shape PA beyond individual factors. **Built environment infrastructural changes** (BEICs) may promote **active transportation** (AT) and reduce sedentary behaviour (SB), but causal evidence from experiments is limited. Natural/quasi-experiments can evaluate real-world BEICs yet often face measurement and bias challenges.

## Objectives

To **systematically review quasi-experimental studies** assessing how BEICs affect adults' PA, AT (walking/cycling), and SB, and to examine how **intervention type** and proximity to infrastructure relate to **outcomes**.

## Design

**Data:** PubMed and Web of Science (to Feb 2018).

**Population:** Adults ( $\geq 18$  y)

**Design:** Natural/quasi-experimental, pre-post studies.

**Exposure:** BEICs directly targeting transport-related PA/AT.

**Outcome:** Overall PA, walking, cycling, combined walking/cycling, SB.

**Analysis:** Narrative synthesis. Study quality via adapted ACROBAT-NRSI risk-of-bias tool across multiple domains.

## Results

Nineteen articles (14 unique BEICs).

**Trails** showed inconsistent effects on **overall PA** and **walking**, but predominantly positive effects on **cycling**.

**System-wide BEICs** yielded mainly non-significant results. However, living closer to interventions was associated with greater **cycling/AT gains**.

No studies assessed SB.

Many studies had **moderate–critical risk of bias**. Objective measures were uncommon ( $n = 19$ ).

## Background

**Built environments** influence **PA** alongside social structures. Prior evidence was mostly cross-sectional, limiting causal inference and rarely considering sex/gender. **Longitudinal studies** with objective assessments of environmental change can better identify modifiable determinants and **equity** implications for **men** and **women**.

## Objectives

To **systematically review longitudinal studies** assessing how objectively measured **changes** in the **built environment** affect **PA**, explicitly examining whether effects are similar for, or differ between, males and females.

## Design

**Data:** Six databases (PubMed, CINAHL, SportDiscus, PsycInfo, Scopus, Web of Knowledge), searches to 12 March 2020.

**Population:** General populations.

**Design:** Quantitative longitudinal designs (cohorts, natural/quasi-experiments).

**Exposure:** Built environment objectively assessed (e.g., GIS/audits, new infrastructure).

**Outcome:** Overall PA, MVPA, walking, cycling, active transport, park use.

**Analysis:** Narrative synthesis. Study quality via QualSyst.

## Results

Thirty-six studies (since 2000).

Overall, built environment changes tended to **benefit PA** similarly in males and females.

**Public transport availability** showed consistent positive associations with **overall PA** and **walking**.

**Walking/cycling** infrastructure increased **active transport** but not overall PA.

- **Women:** effects clearer for public transport, safe cycling lanes, housing density, distance to destinations.
- **Men:** street connectivity/road environment more salient.

Mean quality score 0.83.

Key biases: confounding, measurement, selection.



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# Primary quasi- experimental studies

## Background

Researchers have hypothesized that "**food deserts**" are prevalent in **deprived areas**, potentially exacerbating diet-related diseases. The relationship between retail provision and diet quality is debated, though interventions like introducing large-scale food retailers have shown potential benefits in consumption patterns and socio-economic conditions, enhancing community health and psychological well-being.

## Objectives

This study evaluates the **impact** of a new **large-scale food retail provision** on **food consumption patterns** and **general health** in a "food desert" area. It hypothesizes that enhanced retail opportunities can lead to improved diet and health, thereby indicating broader local economic regeneration. The investigation leverages a natural experiment design to validate the effectiveness of such interventions in communities with poor food access.

## Design

**Study Type:** Prospective controlled "before and after" postal survey.

**Data:** 412 residents of two areas in East Glasgow, differentiated into intervention and comparison sites. Random sampling from highly deprived areas (DEPCAT 7) was employed to minimize bias.

**Outcome:** Changes in diet and psychological health post-intervention.

**Statistical Analysis:** ANCOVA for diet, logistic regression for health outcomes, controlling for age, sex, economic activity, and education. Interactions and potential confounders were also assessed.

## Results

**Dietary Impact:** Intervention had minimal effect on fruit (-0.03, 95% CI [-0.25, 0.30]) and vegetable consumption (-0.11, 95% CI [-0.44, 0.22]). Combined fruit and vegetable intake showed no significant change (-0.10, 95% CI [-0.59, 0.40]).

**Health Outcomes:** Adjusted odds of fair to poor self-rated health increased in the intervention group (OR = 1.52, 95% CI [0.77, 2.99]). However, poor psychological health slightly improved, but not significantly (OR = 0.57, 95% CI [0.29, 1.11]).

**Switchers:** Showed a protective effect on psychological health after adjusting for confounders (OR = 0.24, 95% CI [0.09, 0.66]), though changes in self-rated health were not significant (OR = 0.50, 95% CI [0.19, 1.32]).

## Background

The built environment influences **PA**, but most evidence comes from cross-sectional studies. Natural experiments with **quasi-experimental designs** are key to establish causality. In 2005, a **greenway/trail construction** in Knoxville TN allowed to examine the impact of neighborhood connectivity on PA. This study used direct observation to assess changes in PA pre- and post-intervention.

## Objectives

This study aimed to examine the **impact** of **neighborhood connectivity** on PA through a natural experiment in Knoxville, TN. The intervention involved retrofitting a neighborhood with an **urban greenway/trail**. The main objective was to determine if improvements in the built environment led to increased PA by using **direct observation** to compare pre- and post-intervention activity levels in both intervention and control neighborhoods.

## Design

**Data:** Direct observation of PA was conducted pre-intervention (March 2005) and post-intervention (March 2007) in intervention and control neighborhoods.

**Outcome:** Changes in PA levels, observed directly.

**Statistical Analysis:** Nonparametric tests (Fisher's exact tests and Wilcoxon rank sums test).

**Methodology:** Quasi-experimental design with two control neighborhoods .

**Setting:** Neighborhood and school levels, using consistent observation times and locations.

## Results

At **baseline**, **no significant difference** in 2-hour PA counts was observed between experimental and control neighborhoods ( $p=0.370$ ). **Post-intervention**, total PA **counts significantly increased** in the **experimental** neighborhood ( $p=0.028$ ), including walkers ( $p=0.002$ ) and cyclists ( $p=0.036$ ). Median PA counts rose by 8 in the experimental neighborhood and decreased by 1 in control neighborhoods ( $p=0.001$ ). For active transport to school (ATS), the control schools had higher counts, significantly so in 2007 ( $p=0.026$ ), but no significant pre-post difference was found ( $p=0.2061$ ).

## Background

Many communities seek to enhance parks to boost **PA**, but the impact is rarely assessed. Previous reviews show varied cost-effectiveness of interventions, with community-wide efforts generally more efficient. **Facility renovations** have mixed results, with some increasing usage and others failing due to poor marketing. Installing **Fitness Zones (FZs)** in **public parks** provides accessible, durable exercise equipment.

## Objectives

This study aims to evaluate the **impact** of installing **FZs in public parks** on PA levels among diverse community groups in **Los Angeles**. It examines the usage patterns of the new equipment by different demographic groups, the overall increase in park usage and PA, and the **cost-effectiveness** of the equipment based on the incremental change in park-based PA compared to parks without the FZs.

## Design

**Data:** The study utilized the System for Observing Play and Recreation in Communities (SOPARC) to observe park usage before and after.

**Intervention:** FZ installations in 12 parks, compared with 10 control parks without FZs.

**Outcome:** Park usage and PA levels.

**Statistical Analysis:** Mixed effects models compared changes in PA between FZ parks and control parks, using propensity score weighting to account for demographic differences. Cost-effectiveness was calculated by estimating Metabolic Equivalents (METs) gained per dollar spent on FZ installations.

## Results

**Observations of Park Users:** A total of 23,577 people were observed, with park usage increasing by 11% at the first follow-up. FZ users engaged in more moderate to vigorous PA (MVPA) (66% vs. 31% at first follow-up).

**Self-Reported Park Use:** Interviews showed FZ users visited parks more frequently (3.5 vs. 2.4 visits/week) and exercised more (3.9 vs. 2.7 sessions/week).

Possible insufficient statistical power with a sample size of only 20 parks.

**Cost Effectiveness:** FZ parks gained 1,909 METs annually, costing 10.5 cents per MET. Compared to non-FZ parks, the cost was 2.4 cents per MET, though the increase was not statistically significant.

## Background

**Playgrounds** are believed to increase **children's PA**, but evidence is unclear. Most studies show increased activity after **school playground** upgrades, though adding supervision is often necessary. These studies, using heart-rate monitors, accelerometers, or pedometers, typically focus on schools, ignoring **home** and **community** activity.

## Objectives

The study aims to evaluate **changes in children's PA** when **playgrounds in public parks** are **upgraded**. The hypothesis is that these upgrades will **increase** the **total daily PA (TDPA)** of children, measured by accelerometers, compared to a control community. The objectives are to assess the **impact of improved playground** facilities on children's overall PA and determine whether such interventions can enhance their daily exercise levels.

## Design

**Intervention:** Two playgrounds were upgraded with new equipment in Dunedin.  
**Data:** 156 children aged 5-10 participated. The intervention group was from a community with upgraded playgrounds. A similar control community was selected. Baseline data were collected before upgrades. Follow-up data were collected a year later.  
**Outcome:** PA was measured using GT1M accelerometers worn for eight days.  
**Statistical Analysis:** Data were analyzed using linear mixed models, controlling for repeated measures within each child and clustering by schools.

## Results

The final model found **no significant difference in mean TDPA** between the intervention and control communities. However, there was a significant **interaction** between **BMI z-scores** and community ( $p = 0.006$ ). In the intervention community, children with BMI z-scores less than 0.4 showed increased activity, while those with BMI z-scores greater than 0.4 showed decreased activity (Figure 1). This suggests that **playground upgrades** may **benefit children with lower BMIs** but potentially decrease activity in those with higher BMIs. Further studies are needed to confirm these findings.

## Background

Exposure to **parks** positively impacts health and promotes PA, particularly in disadvantaged neighborhoods. However, over half of park users in the U.S. engage in sedentary behavior. Park **aesthetics** and specific **features** are linked to **visitation** and **PA**. **Natural experiments** are crucial for studying the built environment's effect on activity levels, yet such research is rare due to financial and logistical challenges.

## Objectives

This study aims to examine whether **improvements** to **park** facilities in a **disadvantaged neighborhood** in **Victoria**, Australia, lead to changes in (1) **park use**, (2) the nature of **activities** (active or sedentary) undertaken in the park, and (3) whether these changes are **sustained** over time. The study involves refurbishing an intervention park and comparing it with a control park before and after the refurbishment.

## Design

**Intervention:** The study compared a refurbished intervention park (25,200 m<sup>2</sup>) with a control park (10,000 m<sup>2</sup>) in a disadvantaged neighborhood.

**Data:** Data were collected at baseline, post-improvement, and 12 months later.

**Outcome:** PA was assessed using SOPARC, recording gender, age group, and activity level every 15 minutes during three 1.5-hour periods daily over 9 days.

**Statistical Analysis:** Counts of park users, walkers, and vigorous activity were transformed and analyzed using two-way ANOVAs to examine park and time effects.

## Results

There was a significant **interaction** between **park** and **time** for the total counts of park users ( $F(2, 154) = 14.99, p < 0.0005$ ), counts of people **walking** ( $F(2, 154) = 11.70, p < 0.001$ ), and counts of people being **vigorously active** ( $F(2, 154) = 4.98, p = 0.008$ ).

**Intervention Park:** Increased total users, walkers, and vigorous activity at T2 and T3 compared to T1.

**Control Park:** Fewer users at T3 compared to T2; no changes in walkers or vigorous activity across time points.

## Background

Access to **green spaces** has been linked to improved health and wellbeing. Studies indicate that natural environments encourage PA, social interactions, and reduce stress, with stronger effects in **deprived communities**. However, the **quality** of green spaces significantly impacts these benefits. **Glasgow**, despite its abundant green spaces, shows disparities in access and quality, particularly in deprived areas.

## Objectives

This study aims to explore the **impact** of **urban woodland improvements** on a **deprived Glasgow community** through the WIAT (Woods In and Around Towns) scheme. The objectives are: 1. Assess if the WIAT intervention improves **community perceptions** of **environmental quality** and **Quality of Life (QoL)**. 2. Determine if the WIAT intervention increases **local woodland use** and **outdoor PA**. 3. Identify other **differences** in **perceptions** or **experiences** of local woodlands due to the WIAT intervention.

## Design

**Data:** Cross-sectional surveys pre- (2006) and post-intervention (2009). Random sampling within 500 m of green spaces, matching census profiles for age, gender, and socio-economic group. About 100 participants per community.

**Intervention:** Drumchapel (intervention) and Milton (comparison).

**Outcome:** Environmental perception, quality of life, woodland use, and PA.

**Statistical Analysis:** Mann-Whitney U tests compared pre- and post-intervention differences within and between sites.

## Results

**QoL and Environment:** Satisfaction increased more at the intervention site (+27%) than the comparison site (+19%).

**Use of Local Woodlands:** Visits increased significantly at the intervention site (+25%); no change at the comparison site.

**Outdoor PA:** Activity levels increased significantly at the intervention site (+25%); decreased at the comparison site (-17%).

**Experience and Perception:** Perception on local woodlands as places where they can pursue healthy activities increased at the intervention site (+28%); no change at the comparison site.

## Background

**Safe bicycling infrastructure** is crucial for increasing cycling rates among adults and children. Most studies have focused on on-street bicycle lanes and separated paths. **Bicycle boulevards**, low-volume streets designed for cycling, are less studied but preferred by cyclists. Research on new infrastructure's effects on cycling is limited by a **lack of longitudinal studies** with control groups.

## Objectives

The study aims to evaluate the **impact** of installing new **bicycle boulevards** on PA and **active transportation**. It hypothesizes that active transportation levels will increase in neighborhoods with the new infrastructure. The research focuses on comparing pre- and post-installation activity levels in treatment and control groups while accounting for socio-demographic factors and attitudes towards bicycling and walking. This longitudinal design aims to address the lack of controlled studies in existing infrastructure research.

## Design

**Data:** Longitudinal panel (2010–11 and 2012–13) of adults with children (n = 353) in Portland, Oregon, split between 8 treatment and 11 control street segments.

**Intervention:** Installation of bicycle boulevards on 8 street segments in Portland.

**Outcome:** Changes in PA and active transportation, measured by surveys, accelerometers, and GPS data.

**Statistical Analysis:** Difference-in-differences regressions (binomial logit, negative binomial, and linear regression, adjusting for demographic, geographic, and attitudinal covariates).

## Results

The **interaction** term (treatment \* post) was not significant for most models, indicating no significant effect of bicycle boulevards on daily MVPA, walking over 20 minutes, or making a bike trip.

**Weather:** Rain negatively affected bicycling over 10 minutes, making a bike trip, and minutes of walking.

**Proximity to Downtown:** Closer distance to downtown correlated with higher MVPA and more active transportation.

**Gender:** Women engaged in less MVPA and cycling.

**Attitudes:** Positive attitudes towards bicycling and walking were linked to higher engagement in these activities.

## Background

Providing well-maintained public open spaces like parks promotes **PA**, crucial as over half of Australian adults are inactive. Enhancing park quality supports health, especially in urbanized Sydney, where open spaces are dwindling. While park features are linked to increased activity, research on the **impact** of interventions like **outdoor gyms**, which offer free fitness opportunities, is limited and inconclusive.

## Objectives

This study aimed to assess the **impact** of installing and promoting an **outdoor gym** in a **park** on the PA levels of park users. It also aimed to examine the characteristics, motivations, enablers, and barriers for outdoor gym users. The research intended to provide evidence on how environmental interventions like outdoor gyms can influence recreational PA, addressing the lack of conclusive data on their effectiveness.

## Design

**Data:** Methods for data collection included SOPARC observations of park users' activity levels and demographics, and intercept interviews. 9 data collection periods.

**Intervention:** An outdoor gym was installed in March 2013 in a park located in Maraoubra, Eastern Sidney. No comparable parks were identified that could be considered as a control park for this study

**Outcome:** Measured changes in park user numbers, activity levels, and gym area usage before and after the intervention.

**Statistical Analysis:** Used descriptive statistics and chi-square tests-

## Results

**Overall Findings:** 23,905 park users observed: 36% baseline, 30% post-installation, 34% follow-up. Activity: 63% sedentary, 26% walking, 11% MVPA.

**Intercept Interviews:** 2266 interviews with a 65% response rate. Higher response from adults (70%) vs. seniors (50%).

**Activity Levels:** MVPA increased post-installation, then decreased slightly at follow-up. Notable increases in children and male adults.

**Outdoor Gym Use:** Usage doubled post-installation but remained higher than baseline at follow-up. MVPA at the gym increased from 6% to 36% post-installation and 40% follow-up.

**User Characteristics:** Gym users were often local residents and frequent park visitors.

## Background

Urban parks benefit mental and emotional health and support PA and social interaction. Evidence on how **park modifications influence usage** is limited. Some studies show that new equipment and landscaping can increase park use and activity, while others do not. Parks also promote PA through **dog-walking**, especially near off-leash areas.

## Objectives

This study aimed to assess how creating **off-leash areas** in urban parks **impacts the demographics of park visitors** and their **activity patterns**. It focused on whether these modifications could change visitor characteristics and the types and intensities of park-based activities.

## Design

**Data:** Observations were conducted in four Calgary parks (Alberta, Canada) from May to July in 2011 and 2012, collecting data on visitor demographics and activities.

**Intervention:** Taradale Park and Martindale Park. West Hillhurst and Meadowlark Parks: No changes; control sites.

**Outcome:** Measured changes in visitor demographics and activities.

**Statistical Analysis:** Used Chi-square tests with Bonferroni adjustments, binary logistic regression, and multiple linear regression to compare activity types and intensities, adjusting for visitor characteristics

## Results

**Visitor Characteristics:** More visitors in modified parks (Taradale and Martindale) in 2012 compared to 2011. **Martindale:** Increase in adults (41.3% to 56.5%,  $p < 0.05$ ) and weekend visitors (56% to 69.4%,  $p < 0.05$ ). **Taradale:** Increase in children and dog-related visits; decrease in proportion of afternoon visitors (72.5% to 55.5%,  $p < 0.05$ ).

**Visitor Activities:** walking, cycling, dog-related. **Martindale:** Decrease in dog-related activities (OR = 0.55, 95% CI [0.33, 0.93]). **Meadowlark:** Increase in walking (58.0% to 68.3%,  $p < 0.05$ ); decrease in cycling (25.9% to 15.9%,  $p < 0.05$ ).

**Activity Intensity:** No significant change in adult activity intensity in modified parks.

**Meadowlark:** Decrease in activity intensity ( $\beta = -0.44$ , 95% CI [-0.88, -0.01]).

Lower intensity for visitors with dogs (e.g., Taradale:  $\beta = -2.56$ , 95% CI [-2.87, -2.24]).

## Background

Many children and adolescents in Western countries do not meet the recommended 60 minutes of MVPA daily. The **built environment** significantly influences PA levels. **Public outdoor spaces** are crucial for promoting PA, especially in urban areas with limited private outdoor space. The neighborhood environment is particularly important for **children's** and **adolescents' PA** due to limited travel opportunities.

## Objectives

This study aims to evaluate the **impact** of **urban renewal** in the Haraldsgade district of Copenhagen on **adolescents' PA levels**. The renewal included **renovations** and **new constructions** of **green spaces**, **playgrounds**, and **sports facilities**. Adolescents aged 11–16 from local schools were assessed before (2010) and after (2012) the renewal using accelerometry and GPS to measure PA and location. The objective was to determine if these **urban changes** led to **increased PA** among **adolescents** in this deprived neighborhood.

## Design

**Data:** Adolescents aged 11–16 from four schools in the Haraldsgade district, Copenhagen, with 354 participants at baseline (2010) and 319 post-renewal (2012).

**Intervention:** From 2010 to 2012, a 35 million Euro urban renewal project in the Haraldsgade district.

**Outcome:** Time spent in the district and levels of PA, measured using accelerometers and location data with GPS trackers.

**Statistical Analysis:** General linear mixed models adjusted for age, gender, BMI, valid days, daily wear time, and residential status.

## Results

### PA in the District

**Total Time in District:** Increased by 24.6 minutes/day post-renewal ( $p = 0.017$ ).

**Light (LPA):** Increased by 7.8 minutes/day ( $p = 0.012$ ).

**MVPA:** Increased by 4.5 minutes/day ( $p < 0.001$ ).

**Sedentary Time (SED):** Increased by 13.1 minutes/day ( $p = 0.043$ ).

**Effect Moderation:** No significant differences based on gender, age, or district residency in time spent and activity level.

## Background



Sedentary behavior and obesity are highest in low-income, minority communities. Built environments, including parks and active transportation infrastructure, promote **PA**. However, these neighborhoods often lack walkability and face safety issues. Few studies have evaluated the influence of pedestrian infrastructure changes on park use and park-based **PA**.

## Objectives



This study aimed to evaluate the **impact** of **new pedestrian infrastructure** on **park use** and **park-based PA** in a low-income, predominantly African American community in Columbia, Missouri.

## Design



**Study Population:** Low-income, majority African American neighborhood in Columbia, Missouri, comprising 477 households, with 57% living below the poverty level.

**Intervention:** In 2013, a signalized pedestrian crosswalk with a median was installed to replace an unsafe pedestrian bridge, improving access to a local park. No control site.

**Data:** Data were collected over three years (2012-2014) using SOPARC, recording park use and PA by age, gender, and race/ethnicity.

**Statistical Analysis:** ANCOVA models, controlling for temperature, assessed changes in park use and **Energy Expenditure (EE)**.

## Results



**Total park use:** Increased from 2080 (2012) to 2275 (2013), then stable at 2276 (2014). Between 53% and 60% of the observed park-based PA was sedentary

**Changes in Total Park Counts:** Significant year effect on park counts ( $F = 114.98$ ;  $p < 0.001$ ). Increase from 2012 to 2013 ( $p < 0.001$ ), decrease from 2013 to 2014 ( $p < 0.001$ ). 2014 counts still higher than 2012.

**Changes in Total EE:** Significant year effect on total EE ( $F = 11.75$ ;  $p < 0.001$ ). Decrease from 2012 to 2013, maintained in 2014.

**Significant interactions between year and demographics for changes in total EE:**

Two-Way ANCOVA interaction (Year \* Age):  $F = 14.200$ ;  $p < 0.001$ . (Year \* Gender):  $F = 32.059$ ;  $p < 0.001$ . (Year \* Race/Ethnicity):  $F = 36.606$ ;  $p < 0.001$ .

## Background

**Local alcohol licensing** can modify availability and harms, yet granular evidence on **cumulative impact policies** (CIPs) is limited. In 2013, an English borough implemented a borough-wide Statement of Licensing Policy with seven Cumulative Impact Zones (CIZs) and earlier closing guidelines, enabling **natural-experiment evaluation** of **availability, sales** and **harm outcomes**.

## Objectives

Quantify immediate and **longer-term impacts** of the 2013 **SLP–CIP** on **licensing decisions**, temporal/spatial/economic **availability**, and **behavioural outcomes** (overall crime, anti-social behaviour, alcohol-related ambulance call-outs), comparing CIZs with non-CIZs using interrupted time-series methods.

## Design

**Data:** Licensing (2008–2016), ambulance (2008–2016), sales (2010–2016), crime/ASB (2011–2016).

**Population:** Borough premises/events, assigned to CIZs/non-CIZs.

**Intervention:** 2013 SLP–CIP creating 7 CIZs. Earlier closing guidelines by premise type.

**Outcome:** Applications, approval rates, trading hours/late closing; crime/ASB; ambulance; on-licence sales/units/value.

**Statistical analysis:** Interrupted time series (Prais–Winsten; Poisson), step/slope changes. Seasonality/autocorrelation addressed.

## Results

**Approval rates fell** immediately (CIZ: –28.6%, 95% CI [–39.7, –15.4]. Non-CIZ: –24.0%, 95% CI [–41.9, –0.7]).

Trading hours declined longer-term in non-CIZs (–4.8 h/week, 95% CI [–6.6, –2.9]).

On-licences: –10.2 h/week (95% CI [–16.0, –4.5]).

**Crime dropped** immediately (CIZ: –12.22%, 95% CI [–17.95, –6.09]. Non-CIZ: –7.97%, 95% CI [–13.96, –1.56]) but trends later rose.

**Ambulance call-outs** showed **no significant change**.

CIZ on-licence units fell over time (slope: –2060, 95% CI [–3033, –1087]).

## Background

Physical inactivity contributes to chronic diseases. Parks provide key opportunities for PA and health benefits. Despite significant investment, little evidence exists on the impact of **park refurbishments** on **visitation** and **activity**. Natural experiments suggest park improvements boost these metrics, but more research is needed, particularly on **playground installations** in **disadvantaged** areas, to guide equitable public health strategies.

## Objectives

To evaluate the **impact** of installing a **children's play-scape** in a **large metropolitan park** in a **low SES** area of **Melbourne**, Australia, this study compares park **visitation** and **park-based PA** between the intervention park and a control park. The primary objective is to assess whether the play-scape installation increases park visitation and PA among different age groups. This research aims to inform public health strategies by providing evidence on the benefits of park refurbishments, particularly in socio-economically disadvantaged areas, to promote equitable access to recreational facilities and PA opportunities.

## Design

**Data:** The study involved observations from SOPARC, path usage monitoring, car traffic counts, intercept surveys, and resident surveys.

**Intervention:** A \$1.1 million play-scape was installed in a large metropolitan park in a low SES area of Melbourne. The control park, located in a High SES area, had an older adventure playground.

**Outcome:** Park visitation and park-based PA levels among different age groups.

**Statistical Analysis:** Negative binomial regression models for analysing visitor and traffic counts. Logistic regression models for regular visitation and PA levels.

## Results

**Visitor counts** increased by 176% at the intervention park from T1 to T2 compared to the control park (IRR = 2.76, 95% CI [1.04, 7.33]). **Visitors** engaging in **MVPA** increased by 119% from T1 to T2 (IRR = 2.19, 95% CI [1.14, 4.20]) and by 128% from T1 to T3 (IRR = 2.28, 95% CI [1.19, 4.38]). **Visitation** at the **intervention park's play-scape** increased significantly from T1 to T2 (IRR = 18.12, 95% CI [5.51, 59.59]) and from T1 to T3 (IRR = 15.05, 95% CI [4.61, 49.16]). The odds of **children's regular visitation** to the intervention park increased at T2 (OR = 2.67, 95% CI [1.08, 6.64]). Other measures showed no significant differences between the parks.

## Background

In June 2013, a 1.5-mile **greenway** was built in a **disadvantaged**, predominantly **African-American neighborhood** in Philadelphia. The greenway included sidewalks, pedestrian signals, ADA ramps, and street trees. This study tests if the new greenway increases **MVPA**, as greenways can promote activity by serving as transit corridors and leisure destinations. Evidence in **low-income** areas is limited.

## Objectives

This study aims to **test** whether the **new greenway increases MVPA** levels in a **low-income urban area**. A **quasi-experimental pre-post design** is used to observe changes in PA. Additionally, an environmental audit documents changes in the greenway and comparison sites.

## Design

**Data:** Systematic observations using SOPARC. Post-construction intercept surveys were collected at the greenway (N = 175)

**Intervention:** A 1.5-mile greenway in a deprived neighborhood in Philadelphia. A 1-mile section of arterial streets in a demographically similar area served as a control.

**Outcome:** Changes in MVPA.

**Statistical Analysis:** Difference-in-difference analysis to compare changes in PA between the greenway and control sites. Hierarchical logistic models for estimating ORs of engaging in MVPA pre- and post-construction.

## Results

**PA Observations:** Pre-construction, 100 people per hour were observed using the greenway, with less than 20% engaging in MVPA. Post-construction, the number slightly increased to 116 per hour, with a small rise in MVPA. Cycling increased by 4%, and running or fast walking increased by 2%. However, these changes were similar to those in the comparison area. The adjusted analysis showed a 45% increase in MVPA odds at the greenway (OR = 1.45, 95% CI [1.06, 1.98]), but no significant difference between the greenway and comparison sites.

**Greenway User Characteristics:** Most users were local residents, with over 60% using the greenway daily, primarily for transportation rather than leisure. Users largely agreed that the greenway was an improvement and felt safe during the day (92%), though 58% felt unsafe at night. Many still noted pavement cracks post-construction.

## Background

**Urban parks** enhance neighborhoods and encourage **PA**. **Renovations**, guided by community input, can boost **park use** and **activity**. Despite their potential, few studies evaluate **renovations' long-term effects on MVPA**. Existing research often shows mixed results due to varying methodologies and typically includes only short-term assessments.

## Objectives

This study addresses this gap by examining **park use** and **MVPA** at three time points over six years, during which **five** of the six **parks** were **renovated** by the **San Francisco** Recreation and Parks Department (SFRPD). The goal is to assess both **immediate** and **longer-term impacts** of these **renovations** on **park use** and **PA**.

## Design

**Data:** Observations from SOPARC were made at three time points: baseline (2009), wave 1 (2012), and wave 2 (2015). Observations recorded user characteristics and activity levels, converted to METs.

**Intervention:** Five parks were renovated by the SFRPD, with community input influencing design features. One park served as a control with no renovations.

**Outcome:** Changes in park use and MVPA.

**Statistical Analysis:** Difference-in-differences approach with mixed-effect models to estimate short-term and long-term park renovation effects.

## Results

**Park Use and PA:** Renovated parks saw a net increase in users, while the unrenovated park had a decrease. Playground use tripled, and seating area use more than tripled. MET-hours per observation increased by at least 70% in all renovated parks. The unrenovated park saw a 45% decrease.

**Overall Impact:** Renovated parks had a 480% increase in users and a 636% increase in MET-hours from 2009 to 2015 ( $p < 0.001$ ). Short-term effects showed a 580% increase in users and 800% increase in MET-hours ( $p < 0.001$ ), while long-term effects were negative (-53% users and -60% MET-hours,  $p < 0.05$ ).

**Age Group Differences:** The effect sizes differed among age groups. The effects for children and adults were similar to the overall effects, but not for seniors and teenagers.

## Background

**Public Bicycle Share Programs (PBSPs)** provide rentable bicycles for short trips and aim to **increase cycling**, ease public transport connections, and reduce traffic congestion. Despite rapid expansion, the **impact** of **PBSPs** on overall cycling levels remains **unclear** due to limited and inconsistent studies.

## Objectives

This study aims to evaluate the **impact** of **PBSPs** on **population-level cycling** in eight North American cities from 2012 to 2014: newly implemented (Chicago, New York), existing (Boston, Montreal, Toronto), or no PBSP (Detroit, Philadelphia, Vancouver). It hypothesizes that **cities with newly implemented PBSPs** will show the **greatest increase in cycling**, followed by cities with existing programs. The study also examines potential **gender differences** in cycling behavior changes associated with PBSP implementation.

## Design

**Data:** 23,023 residents (aged 18+) across 8 North American cities.

**Intervention:** Implementation and presence of PBSPs. Cities with PBSPs had docking stations within 500m of participants' homes. For control cities, hypothetical service areas were assigned based on future docking station locations.

**Outcome:** Binary measure of self-reported cycling for any purpose (transportation or leisure) for at least 10 minutes in the past week.

**Statistical Analysis:** Triple difference-in-differences logistic regression. Sensitivity analysis and gender-stratified models were also used.

## Results

**Cycling Rates:** Past-week cycling increased from 18.1% in 2012 to 24.8% in 2013 and 24.5% in 2014. Men reported higher cycling rates than women, but both groups showed increases over time. PBSP usage rose from 9.0% in 2012 to 14.3% in 2014.

**Impact of PBSP on Cycling:** Logistic regression models showed higher odds of past-week cycling for those living near docking stations in cities with newly implemented PBSPs, with OR = 2.14 (95% CI [1.11, 4.12]) at the first follow-up and OR = 2.08 (95% CI [1.14, 3.77]) at the second follow-up, compared to cities with no PBSP. The effect remained significant after adjusting for covariates at the second follow-up (OR = 1.84, 95% CI [1.003, 3.39]). There was no significant change for cities with existing PBSPs.

**Gender:** Women in newly implemented PBSP cities showed higher cycling odds at the first follow-up (OR = 2.61, 95% CI [1.08, 6.32]), but this was not sustained.

## Background

In westernized countries, including Canada, the **winter holiday season** often leads to weight gain and **reduced PA**, particularly in sub-zero regions. Behavioural interventions during this period can prevent typical weight gains but may not reach all affected populations. The start of the year presents a critical time for adopting healthy habits. **Urban frozen waterway trails**, supporting **winter recreational activities**, offer a potential solution.

## Objectives

This study aimed to assess the **impact** of a **frozen waterway trail** on **user visits** and **PA** patterns. The main hypothesis was that **daily visits** to an urban trail network would significantly **increase** with the creation of a **frozen waterway** trail compared to days without it. Additionally, the study aimed to describe trail user demographics, PA levels, and perceived benefits.

## Design

**Data:** Daily user counts and field survey data during the 2017/2018 and 2018/2019 winter seasons. Participants were trail visitors, with a convenience sample of adults over 18 for surveys and pedometer data.

**Intervention:** Seasonal trail on frozen waterway for ~10 weeks post-Christmas in Winnipeg, Canada, featuring art displays and warming huts.

**Outcome:** Daily trail user counts using a PYRO-Box people counter. Secondary outcomes included PA levels and perceived health impacts.

**Statistical Analysis:** Multivariate regression and ARIMA models for user counts.

## Results

**Impact of Intervention on Visitors:** Daily trail visits increased 2- to 4-fold during the intervention in both 2017/2018 and 2018/2019 ( $p < 0.001$ ), with counts returning to pre-intervention levels post-intervention.

**PA Levels:** Users averaged 4195 steps and 39 minutes of activity per visit. 37% achieved 30 minutes of MVPA. Weekday users had more steps and MVPA than weekend users.

**User Profiles and Perceived Health Outcomes:** Of 466 users, 58% were female, 60% had incomes  $> \$50,000$ , and 58% were over 35. Most traveled  $\leq 15$  minutes to the trail and used it for recreation. Over 90% used the trail for  $> 30$  minutes per visit. 53% reported improved health and 58% noted better mental/emotional health.

## Background

Promoting **PA** in **children** is crucial for combating childhood obesity. Access to **PA spaces in neighborhoods** is important, but there is limited evidence on whether these spaces increase PA or if active families choose to live near them. While RCTs are ideal for establishing causality, they are impractical for assigning play facilities. **Natural experiments** offer an alternative by using variations in access to PA spaces to determine intervention effects.

## Objectives

This study aimed to assess the **impact** of 18 new **PA spaces** on children's **outdoor play** and **sedentary behavior** in Rotterdam. It also aimed to evaluate whether these effects varied by family income, parental education, and ethnicity. The primary hypothesis was that the **introduction** of **PA spaces** would significantly **increase outdoor play** and **reduce sedentary behavior** among children.

## Design

**Data:** Prospective birth cohort including 1841 children who were assessed at ages 6 and 10, with relevant data collected via parent-reported questionnaires.

**Intervention:** 18 new PA spaces introduced in Rotterdam from 2008 to 2015 in deprived neighborhoods to encourage PA among children.

**Outcome:** Outdoor play and sedentary behavior, measured via parent-reports. Secondary outcomes included sport participation and active transport to school.

**Statistical Analysis:** Fixed-effects regression models controlled for time-variant and time-invariant confounders. Sensitivity analyses tested different forms of exposure.

## Results

**Intervention Group** included 171 children. They were more often non-Western, less often participated in sports, and came from families with lower SES.

**Outdoor Play and Sedentary Behavior: Cross-Sectional Analysis:** Intervention group children played 40 min/week more outside (95% CI: -6, 87). With lower maternal education, outdoor play increased by 96 min/week (95% CI: 18, 174). Sedentary behavior differences were non-significant. **Buffer Analysis:** No effect on outdoor play (-25 min/week, 95% CI: -101, 51) or sedentary behavior (55 min/week, 95% CI: -57, 167). **Distance Analysis:** Reducing distance by 100 m had no effect on outdoor play (-3 min/week, 95% CI: -31, 25) or sedentary behavior (42 min/week, 95% CI: -16, 99).

**Sensitivity Analyses:** Consistent results across different buffer sizes, inclusion of movers, and varying exposure times.

## Background

**Cardiovascular diseases (CVD)** are the leading cause of death globally. In Europe, CVDs accounts for 3.9 million deaths annually, costing €210 billion. Evidence suggests that **greenspace** is associated with reduced CVD mortality through promoting **Physical Activity (PA)**, a key factor in CVD prevention. This study examines the link between greenspace and incident CVD, considering PA as a **potential mediator**.

## Objectives

The study aims to **assess** the **link** between neighborhood **greenspace** and **incident CVD** using longitudinal data. It evaluates if **PA** is a **mediating factor** in this relationship, using hospital data for CVD verification and detailed greenspace measurements. The research advances prior work by focusing on incident CVD as a critical public health issue influenced by **modifiable behaviors**.

## Design

**Data:** Longitudinal health and lifestyle data from the EPIC Norfolk, UK cohort.

**Outcome:** Incident CVD identified through hospital admission records.

**Neighborhood greenspace:** Percentage of greenspace around homes, measured using classified satellite imagery.

**PA measurement:** Activity levels assessed from questionnaire. **Covariates:** Age, sex, Body Mass Index (BMI), diabetes, socio-economic status (SES).

**Statistical analysis:** Cox regression models to determine the impact of greenspace on CVD incidence.

## Results

**Participant profile:** Mean age was 59.2 years, 54.7% female, with a mean follow-up of 14.5 years.

**Greenspace vs. CVD:**

- Residents in the greenest quartile saw a 7% reduced hazard for CVD (HR = 0.93, 95% CI [0.88, 0.97],  $p = 0.003$ ) after adjustment.
- Predicted CVD incidence could drop by 4.8% in the least green areas if greenspace increased to average levels (HR = 0.95, 95% CI [0.91, 0.99],  $p = 0.003$ ).

**PA's role:** PA did not act as a mediator (HR = 0.99, 95% CI [0.97, 1.01],  $p = 0.416$ ).

**Occupation:** The greenspace-CVD association was non-significant in manual workers.

## Background

Individuals in deprived inner cities face high rates of obesity, diabetes, cancer, and cardio-metabolic conditions due to stress and physical inactivity. These conditions incur significant medical costs. Low-income neighborhoods exhibit low PA and high stress, leading to chronic disease. **Greenspaces**, like parks, promote **PA** and **reduce stress**, with 'green PA' proving more effective than indoor or non-green outdoor PA.

## Objectives

The StAND study aims to observe the **effects** of **park ecological restoration** on **PA**, **stress**, and **cardio-metabolic health** over three years. The **hypotheses** are:

1. Increased PA in intervention (INT) park neighborhoods.
2. Increased 'green PA' in INT park neighborhoods.
3. Visual and auditory exposures affect PA levels.
4. Lower stress levels in INT park neighborhoods.
5. Higher PA and 'green PA' correlate with lower stress.
6. Visual and auditory exposures affect stress levels.
7. Improved A1C and CRP in INT park neighborhoods.
8. Lower blood pressure, BMI, and hip-to-waist ratios in INT park neighborhoods.

Primary study

## Design

The Study of Active Neighborhoods in Detroit is a **quasi-experimental**, longitudinal panel **natural experiment** with two conditions (**restored park** intervention (INT) and control (CNT)) and annual measurements at baseline and 3-years post-restoration. **Intervention:** Restoration (n = 4 parks) involves replacing non-native plants and turf with native plants; creating trails; posting signage; and leading community stewardship events. The CNT condition (n = 5) is an unmaintained park, matched to INT based on specified neighborhood conditions.

## Results

Authors reported problems in implementing the study protocol. See:

Pearson, A. L., Pfeiffer, K. A., Buxton, R. T., Horton, T. H., Gardiner, J., & Asana, V. (2023). Four recommendations to tackle the complex reality of transdisciplinary, natural experiment research. *Frontiers in Public Health*, 11, 1240231. <https://doi.org/10.3389/fpubh.2023.1240231>

## Background

By 2050, 84% of Europe's population is expected to live in cities. Urban ecosystems need to support higher quality of life and sustainability. **Urban green spaces** (UGSs) are vital for **physical** and **mental health**, economic, and environmental wellbeing. However, UGSs face threats from urban development. While evidence shows UGSs benefits, such as improved health and social inclusion, they are **not equitably distributed**.

## Objectives

The aim of this study is to investigate the public health impact of the Connswater Community Greenway (CCG), an **urban greenway intervention**, on **PA, health, wellbeing**, social capital, and perceptions of the environment. The study focuses on understanding the influence of this systems-level intervention, with outcomes stratified by exposure to the CCG and levels of deprivation.

## Design

**Data:** Adult residents ( $\geq 16$  years) within a 1-mile radius of the greenway (intervention) and beyond 1-mile (control). Repeated cross-sectional survey was conducted pre-intervention (2010/2011) and 6 months post-intervention (2016/2017).

**Intervention:** £40 million urban regeneration including a 9 km greenway in Belfast.

**Outcome: Primary Outcome:** PA. **Secondary Outcomes:** Quality of life, mental wellbeing, social capital, and perceptions of the built environment.

**Statistical Analysis:** Linear regression and Multi-level models with random intercepts. Ordered logit for assessing changes in the social patterning of outcomes over time.

## Results

**PA: Pre-intervention:** 68% met guidelines. **Post-intervention:** 65% within  $\leq 400$  m (adjusted OR = 0.60, 95% CI [0.35, 1.00]), 60% within  $\geq 1200$  m (adjusted OR = 0.64, 95% CI [0.41, 0.99]). **Deprivation:** Similar reduction in PA across all quintiles.

**Quality of Life: Intervention Area:** Declined less than **control** (adjusted difference in mean EQ5D: -11.0, 95% CI [-14.5, -7.4] vs. -30.5, 95% CI [-37.9, -23.2]).

**Mental Wellbeing:** No significant change observed.

**Social Capital:** Improvements in some indicators.

**Environmental Perceptions:** Increased attractiveness, traffic, and safety perceptions.

## Background



Evidence links **alcohol outlet availability** to **consumption**, but **longitudinal** individual-level **studies** are **scarce**. **Pennsylvania's 2016 regulatory liberalisation** created a natural setting to examine whether short-term increases in off-premise outlets relate to changes in adults' drinking.

## Objectives



Assess cross-sectional and 1-year longitudinal associations between off-premise **outlet density/proximity** and **alcohol use** (days/week, drinks/week, high consumption, binge drinking), and test whether associations differ in Pennsylvania versus neighbouring states without major regulatory change.

## Design



**Data:** Population-based cohort (2016–2018, N=772 baseline, N=714 longitudinal).

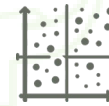
**Population:** Adults  $\geq 21$  years in PA, NJ, DE.

**Exposure/Intervention:** Change in off-premise outlet density (1.6 km buffer) and proximity amid PA liberalisation (Act 39). NJ/DE as comparators.

**Outcome:** Drinking days/week, drinks/week,  $\geq 8$  drinks/week, binge  $\geq 1/30$  days.

**Statistical analysis:** Adjusted Poisson, logistic, and multinomial logit models.

## Results



**Cross-sectional:** highest outlet density vs lowest—drinking days (ratio = 1.28, 95% CI [1.08, 1.52],  $p = 0.005$ ), drinks/week (ratio = 1.34, 95% CI [1.21, 1.49],  $p < 0.001$ ), high consumption (OR = 1.97, 95% CI [1.08, 3.62],  $p = 0.028$ ).

**Longitudinal:** increased outlet density  $\rightarrow$  higher odds of increasing drinking days (OR = 1.64, 95% CI [1.00, 2.68],  $p = 0.049$ ), drinks/week (OR = 1.55, 95% CI [0.95, 2.55],  $p = 0.081$ ).

No binge associations.

No PA–state interaction.

## Background

Meeting national PA guidelines is crucial for preventing chronic diseases and enhancing QoL. Built environment strategies, such as **park availability** and amenities, are known to promote **PA**. Research indicates that combining these with formal programming activities has a greater impact on PA. **Natural experiments**, which evaluate interventions before and after implementation, and **community engagement** in **park improvements** can further boost PA levels.

## Objectives

The objective of this study was to **evaluate** whether built environment **changes** in **two suburban parks** outside Denver, Colorado, involving **community engagement** and **PA programming**, **increased park use** and **PA levels**. This natural experiment tracked community participation in the redesign process, diversity of partners on the steering committee, and measured park use and PA before and after improvements using the SOPARC instrument.

## Design

**Data:** Residents of a suburban community near Denver, Colorado, participated in redesigning two parks from 2015 to 2018.

**Intervention:** Park A added a trail, fitness equipment, natural pavilion, benches, and picnic shelter. Park B added a trail, dog park, fitness equipment, picnic shelter, benches, trees, and lighting. Community engagement included planning meetings.

**Outcome:** Changes in average park users and activity levels, using SOPARC to measure park use and PA levels before and after improvements.

**Statistical Analysis:** T-tests and Chi-square tests compared baseline and follow-up.

## Results

Twenty-one community meetings, with 10-100 attendees each, and annual park festivals increased community engagement. The steering committee had 47 partners, including residents, community organizations, local businesses, government agencies, faith-based organizations, and educational institutions.

**Park A:** Visitors increased by 53% ( $p < .05$ ), mainly in the evenings. Very active visitors increased from 20% to 24%; sedentary visitors decreased from 45% to 41% (not significant).

**Park B:** Visitors increased by 50% ( $p = .10$ ), with significant evening increases ( $p < .0001$ ). Very active visitors decreased from 21% to 15%; sedentary visitors increased from 40% to 43% (not significant); walking visitors increased from 39% to 42% (not significant).

## Background

The research builds on the premise that **multi-use trails** offer a viable solution for encouraging active lifestyles within urban populations.

Authors highlight the inherent **challenges** of **Randomised Clinical Trials** (RCTs) and the previous shortcomings of **natural experimentation** methods in assessing the impact of the built environment on health outcomes.

## Objectives

To determine if the **expansion** of **multi-use PA trails** in an urban centre (**Winnipeg, Canada**) is associated with reduced rates of **incident CVD** events - CVD-related mortality, ischemic heart disease, cerebrovascular events and congestive heart failure - and **CVD risk factors** - hypertension, diabetes and dyslipidemia -.

## Design

**Data:** Administrative health, census and built environment data.

**Intervention:** Building of four multi-use trails, 2010-2012.

**Population:** Winnipeg residents aged 30 years and older.

**Outcome:** Major CVD events and risk factors.

**Statistical analysis:** Difference-in-differences regression with propensity score matching.

**Citizen participation** in all phases of the study.

**Protocol study** at [clinicaltrials.gov](https://clinicaltrials.gov)

## Results

**Trail use:** Most users (over 85%) travelled less than 15 minutes to access the trail.

**Comparison between intervention and control** ( 400 m buffer):

- **CVD events:** In intervention areas the incidence rate was a non-significant 6% higher compared to control areas (IRR = 1.06, 95% CI [0.90, 1.24],  $p = 0.51$ ).
- **CVD risk factors:** In intervention areas the incidence rate was a non-significant 8% lower compared to control areas (IRR = 0.92, 95% CI [0.84, 1.02],  $p = 0.10$ ).

**Sensitivity:** In areas near the longest and most used trail (400 m buffer), the incidence rate of CVD risk factors was 15% lower compared to control areas (IRR = 0.85, 95% CI [0.75, 0.96]).

## Background

**Overall health** and **QoL** are influenced by individual and environmental factors, including urban planning choices. **Urban interventions**, like low-emission zones, have been implemented to improve conditions but **lack extensive real-life health assessments**. The **natural experiment** approach can help evaluate such interventions. Studies show mixed results on health impacts due to methodological challenges.

## Objectives

The UrbASanté study aims to assess how **urban interventions impact environmental exposures, health-risk behaviors, and self-reported health** using a natural experiment protocol in **Paris**. Specific objectives are to: (i) develop methods to assess and monitor these factors, (ii) collect relevant local data during experimentation, and (iii) analyse the data to understand the effects of urban transformations on health and inform public health and urban planning policies.

## Design

The study employs a **natural experiment** with a before/after protocol to evaluate **changes in environmental exposures, health-risk behaviours, and self-reported health** among residents in Paris. Data will be collected from intervention and control neighbourhoods at baseline (T0, 2022) and follow-up (T1, 2025). The **intervention** area, Porte de la Chapelle, will undergo **urban changes**, while control areas will not. Participants must be adults residing in the neighbourhoods and able to complete the survey. Recruitment will utilize various community outreach methods. Analyses will include multivariate regressions and spatial models to assess changes over time.

## Results

Results are not yet available as the cited paper is a recent study protocol.

## Background

This study investigates how the **availability** of different **food retail** types like supermarkets and produce markets affects **CVD** and **diabetes** incidence among older adults. Natural experiments and prospective studies suggest variable health impacts related to food store availability, highlighting the **complexity** of linking **food retail changes** to **health outcomes**.

## Objectives

This study aims to evaluate the **impact** of the **presence of food retail types** (supermarkets/produce markets vs. convenience/fast food outlets) on the **incidence** of **CVD** and **diabetes** among older adults. Using longitudinal data from the Cardiovascular Health Study (CHS), it assesses how changes in nearby food retail environments influence health outcomes in an older population, considering the effects of newly available or consistently present food retail options.

## Design

**Data:** Adults aged 65+ from the CHS, with 2,939 and 2,497 included for CVD and diabetes analyses, respectively.

**Outcome:** Incident CVD and diabetes, tracked via adjudicated events and elevated serum glucose or medication use.

**Statistical Analysis:** Cox proportional hazards regression assessing time-to-event based on food retail type presence (supermarkets/produce markets vs. convenience/fast food), adjusted for demographics and health.

Adjustments for individual and area-based confounders

## Results

### CVD incidence:

- Baseline supermarket/produce market presence within a 1-km radial buffer was associated with excess incident CVD before adjustment (HR = 1.12, 95% CI [1.01, 1.24]). The association was attenuated and no longer statistically significant after adjustment (HR=1.02, 95% CI [0.90, 1.15]).
- Time-varying presence of convenience/fast food retail within 1-km buffers was not significantly associated with incident CVD.

### Diabetes incidence:

- Neither supermarket/produce market nor convenience/fast food retail was associated with incident diabetes.

## Background

**Outdoor smoke-free policies** reduce second-hand smoke, yet beach-specific evidence in Europe is limited. **Barcelona** piloted **smoke-free beaches** using a mayoral decree, communication campaign and on-site information, enabling a **quasi-experimental assessment** of behavioural impact and acceptability during the 2021 bathing season.

## Objectives

Assess whether **Barcelona's smoke-free beaches** reduced (i) self-reported witnessing of smoking and (ii) directly observed smoking, and evaluate user satisfaction, by comparing four intervention beaches with five comparison beaches before (15–28 May 2021) and after (29 May–12 September 2021) implementation.

## Design

**Data:** Face-to-face surveys (n=3751) and systematic observations (n=1108).

**Population:** Beach users ≥16 years.

**Design:** Quasi-experimental pre–post with comparison group across nine beaches.

**Intervention:** Mayoral decree (from 29 May 2021) banning tobacco on four beaches, plus media/social-media campaign, beach signage, loudspeaker reminders and trained informant teams.

**Outcome:** Witnessing smoking in last fortnight; users observed smoking.

**Statistical Analysis:**  $\chi^2$  tests and robust Poisson regressions estimating adjusted PRs.

## Results

**Witnessing smoking** fell more on **intervention** beaches (pre 87.2%→post 49.7%) than comparison (86.2%→74.1%); (PR = 0.7, 95% CI [0.6, 0.8]).

**Observed smoking** decreased on **intervention** (3.8%→3.0%) but rose on comparison (2.3%→9.9%); (PR = 0.3, 95% CI [0.3, 0.4]).

**Satisfaction:** 8.3/10 (intervention) vs 8.1/10 (comparison).

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