Joint effects of walkability and parental perceived neighbourhood safety on likelihood of active travel to school:

A longitudinal follow-up of the Wixx campaign

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Wixx:

A multimedia communication campaign

Modelled after: the Verb Campaign **(Huhman et al., 2010)**

Launched by: Quebec en Forme

Aims: promote physical activity among tweens in Quebec by increasing their

- knowledge, attitudes, self-efficacy, social norms
- social support
- awareness about opportunities for physical activity
- physical activity levels

(Laferté et al., 2014)

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Wixx components

- Branding Advertising
- Partners' Wixx zones
- Promotion & Public relations
- Internet Platforms

(Laferté et al., 2014)

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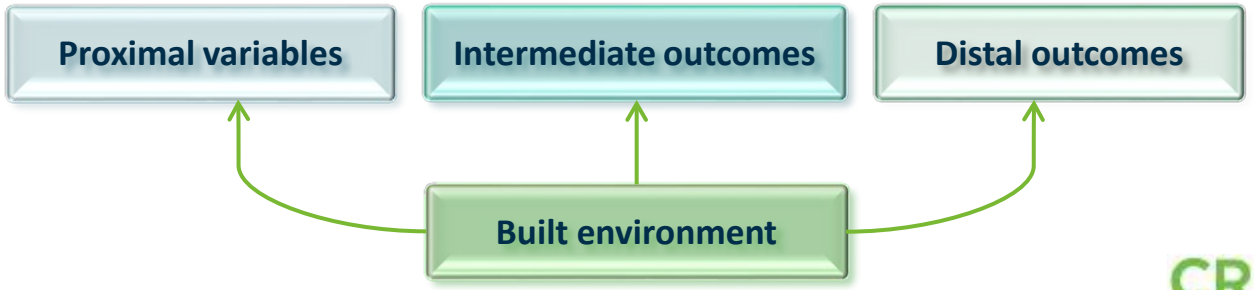
The Wixx Evaluation Project (1)

Evaluation Framework: Logic Model
(Lemay, Lagarde, & Gauvin, 2012)

Conceptual Framework: The Hierarchy of Effects
(Bauman et al., 2008)



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The Wixx Evaluation Project (2)

Samples: N_{2012}=1000 dyads N_{2013}=1001 dyads

Aim: environment's moderating influence on changes in active transportation to school (ATS) between 2012 and 2013

Subsamples (Urban Québec):

n_{2012}=809 dyads

n_{2013}=810 dyads

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Methods

- **Data sources:**
  - **Individual data: 2012 and 2013 cross sectional surveys**
  - **Built and socio-economic environment data**
    - **Canadian Census (2011) and the NHS (2011)**
    - **Addresses Québec 2.0 (2011): postal codes and street networks**
    - **Taxation database Provincial Ministry (MAMROT, 2012)**
- **Procedure: GIS to link individual, built environment, and socio-economic environment data**
- **Analysis: Binary logistic regression to predict change in ATS across time as a function of walkability, perceived safety, deprivation, after controlling for socio-demographic variables**

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Methods: Measures (1)

- **Outcomes:**
  - **Child report travel mode**
  - **Parent report number of days**

- **Individual variables:**
  - **Socio-demographics**
  - **Perceived safety**
  - **Child weight status** (DeOnis et al., 2007)

Passive passive + mixed	**Active** walk + cycle
Passive 0-2 days	**Active** 3-7 days
At ease to let my child travel actively disagree	**At ease to let my child travel actively agree**
Underweight or normal weight	**Overweight or obese**

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Methods: Measures (2)

- **Area-level measures:**
  - **Dissemination Area (DA) measure:**
    Prevalence of low income
  - **Buffer-level measures:**
    walkability 800 & 1200 m
    (Frank et al., 2010; Forsyth et al., 2012)

$$\frac{\Sigma \text{ people low income (DA)}}{\Sigma \text{ people (DA)}}$$

Low deprivation

High deprivation

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Results

	Child OR (95%CI)	Parent OR (95%CI)
Walkability 800 m	**1.17*** (1.12, 1.23)**	**1.16*** (1.11, 1.22)**
Perceived safety	**3.79*** (2.93, 4.90)**	**3.54*** (2.75, 4.57)**
Time	1.02 (0.80, 1.31)	1.13 (0.88, 1.44)

*** p < 0.05; ** p < 0.01, *** p < 0.001**

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Results

	Child OR (95%CI)	Parent OR (95%CI)
Walkability 800 m	**1.19*** (1.10, 1.30)**	**1.17***(1.08, 1.27)**
Perceived safety	**1.99*** (1.42, 2.80)**	**1.82** (1.30, 2.56)**
Time	0.37 (0.24, 0,59)	0.38 (0.24, 0.60)
Walkability 800 m * Time	1.01 (0.92, 1.12)	1.06 (0.96, 1.17)
Walkability 800 m * Perceived safety	0.97 (0.88, 1.07)	0.96 (0.87, 1.06)
Perceived safety * Time	**4.59*** (2.65, 7.93)**	**4.95*** (2.87, 8.55)**

*** p < 0.05; ** p < 0.01, *** p < 0.001**

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Results

	Child OR (95%CI)	Parent OR (95%CI)
Walkability 800 m	**1.18*** (1.07, 1.29)**	**1.16***(1.06, 1.27)**
Perceived safety	**1.97*** (1.40, 2.78)**	**1.82** (1.29, 2.54)**
Time	0.36 (0.22, 0.59)	0.36 (0.22, 0.60)
Walkability 800 m * Time	1.06 (0.89, 1.25)	1.10 (0.93, 1.30)
Walkability 800 m * Perceived safety	0.99 (0.87, 1.13)	0.97 (0.86, 1.10)
Perceived safety * Time	**4.90*** (2.71, 8.86)**	**5.22*** (2.88, 9.43)**
Walkability 800 m * Perceived safety * Time	0.94 (0.76, 1.15)	0.95 (0.77, 1.17)

*** p < 0.05; ** p < 0.01, *** p < 0.001**

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Results

	Child OR (95%CI)	Parent OR (95%CI)
Walkability 800 m	1.16** (1.05, 1.27)	1.14** (1.04, 1.25)
Perceived safety	1.95*** (1.38, 2.75)	1.79** (1.27, 2.52)
Time	0.36***(0.22, 0.59)	0.37***(0.22, 0.60)
Walkability 800 m * Time	1.05 (0.89, 1.24)	1.09 (0.92, 1.28)
Walkability 800 m * Perceived safety	0.99 (0.87, 1.12)	0.97 (0.86, 1.10)
Perceived safety * Time	4.98*** (2.75, 9.02)	5.32*** (2.94, 9.63)
Walkability 800 m * Perceived safety * Time	0.95 (0.77, 1.16)	0.96 (0.78, 1.18)
Deprivation	1.34 (0.96, 1.86)	1.36 (0.98, 1.89)

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* p < 0.05; ** p < 0.01, *** p < 0.001

Results

	Child OR (95%CI)	Parent OR (95%CI)
Walkability 800 m	**1.16** (1.06, 1.28)**	**1.14** (1.03, 1.25)**
Perceived safety	**1.93*** (1.36, 2.74)**	**1.75** (1.24, 2.48)**
Time	**0.37*** (0.22, 0.61)**	**0.37***(0.22, 0.61)**
Walkability 800 m * Time	1.06 (0.89, 1.25)	1.10 (0.93, 1.30)
Walkability 800 m * Perceived safety	0.98 (0.86, 1.12)	0.97 (0.86, 1.10)
Perceived safety * Time	**5.14*** (2.81, 9.39)**	**5.49*** (3.02, 9.96)**
Walkability 800 m * Perceived safety * Time	0.93 (0.76, 1.16)	0.95 (0.77, 1.17)
Deprivation	1.16 (0.82, 1.63)	1.19 (0.85, 1.67)
Child sex	**0.74* (0.57, 0.95)**	0.92 (0.71, 1.18)
Child physical impairment	0.83 (0.40, 1.71)	0.89 (0.44, 1.81)
Child grade level	**2.25*** (1.64, 3.07)**	**1.63** (1.20, 2.21)**
Parent sex	0.82 (0.63, 1.07)	1.09 (0.84, 1.41)
Parent education	1.18 (0.83, 1.68)	1.26 (0.89, 1.78)
Family income	**1.62* (1.09, 2.41)**	**1.52* (1.03, 2.25)**
Weight status	1.27 (0.96, 1.68)	1.10 (0.83, 1.45)

*** p < 0.05; ** p < 0.01, *** p < 0.001**

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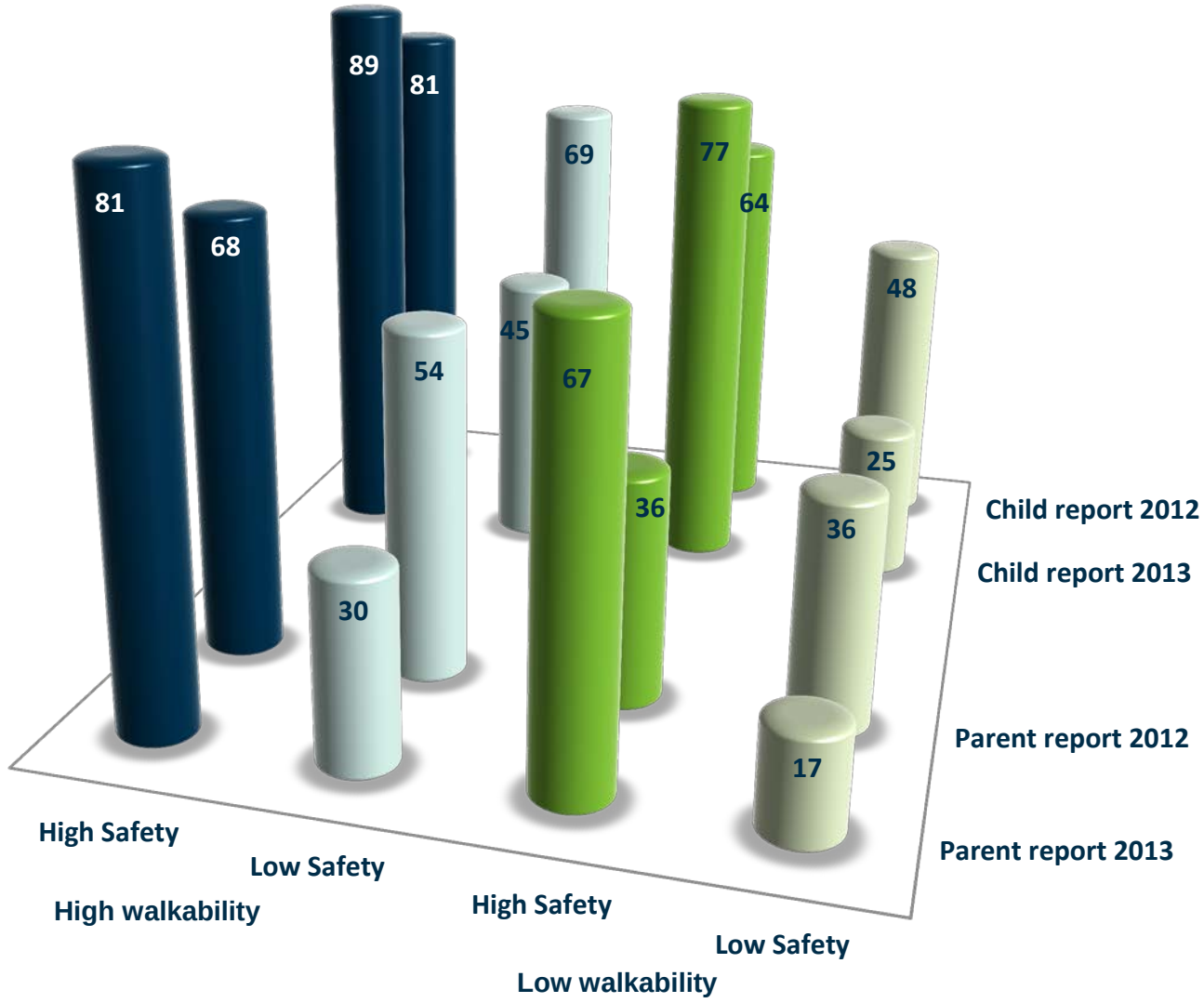
Predicted probability of active travel by walkability and safety (%)



Kendall τ-b = 0.72**

Illustrated for primary school boys, no impairment, mothers with less than HS education and family income lower than CAN$40,000, high deprivation area, normal or underweight weight status

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Discussion:

Main findings

- **Greater likelihood of ATS associated with**
  - **Higher walkability**
  - **Higher perceived safety**
- **Change in patterns of associations from 2012 to 2013**
  - **Perceived safety more strongly associated with ATS in 2013 in comparison to 2012**

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Discussion:

Further directions

- Examine differential effects as a function of exposure to and recall of Wixx
- Examine changes in perceived safety across time and link to exposure to and recall of Wixx
- Examine differential effects of weather

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Discussion:

Methodological issues

- **Buffer size suitable:**

  Variable buffers over 5 waves?

- **Thresholds in Greater Montreal:**

  Drop off zones at 0.8 – 1 km; is it enough?

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Limitations & Strengths

- Self-report
- No account for distance to school or objective safety
- Difficulty in linking changes to the Wixx campaign
- GIS
- Representative samples
- Associations replicated across buffers and parent & child reports

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Implications

- **Focus on neighbourhood**
  - **Retrofitting**
  - **Prioritization strategies in areas where danger, disadvantage, and disengagement overlap** (Cuellar, Jones, & Sterrett, 2015)

- **Focus on school: Involving Wixx in school travel planning** (Mammen et al., 2014)

Wixx educational programs Pedestrian skills	**Infrastructure improvement** ATS amenities / Wixx labelling
Wixx walking bus activities Visibility of Wixx ATS	**Enforcement** ATS-friendly measures / Wixx volunteers

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Conclusions

- **Targets of future interventions:**

  improving walkability and safety using strategies that do not improve one at the expense of the other

Acknowledgments

www.operationwixx.ca

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Thank you!

Predicted probability of active travel by walkability and safety (%)