

## TRANSPORT FINDINGS

# Toward an Understanding of Disabled Persons' Satisfaction with Pedestrian Infrastructure in Toronto, Canada.

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## Findings

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The experiences of disabled persons with pedestrian infrastructure (PI) is a human rights, social justice, political, and planning and design issue. We used ordinal logistic regression to study disabled persons' satisfaction with PI in Toronto, Canada. Disabled people who identify as men and people from higher income households reported greater satisfaction with PI conditions. In rank order, greater contrast in levels of satisfaction appear related to sidewalk conditions, construction zones, and streets and related facilities.

## 1. QUESTIONS

Disabled persons have a troubling history of difficult experiences with barriers in cities and with transportation systems (Bezyak, Sabella, and Gattis 2017; Buliung 2024a; Galer 2023). Cracked/broken sidewalk pavements, snow/ice, absent curb cuts, objects littering/blocking sidewalks, multi-modal conflict points, and stepped entries are just some of the design or infrastructure conditions that can produce mobility barriers for disabled persons (Buliung 2024b; Desai et al. 2023; Kapsalis, Jaeger, and Hale 2024; Soares Müller et al. 2023). Limitations on access to employment, personal safety risk, and reduced social contact are some of the impacts of such barriers (Galer 2023; Schwartz et al. 2022; Ripat et al. 2018).

We examine the experience of disabled persons in Toronto, Canada in regard to two aspects of public infrastructure: (1) level of satisfaction with pedestrian infrastructure (PI) in general across types of disability, and (2) understanding the relationship between barriers in the pedestrian environment (e.g., sidewalks, construction, etc.), and PI satisfaction. Inclusion of a range of disability types (e.g., physical, sensory, etc.) in this paper is noteworthy. Throughout the paper we use identity first language (disabled person), while acknowledging variation in personal or institutional preferences for person first language (person with disability) (Ferrigon and Tucker 2019).

## 2. METHODS

In 2022 Toronto City Council requested that the Transportation Services Division conduct a public consultation and develop an action plan to address construction zone impacts on the mobility of disabled persons. Concerns

about construction zones were surveyed within the context of other types of barriers in the pedestrian right of way. Recruitment relied on pre-existing on-line panels and advertising through key public locations including libraries, shelters and community housing. Inclusion criteria: respondent lived within the City of Toronto *and* either identified as having one or more disabilities or health conditions or worked as a disabled person's caregiver. Disability categories and inclusion criteria were informed by the [Canadian Survey on Disability](#). Recruitment and primary analysis were managed by The Strategic Counsel, a research consulting firm hired by the City of Toronto.

This paper presents a secondary re-analysis of the survey data. The consultants' relied on descriptive statistical analysis and bivariate hypothesis testing. We use ordinal logistic regression (OLR) analysis to explore the relationship between PI satisfaction and intra-personal characteristics, residential context, and the relative importance and subjective experience of barriers reported by disabled persons. The OLR approach produces greater clarity in regard to the direct and relative effect of particular characteristics on satisfaction levels. Model specification is informed in part by a socio-ecological perspective, i.e., there are multiple scales of influence, from the body/intra-personal to the environmental/contextual on health and in this case transport outcomes (Sallis and Owen 2002).

The ordinal outcome variable has five categories; Very Dissatisfied to Very Satisfied, in response to the question: "Overall, how satisfied are you with the pedestrian infrastructure on city streets including sidewalks, intersections, crosswalks?" The survey was conducted between January 6<sup>th</sup> – 23<sup>rd</sup>, 2023. Data cleaning, including responses of disabled persons only (removing proxy reports from caregivers), and only respondents reporting pre-tax household income (due to protective income effects) produced a sample of 664 persons. Each person could report one or more types of disability. People reported multiple (48%), physical (26%), mental health (24%), pain/illness (19%), cognitive (15%), sensory (11%), and other disabilities (4%) ([Figure 1](#)).

The authors share a preference for thinking about disability as being produced through interacting contemporary, historical, social and economic factors and processes (Oliver 2013). The survey asks respondents to focus less on the external elements of disability and more on their bodies and even their clinical diagnoses. The research question focuses on how environmental features – in this case pedestrian infrastructure – can be disabling.

### 3. FINDINGS

Individual experiences may vary considerably from what we are reporting in [Table 1](#). Lack of statistical evidence does not de-value individual experiences nor does it abdicate institutions of their legislative compliance responsibilities. We found no statistically significant variation in

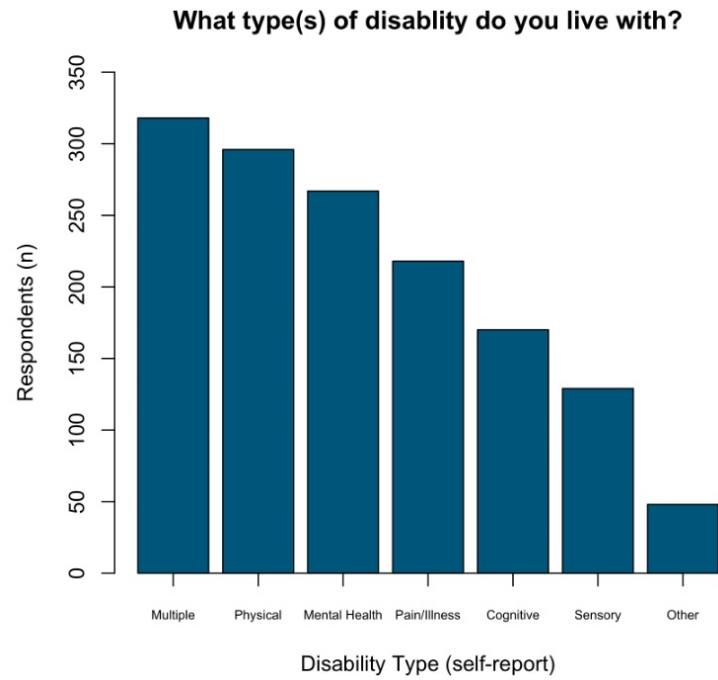


Figure 1. Sample by Type of Disability

Table 1. Ordinal Logistic Regression Results<sup>a</sup>

| Variables <sup>b,c</sup>                              | OR       | CI              |
|-------------------------------------------------------|----------|-----------------|
| <b>Personal and Location</b>                          |          |                 |
| Disability Type (physical v. other)                   | 0.946    | (0.590 – 1.517) |
| Age (≥ 65 years)                                      | 1.119    | (0.791 – 1.584) |
| Gender (male v. other)                                | 1.300**  | (1.050 – 1.585) |
| Income (≥ \$70k)                                      | 1.912*   | (0.973 – 1.600) |
| Residence in Old Toronto/<br>East York <sup>d</sup>   | 0.997    | (0.710 – 1.400) |
| Postal Zone Sidewalk Density <sup>e</sup>             | 0.677    | (0.424 – 1.082) |
| <b>Barriers (top 3)</b>                               |          |                 |
| Sidewalks                                             | 0.400*** | (0.318 – 0.503) |
| Streets, Intersections, Crosswalks, Bike lanes (SCIB) | 0.649*** | (0.522 – 0.807) |
| Construction                                          | 0.627*** | (0.484 – 0.810) |
| Street Furniture and Other Pedestrian Amenities       | 0.798    | (0.577 – 1.104) |
| Storefront Clutter                                    | 0.817    | (0.605 – 1.102) |
| Seasonal Maintenance                                  | 0.907    | (0.730 – 1.126) |
| Other                                                 | 0.945    | (0.590 – 1.517) |

$n = 664$

OR: odds ratio

CI: 95% odds ratio confidence interval

\*\*\*  $p \leq .001$ , \*\*  $p \leq .05$ , \*  $p \leq .10$

<sup>a</sup>: models were estimated using the R-package MASS

<sup>b</sup>: fully specified model improves over null model (\*\*  $p \leq .001$ )

<sup>c</sup>: VIF analysis allayed any concerns regarding multicollinearity

<sup>d</sup>: Old Toronto/East York tends to have more transit options and pedestrian infrastructure

<sup>e</sup>: log transformed, postal zone (finest available scale) used for ethical (anonymity) reasons

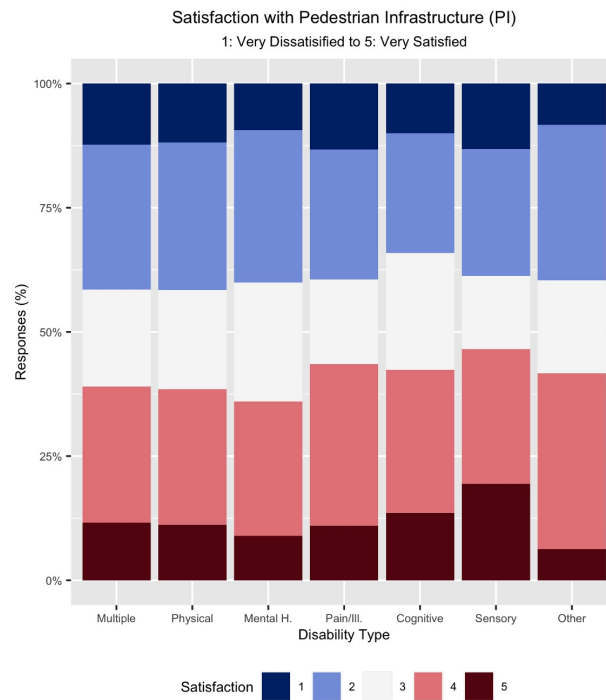


Figure 2. PI Satisfaction by Type of Disability

PI satisfaction by disability type ([Figure 2](#)). Among the intra-personal characteristics, gender had the strongest effect followed by income. Persons identifying as men (41.7% of the sample) were more likely to report PI satisfaction than others. The sample also included women (55.6%), trans-male (.2%), trans-female (.2%), non-binary (2.1%), two-spirit (.3%), and other (0%). People in higher income households were also more likely to report greater PI satisfaction.

Compared to men, disabled women are more likely to earn less, have lower desired levels of educational attainment, engage in more unpaid household work, and use transit more (Statistics Canada 2017). We suspect our findings indicate something about greater use of PI among lower income disabled persons (e.g., less access to costly adapted vehicles) and among people with complex daily activity patterns dotted with unpaid service work. Additional exploratory analysis mirrored findings from the 2022 Canadian Survey on Disability regarding women being more likely to report sidewalk issues than disabled men (Statistics Canada 2024).

The survey enabled respondents to identify the top three categories of barriers that most negatively impacted their movement around the city. In the OLR analysis, each barrier category was treated as a binary variable, with each case labelled as either indicating if a category (e.g., sidewalks, construction, etc.) was in their top three or not. Our model produced a different ordering of concerns when compared with the consultant report. Sidewalks had the strongest effect size followed by SCIB and then construction zones. There is ample research evidence about seasonally produced barriers (e.g., Lindsay et al. 2015; Ripat et al. 2018). While respondents reported concerns about

seasonal issues, in relation to the PI satisfaction question, there was not an exceptionally strong orientation toward either end of the scale. In contrast, respondent concerns appeared more focused on other elements of the pedestrian environment.

Our findings begin to highlight particular constituencies across disabled communities that may be particularly troubled by barriers in pedestrian infrastructure. The city might also decide to prioritize intervention work using the sort of ordering of concerns reported here.

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