

Test-Retest Reliability of the Abbreviated Neighbourhood Walkability Scale among Canadian Adults

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BACKGROUND

Self-reported and objectively measured environmental attributes including residential density, the proximity and mix of land uses, safety, street and sidewalk connectivity, and aesthetics influence physical activity behaviours.^{1,2} Capturing perceptions regarding neighbourhood walkability is necessary for advancing understanding about the relations between the built environment and physical activity. Instruments including the Neighbourhood Environment Walkability Scale (NEWS)^{3,4} and the International Physical Activity Questionnaire Environmental Module (IPAQ-E)^{5,6} have been developed to capture perceptions of neighbourhood walkability. While the measurement properties (i.e., reliability and validity) of these instruments have been examined, these properties are dependent on the characteristics of the populations in which the instruments are tested.

Study purpose

- To examine the test-retest reliability of previously developed items (from the Abbreviated Neighbourhood Environment Walkability Scale: NEWS-A)⁷ for capturing perceptions of neighbourhood walkability among Canadian adults.
- This pilot study was undertaken as part of the EcoEUFORIA (Economic Evaluation of Using Urban Form to Increase Activity) project with the overall aim of evaluating the cost-effectiveness of using urban form—by improving neighbourhood walkability—to promote physical activity and thus improve health.

METHOD

Sample

- Convenience sample with snowball recruitment.
- Initial recruitment included staff and students of PHIRC (University of Calgary) with friends and family members also invited to participate.
- Data were collected during June and July (2007) using a self-administered “pencil and paper” questionnaire on two separate occasions at least five days apart.
- N = 68 completed the questionnaire on two occasions (mean days=14.1±10.1 apart).

Abbreviated Neighbourhood Walkability Scale (NEWS-A)

The NEWS-A items capture perceptions about different environment attributes inside the neighbourhood (i.e., defined as a 10-15 minute walk from the home) that are supportive mainly of walking. Items captured perceptions of:

- Residential density (6-items)
- Proximity of stores/facilities (23-items)
- Access to services (6-items)
- Street connectivity (3-items)
- Walking/cycling infrastructure (3-items)
- Attractiveness of surroundings (4-items)
- Safety (9-items)

Except for residential density and proximity to stores/facilities, item responses were captured on a 4-category response scale (i.e., strongly disagree to strongly agree). Residential density was captured on a 5-category response scale (i.e., none to all) and proximity of stores/facilities on 8-category response scale (i.e., 1-5 minutes up to >30 minutes in 5 minutes intervals and “don't know”).

Data analysis

Spearman's rank correlation (Rho) was used to assess agreement of item responses between the two administrations. Cohen's kappa (K) and proportion of overall agreement (P_o) were used to assess agreement after item responses were dichotomized. Criteria for assessing the reliability coefficients (Rho and K) included: excellent (>0.75); fair to good (0.40-0.75), and; poor (<0.40). Proportion of overall agreement >75% was considered acceptable.

RESULTS

Sample characteristics (N = 68)

- Mean age = 41.8±14.5 years
- 65% were women
- 66% resided in detached single-family housing
- 69% reported excellent or very good health
- 82% reported that the design or layout of their neighbourhood made it easy to walk around it

Test-retest reliability

Fair to excellent reliability was found for NEWS-A items capturing (Table 1):

- Residential density (Rho=0.55-0.79; K=0.47-1.00; P_o=87-100%)
- Proximity of stores/facilities (Rho=0.55-0.93; K=0.40-1.00; P_o=78-100%)
- Access to services (Rho=0.51-0.71; K=0.38-0.62; P_o=80-95%)
- Street connectivity (Rho=0.68-0.73; K=0.50-0.62; P_o=76-88%)
- Walking/cycling infrastructure (Rho=0.65-0.72; K=0.41-0.62; P_o=80-90%)
- Attractiveness of surroundings (Rho=0.63-0.76; K=0.49-0.72; P_o=79-90%)
- Safety (Rho=0.50-0.88; K=0.39-0.78; P_o=75-94%).



Table 1. Test-retest reliability estimates (Rho, K, and P_o) for NEWS-A items

NEWS-A Item	N	Rho	K	P _o
Residential density				
Detached single-family houses	66	0.62	0.68	88
Townhouses/row houses 1-3 stories	66	0.55	0.47	94
Apartments/condos 1-3 stories	66	0.79	0.88	99
Apartments/condos 4-6 stories	66	0.78	1.00	100
Apartments/condos 7-12 stories	66	0.57	.	.
Apartments/condos >13 stories	65	0.66	.	.
Proximity of stores/facilities				
Convenience/small grocery store	67	0.85	0.40	90
Supermarket	67	0.89	0.82	92
Hardware store	51	0.65	0.42	80
Fruit/vegetable market	36	0.55	0.48	79
Laundry/drycleaners	52	0.63	0.57	84
Clothing store	54	0.74	0.80	91
Post office	63	0.82	0.81	89
Library	56	0.93	0.95	98
Elementary school	57	0.78	0.58	87
Other schools	49	0.86	0.76	88
Bookstore	56	0.92	0.86	94
Fast-food restaurant	63	0.72	0.54	79
Coffee place	65	0.83	0.68	86
Bank/credit union	61	0.79	0.64	82
Video store	58	0.81	0.62	81
Pharmacy/drug store	65	0.88	0.87	94
Salon/barber shop	52	0.87	0.90	96
Your job/school	46	0.88	1.00	100
Bus or train stop	68	0.74	0.72	94
Park	65	0.77	0.70	95
Recreation centre	52	0.83	0.72	88
Gym or fitness facility	55	0.84	0.80	91
Trail	56	0.82	0.73	89
Access to services				
Stores are within easy walking distance	66	0.66	0.62	85
Parking is difficult in local shopping areas	66	0.69	0.53	85
Many places to go within easy walking distance	66	0.65	0.56	86
It is easy to walk to a transit stop	66	0.51	0.38	96
Streets are hilly/difficult to walk	66	0.71	0.46	80
Major barriers make it hard to get from place to place	66	0.64	0.46	82
Street connectivity				
Not many/many cul-de-sacs	68	0.68	0.50	77
Distance between intersections is usually short	68	0.73	0.52	82
Many alternative routes for getting from place to place	68	0.68	0.62	88
Walking/cycling infrastructure				
Sidewalks on most of streets	68	0.67	0.41	90
Sidewalks are separated from the road/traffic by parked cars	68	0.65	0.64	88
Grass/dirt strip that separates streets from sidewalks	68	0.72	0.62	81
Attractiveness of surroundings				
Trees along the streets	68	0.72	0.48	90
Many interesting things to look at while walking	68	0.76	0.72	90
Many attractive natural sights	68	0.70	0.59	82
Attractive buildings/homes	68	0.63	0.49	79
Safety				
Too much traffic along streets makes it difficult/unpleasant to walk	68	0.75	0.69	87
Traffic speed on most streets is usually slow (<50 km/h)	68	0.53	0.39	75
Most drivers exceed the posted speed limit	68	0.68	0.63	82
Streets are well lit at night	68	0.75	0.78	94
Walkers/cyclists can be easily seen by people in their homes	68	0.52	0.46	82
Crosswalks/pedestrian signals to help walkers cross busy streets	68	0.53	0.43	82
High crime rate	68	0.88	0.76	93
Crime rate makes it unsafe to go on walks during the day	68	0.50	.	.
Crime rate makes it unsafe to go on walks at night	68	0.72	0.49	84

Missing values could not be estimated. Rho and K coefficients significant at p<0.05

CONCLUSIONS

- Most NEWS-A items were found to have acceptable reliability and could be used in future research examining associations between perceptions of neighbourhood environments and physical activity among Canadian adults.
- The validity of the NEWS-A has been assessed elsewhere however, further research is needed to assess the instrument's validity in the Canadian context.

REFERENCES

- Saelens BE, Handy SL. Built environment correlates of walking: a review. *Med Sci Sports Exerc.* 2008 Jul;40(7 Suppl):S550-66.
- McCormack G, Giles-Corti B, Lange A, Smith T, Martin K, Pikora TJ. An update of recent evidence of the relationship between objective and self-report measures of the physical environment and physical activity behaviours. *J Sci Med Sport.* 2004 Apr;7(1 Suppl):81-92.
- Leslie E, Saelens B, Frank L, Owen N, Bauman A, Coffee N, et al. Residents' perceptions of walkability attributes in objectively different neighbourhoods: a pilot study. *Health & Place.* 2005;11(3):227-36.
- Saelens BE, Sallis JF, Black JB, Chen D. Neighbourhood-based differences in physical activity: an environment scale evaluation. *Am J Public Health.* 2003 Sep;93(9):1552-8.
- Alexander A, Bergman P, Hagströmer M, Sjöström M. IPAQ environmental module; reliability testing. *J Urban Health.* 2006;14:76-80.
- Oyeyemi AL, Adegoke BO, Oyeyemi AY, Fatudimu BM. Test-retest reliability of IPAQ environmental- module in an African population. *Int J Behav Nutr Phys Act.* 2008;5:38.
- Cerin E, Saelens BE, Sallis JF, Frank LD. neighbourhood Environment Walkability Scale: validity and development of a short form. *Med Sci Sports Exerc.* 2006 Sep;38(9):1682-91.

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