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Measuring Perceptions of Social Environments for Walking: A Systematic Review of Walkability Surveys

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Does The Social Environment Matter?

Over two decades of walkability research has led to an abundance of tools to measure and evaluate environments that promote physical activity. Yet disparities in physical activity and health persist, particularly for low-income communities and communities of color. If we hope **to understand and support vulnerable communities, we need methods and measures that capture the unique social and cultural barriers and facilitators of walking.**

Researchers have long known that **the social context – including safety, physical signifiers, and social capital – likely influences when and where individuals walk**. However many walkability instruments have overlooked the social elements that are harder for a trained observer to immediately recognize. Instead, most instruments favor "objective" data describing the physical environment or physical symbols of the social environment. **Survey instruments are more likely to contain social questions**, usually in sections that ask about **how a resident perceives their neighborhood environment**. Yet these surveys also vary widely in their approach to the social context.

This project seeks to systematically document social environment questions in instruments to better understand strengths and weaknesses of walkability measures from the social perspective.

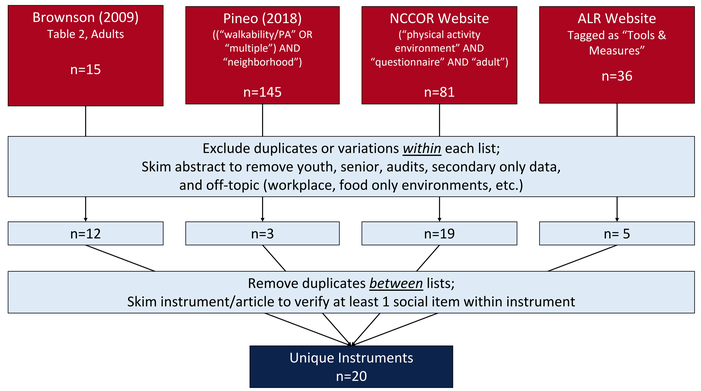
Table 1: 20 Instruments that Contain Social Environment Items

# of Google Scholar Citations	Common Name(s) of Instrument	Primary Citation	Total # of Items in Instrument	# (% of Total) of Items Devoted to Domain: Social Capital	Personal Safety	Physical Signifiers	General Satisfaction
1727	Neighborhood Environment Walkability Scale (NEWS) Original and Abbreviated (NEWS-A)	Saelens, B. E., Sallis, J. F., Black, J. B., & Chen, D. (2003). Neighborhood-based differences in physical activity: an environment scale evaluation. American journal of public health, 93(9), 1552-1558.	98	4 (4%)	7 (7%)	9 (9%)	4 (4%)
834	Perceptions About Neighborhood Environment and Access to Facilities	Giles-Corti B, Donovan RJ. Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. Prev Med 2002 Dec;35(6):601-11.	16	3 (19%)	2 (13%)	3 (19%)	1 (6%)
628	Home Equipment, Neighborhood, and Convenient Facilities Scales (San Diego Scales)	Sallis JF, Johnson MF, Calfas KJ, Caparosa S, Nichols JF. Assessing perceived physical environmental variables that may influence physical activity. Res Q Exerc Sport 1997 Dec;68(4):345-51.	43	1 (2%)	5 (12%)	..	--
558	Perceived Measures of Neighborhood Environment That May Affect Walking	Handy S, Cao X, Mokhtarian PL. Self-Selection in the Relationship between the Built Environment and Walking: Empirical Evidence from Northern California. J Am Plann Assoc 2006 Mar;72(1):55-74.	34	2 (6%)	3 (9%)	5 (15%)	3 (9%)
551	Objective Measures of Neighborhood Characteristics That May Affect Walking	Li F, Fisher K, Brownson R, Bosworth M. Multilevel modelling of built environment characteristics related to neighbourhood walking activity in older adults. J Epidemiol Commun Health 2005 Jul;59(7):558-564.	5	..	2 (40%)	..	--
422	Neighborhood Scale Questionnaire on Food Quality, Safety, Aesthetics, and Social Cohesion	Mujahid MS, Diez Roux AV, Morenoff JD, Raghunathan T. Assessing the measurement properties of neighborhood scales: from psychometrics to ecometrics. Am J Epidemiol 2007 Apr 15;165(8):858-67. Epub 2007 Feb 28.	36	10 (28%)	7 (19%)	5 (14%)	3 (8%)
371	Physical Activity Environment Measures / Environmental Support for Physical Activity Questionnaire	Kirtland KA, Porter DE, Addy CL, Neet MJ, Williams JE, Sharpe PA, Neff LJ, Kimsey CD Jr, Ainsworth BE. Environmental measures of physical activity supports: perception versus reality. Am J Prev Med 2003 May;24(4):323-31.	26	1 (4%)	2 (8%)	..	1 (4%)
308	St. Louis Environment Instrument	Brownson RC, Chang JJ, Eyler AA, Ainsworth BE, Kirtland KA, Saelens BE, Sallis JF. Measuring the environment for friendliness toward physical activity: a comparison of the reliability of 3 questionnaires. Am J Public Health 2004 Mar;94(3):473-83.	104	..	2 (2%)	..	--
303	Perceived Neighborhood Environment	Duncan M, Mummery K. Psychosocial and environmental factors associated with physical activity among city dwellers in regional Queensland. Prev Med 2005 Apr;40(4):363-72.	15	2 (13%)	3 (20%)	3 (20%)	1 (7%)
291	Perceived Measures of the Physical Activity Environment / Twin Cities Walking Survey	Forsyth A, Hearst M, Oakes JM, Schmitz KH. Design and destinations: factors influencing walking and total physical activity. Urban Stud 2008 Aug;45(9):1973-1996.	284	22 (8%)	..	..	--
257	Perceived Walking Environment	Humpel N, Marshall AL, Leslie E, Bauman A, Owen N. Changes in neighborhood walking are related to changes in perceptions of environmental attributes. Ann Behav Med 2004 Feb;27(1):60-7.	10	1 (10%)	..	1 (10%)	--
185	Self-Reported Neighborhood Characteristics	Echeverria SE, Diez-Roux AV, Link BG. Reliability of self-reported neighborhood characteristics. J Urban Health 2004 Dec;81(4):682-701.	77	6 (8%)	9 (12%)	12 (16%)	1 (1%)
108	Women's Determinants Survey	Brownson, R. C., Eyler, A. A., King, A. C., Shyu, Y. L., Brown, D. R., & Homan, S. M. (1999). Reliability of information on physical activity and other chronic disease risk factors among US women aged 40 years or older. American Journal of Epidemiology, 149(4), 379-391.	92	3 (3%)	1 (1%)	..	--
101	Environmental and Policy Factors	Catlin TK, Simoes EJ, Brownson RC. Environmental and policy factors associated with overweight among adults in Missouri. Am J Health Promot 2003 Mar-Apr;17(4):249-58.	92	..	1 (1%)	..	1 (1%)
98	IPAQ Environmental Module	Alexander A, Bergman P, Hagstromer M, Sjostrom M. IPAQ environmental module; reliability testing. J Public Health 2006;142(2):76-80.	17	1 (6%)	2 (12%)	2 (12%)	--
78	Physical Activity Environment, Healthy Environment Partnership (HEP) Survey	Israel BA, Schulz AJ, Estrada-Martinez L, Zenk SN, Viruell-Fuentes E, Villarruel AM, Stokes C. Engaging urban residents in assessing neighborhood environments and their implications for health. J Urban Health 2006 May;83(3):523-39.	13	3 (23%)	..	2 (15%)	--
54	Neighborhood Quality Index	Yang XL, Yang MS, Shih CH, Kawachi I. Development and validation of an instrument to measure perceived neighbourhood quality in Taiwan. J Epidemiol Community Health 2002 Jul;56(7):492-6.	15	7 (47%)	2 (13%)	..	2 (13%)
35	Environmental Characteristics Scale	Ogilvie D, Mitchell R, Mutrie N, Petticrew M, Platt S. Perceived characteristics of the environment associated with active travel: development and testing of a new scale. Int J Behav Nutr Phys Act 2008 May 30;5:32	14	..	2 (14%)	1 (7%)	1 (7%)
12	Transportation Walking Questionnaire	Badland H, Schofield G. Test-retest reliability of a survey to measure transport-related physical activity in adults. Res Q Exerc Sport. 2006;77(3):386-90.	24	2 (8%)	..	..	--
6	Core Measures of Trail Use/ROUTES	Spruijt-Metz D, Lindsey G, Troped P, et al. (2005). Core measures of trail use. Available at: http://www.activelivingresearch.org/node/10653 Spruijt-Metz, Donna, et al. "Development, reliability, and validity of an urban trail use survey." American journal of health promotion 25.1 (2010): 2-11.	62	7 (11%)	..	..	--

Method to Identify Instruments and Items

Step 1: Identify <u>Source Lists</u> (n=277 Potential Instruments)
Searching both the literature and the internet for walkability measures and tools resulted in the following source lists of potential survey instruments:

- Table 2 of **Brownson et al (2009).** *Measuring the built environment for physical activity: state of the science.* Am J Prev Med. 36(4): S99-S123.
- Appendix in **Pineo et al (2018)**. *Urban Health Indicator Tools of the Physical Environment: a Systematic Review.* J Urb Health. 1-34.
- National Collaboration of Childhood Obesity Research **(NCCOR) Measures Registry** https://tools.nccor.org/measures
- **Active Living Research (ALR)** https://activelivingresearch.org



Step 2: Skim Abstracts and Papers for Inclusion (n=20 Unique Instruments)
We looked for resident surveys about the perceived neighborhood environment with a research connect to physical activity. **Exclusion** criteria included:

- Instruments that were clearly aimed at youth or seniors
- Audit instruments, secondary data tools, or GIS methods that did NOT contain a survey of residents
- Instruments that focused on scales larger than the neighborhood
- Instruments that asked only about the workplace or food environment.

Duplicates within and between source lists were also removed. For example, NCCOR listed 9 different Neighborhood Environment Walkability Scale (NEWS) instruments; these were collapsed into a single "instrument". Each source list also contained at least 1 NEWS derived instrument; these too were collapsed. After inclusion and exclusion criteria were applied and all of the duplicates were accounted for, 20 unique instruments remained.

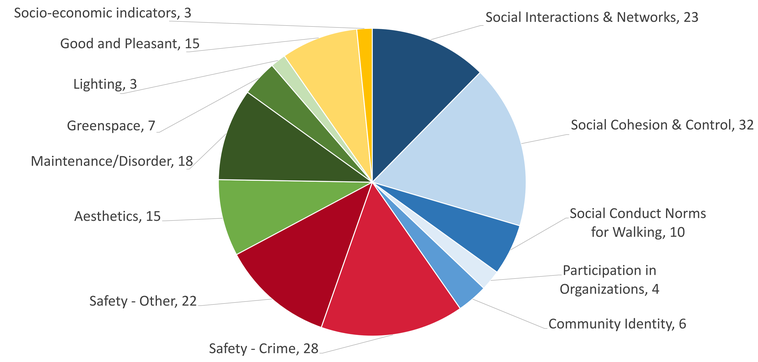
Step 3: Skim Papers/Instruments and Abstract Social Environment Items (n=184 items)
Using the citation and original instrument, each survey was skimmed for social environmental items for walking. (Biking specific items were ignored.) The item and its response type (i.e. 5-pt Likert) were placed in an excel spreadsheet.

Step 4: Categorize Items by Social Domain
The three authors then categorized each item by social theme **until the following stable domains emerged:**

- **Social Capital,** further subdivided using Sampson (2009) into interaction/networks; cohesion/control; conduct norms for walking; and organizational capacity. We also added a community identity category.
- **Personal Safety,** further subdivided into crime-specific safety including lighting and non-traffic, non-crime "general" safety;
- **Physical Signifiers** with separate subcategories for aesthetics and upkeep/maintenance/disorder;
- **General Satisfaction** for items that discussed a neighborhood being pleasant, good, or nice.

Findings & Challenges

We identified over 180 items addressing social environment elements across the 20 instruments. None were published after 2010. **It is unusual for <u>ALL</u> 3 major domains (Social Capital, Personal Safety, and Physical Signifiers) to be included in a single instrument,** making the pooled summary below somewhat misleading. Table 1 shows that only 6 of the instruments (Saelens 2003; Giles-Corti 2002; Mujahid 2007; Duncan 2005; Echeverria 2004; Alexander 2006) included an item in all three of the major domains. While this finding may be due to study or instrument purpose, it also may also reflect lingering silos of disciplines.



There were 75 social capital items. Social capital items are most likely to capture social cohesion (32 items). Since a key part of walking is the pedestrian scale facilitating face-to-face interaction, the emphasis on social efficacy may need to be better balanced with **interactions (23 items)** and with **conduct norms of walking (10 items)** in the neighborhood. Four instruments had no social capital items. Only three instruments had more than 20% of items covering social capital (Mujahid 2007; Israel 2006; Yang 2002). Forsyth 2008, as a very long survey, only devotes 8% to social capital but includes 22 items across multiple dimensions. **Community identity and a sense of belonging is a significant social capital element that likely contribute to perceived support for walking; yet only 6 items across 3 instruments address community identity.** For example, a non-native English speaker likely walks more in a neighborhood where signage is bilingual and shops carry culturally specific goods. LBGTQ individuals similarly may feel more comfortable in a place where there are visible signifiers they are welcome. A third generation family may feel a strong sense of connection to the shopping corridor of their neighborhood.

Fifty questions across 15 instruments asked about safety. **Most instruments had 2-3 questions with thirteen instruments including at least one crime-specific item.** Twelve asked about non-traffic, non-crime safety, often using general "I feel safe walking" language. **Developing non-crime social safety questions may align better with context-specific conduct norms and thus improve our understanding of the walking environments in traditionally marginalized neighborhoods**.

Balancing aesthetics with maintenance may help reduce class bias in the instruments. A low-income community may be more utilitarian (i.e. not have a lot of "interesting" or "pretty" houses) and thus less aesthetically pleasing; **upkeep and maintenance of both private and public space may be a more appropriate signifier of an enjoyable walking environment in low-income neighborhoods**. See Echeverria 2004 for many upkeep items balanced by aesthetic items. However, care needs to be taken not to further stigmatize neighborhoods.

General satisfaction questions are difficult to interpret and may not be as relevant to practitioners. Eighteen items in ten instruments were so broad as to make it difficult to categorize ("pleasant place to walk" or "neighborhood as a good place to live"). These types of questions are not particularly helpful in identifying what the underlying intervention would be.

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