



## How reported usefulness modifies the association between neighborhood supports and walking behavior



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### ABSTRACT

Neighborhood supports have been associated with walking, but this association may be modified by reports about the usefulness of these supports for promoting walking. This study examined the association between reported presence of neighborhood supports and walking and whether usefulness modified this association in a nationwide sample of U.S. adults. Measures of reported presence and use or potential use (i.e., usefulness) of neighborhood supports (shops within walking distance, transit stops, sidewalks, parks, interesting things to look at, well-lit at night, low crime rate, and cars following speed limit) were examined in 3973 adults who completed the 2014 SummerStyles survey. Multinomial regression models were used to examine the association between presence of supports with walking frequency (frequently, sometimes, rarely (referent)) and the role usefulness had on this association. The interaction term between reported presence and usefulness was significant for all supports ( $p < 0.05$ ). For adults who reported a support as useful, a positive association between presence of the support and walking frequency was observed for all supports. For adults who did not report a support as useful, the association between presence of the support and walking frequency was null for most supports and negative for sidewalks, well-lit at night, and low crime rate. The association between presence of neighborhood supports and walking is modified by reported usefulness of the support. Tailoring initiatives to meet a community's supply of and affinity for neighborhood supports may help initiatives designed to promote walking and walkable communities succeed.

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### 1. Introduction

Regular physical activity is associated with important health benefits, including the reduced risk for premature death, cardiovascular disease, type 2 diabetes, some cancers, and depression (Physical Activity Guidelines Advisory Committee, 2008). People can get these benefits through brisk walking or by adding brisk walking to other physical activities (U.S. Department of Health and Human Services, 2008). Walking can be promoted by creating communities where walking supports are present (U.S. Department of Health and Human Services, 2015). For example, walking has been associated with distance to shops and services; presence of sidewalks; aesthetics; and access to parks and recreational facilities (McCormack and Shiell, 2011; Saelens and Handy, 2008; Sugiyama et al., 2012). Fear of crime and traffic (McCormack and Shiell, 2011; Owen et al., 2004) and perceptions of an unsafe neighborhood (Centers for Disease Control and Prevention, 1999; Foster et al.,

2014) can discourage walking, while the use of public transit can promote walking (Freeland et al., 2013; Lachapelle et al., 2011).

Some researchers have postulated that the association observed between community supports and walking is due to other factors, such as neighborhood self-selection or preferences (Frank et al., 2007; Handy et al., 2006; Van Dyck et al., 2011). Incorporating true experimental designs, such as randomly assigning people to neighborhoods and following them over time, is not practical (Centers for Disease Control and Prevention, 2009); however, researchers have conducted analyses to isolate effects of the built environment from neighborhood self-selection and preferences. Researchers examining the association between features of the built environment and walking have found the association remains after controlling for self-selection, although they also suggest self-selection or neighborhood preferences may modify this association (Christiansen et al., 2014; Frank et al., 2007; Van Dyck et al., 2013).

This study extends previous research by examining the role use or potential use (i.e., usefulness) of eight neighborhood walking supports has on the association between presence and walking behavior in a nationwide sample of U.S. adults. We considered usefulness to be a proxy for individual preference and hypothesized the association between presence and walking behavior will be modified by reported usefulness.

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Walking supports examined included: shops within easy walking distance; transit stop within a 10–15 min walk; sidewalks on most streets; parks, green spaces, or trails; interesting things to look at; well-lit at night; low crime rate; and cars following the speed limit. First, we examined the overall percentage of adults who reported having supports and whether supports were useful to their walking behavior. Second, we examined the association between presence of each support and walking frequency, and the role use or potential use played in this association.

## 2. Methods

### 2.1. Survey

Data came from the summer wave of Porter Novelli's 2014 ConsumerStyles database, called SummerStyles. Each year, a ConsumerStyles database is built from a series of web-based surveys that gather insights about US consumers, including information about their health attitudes and behaviors. In 2014, the spring wave of the survey was conducted among 6713 adults age 18 or older who belong to the GfK Knowledge Panel.® Panel members are randomly recruited through probability-based sampling and membership is continuously replenished to maintain about 55,000 panelists.

The SummerStyles survey was sent during June and July to 6159 adults who completed the spring wave. Survey completion took approximately 36 min. Those who completed the survey received reward points worth approximately \$10 and were eligible to win an in-kind monthly sweepstakes prize. The Centers for Disease Control and Prevention (CDC) licensed the results of the survey after data were collected. CDC's analyses were exempt from institutional review board approval because personal identifiers were not included in the data file.

A total of 4269 summer surveys were returned (response rate: 69%). Respondents whose questionnaires were missing data on presence of neighborhood walking supports ( $n = 74$ ), walking frequency ( $n = 21$ ), or both ( $n = 8$ ) were excluded from the analysis.

### 2.2. Measures

**Walking.** Respondents were asked how often they usually walk for at least 10 min at a time. Respondents were instructed to consider walking for exercise/recreation, walking to a specific destination (e.g., work, school, transit stop), or walking their dog. Response categories included every day or most days, some days, hardly ever or never, and I am not physically able to do this. Adults who indicated that they were physically able to walk ( $n = 3973$ ) were put into 3 categories for walking frequency: frequently, sometimes, and rarely.

**Presence of neighborhood walking supports.** The presence of neighborhood supports was assessed by respondents selecting which (if any) of the following statements were true about their neighborhood:

- There are many shops, stores, markets, or other places to buy things within easy walking distance of my home.
- There is a transit stop within a 10–15 min walk from my home.
- There are sidewalks on most of the streets in my neighborhood.
- My neighborhood has parks, green spaces, or trails for walking.
- The crime rate in my neighborhood is low.
- There are many interesting things to look at while walking in my neighborhood.
- It is safe to walk in my neighborhood because many drivers follow the posted speed limits.
- My neighborhood is well-lit at night.
- None of these.

**Usefulness of neighborhood walking supports.** For supports identified as present, respondents were asked this follow-up question: "Below is

the list of amenities that you indicated are available in your neighborhood. Which, if any, do you currently use/do?"

- I walk to nearby shops, stores, markets or other places to buy things.
- I walk to the transit stop.
- I walk on the sidewalks.
- I use the parks, green spaces, or trails for walking.
- I walk because of the low crime rate.
- I walk because there are many interesting things to look at in my neighborhood.
- I walk because drivers follow the posted speed limits.
- I walk because my neighborhood is well-lit at night.
- None of these.

For supports not identified as present, respondents were asked this follow-up question: "Below is the list of amenities that you indicated are not available in your neighborhood. Which, if any, of these would you use/do if they were available?"

- I would walk to nearby shops, stores, markets or other places to buy things.
- I would walk to a transit stop.
- I would walk on sidewalks.
- I would use parks, green spaces, or trails for walking.
- I would walk if the crime rate was low.
- I would walk if there were many interesting things to look at in my neighborhood.
- I would walk if drivers followed the posted speed limits.
- I would walk if my neighborhood was well-lit at night.
- None of these.

We used the answers to these questions to categorize a support as useful to a person's walking behavior if it was selected during either follow-up question.

**Covariates.** Categorical variables for demographic characteristics included the following: sex (men, women), age group (18–34, 35–49, 50–64, ≥65 years), education level (high school graduate or less, some college, college graduate), race/ethnicity (white non-Hispanic, black non-Hispanic, other), metropolitan statistical area (MSA) status (metro MSA, nonmetro MSA) and region (Northeast, Midwest, South, West). MSA status is based on a person's location of residence, which is defined by the US Office of Management and Budget (U.S. Census Bureau, 2010).

### 2.3. Statistical analysis

Data were weighted to match the 2014 US Current Population Survey proportions for sex, age, household income, education level, race/ethnicity, household size, MSA status, census region, and whether a respondent had Internet access before joining the panel. The percentage of adults reporting each neighborhood support as present was examined by walking frequency. The percentage who reported each support as useful to their walking behavior was examined by presence of the support and walking frequency. Orthogonal polynomial contrasts and pairwise t-tests were used to identify significant trends and differences by subgroups.

Two sets of separate multinomial logistic regression analyses were conducted for each neighborhood support, with walking frequency as the outcome (frequently, sometimes, rarely [referent]). Model 1 examined the association between presence of a support (main effect) and walking frequency. Model 2 examined whether usefulness of a support modified the association between the presence of a support and walking frequency. The main effect for usefulness and the interaction between presence and usefulness were added in Model 2. The 2 contrasts of interest compared the effect of the presence of a support separately for adults who identified the support as useful and those who did not. Models adjusted for sex, age group, education, race/ethnicity, MSA

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