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Gender Differences in Neighborhood Walking in Older Adults

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Abstract

Objective: This study examined mobility, self-efficacy, outcome expectations, neighborhood (density, destinations, and design), and neighborhood walking in older men (n = 106, 60-99 years, M = 76.78, SD = 8.12) and women (n = 216, 60-99 years, M = 75.81, SD = 8.46). **Method/Results:** In hierarchical regression, the variables explained 32% of the variance in neighborhood walking in men ($p < .001$) and 27% of the variance in women ($p < .01$). Self-efficacy ($\beta = .49$, $p < .01$), density ($\beta = .22$, $p < .05$), and design ($\beta = .21$, $p = .05$) were associated with walking in men. Significant design characteristics included sidewalks ($\beta = .25$, $p < .05$) and crime ($\beta = .36$, $p < .01$). In women, self-efficacy ($\beta = .48$, $p < .001$) and destinations ($\beta = .15$, $p < .05$) were associated with walking. Walking was associated with self-efficacy for walking despite individual barriers in women ($\beta = .38$, $p < .001$) and neighborhood barriers in men ($\beta = .30$, $p < .05$). **Conclusion:** Walking interventions targeting older women should incorporate local destinations. In older men, interventions should consider neighborhood sidewalk design and crime. Walking interventions for all older adults should include enhancement of self-efficacy, but gender differences may exist in the types of self-efficacy on which to focus.

Keywords

walking, neighborhood environment, self-efficacy

Mobility limitations predict future disability and impact older adults' ability to live independently (Studenski, 2005). But mobility limitations differ by gender: More women report difficulty walking 1/4 mile than men (Centers for Disease Control and Prevention, 2009), and women perform more poorly on measures of physical function (Peiffer et al., 2010). Women are more likely than men to experience moderate to severe disability and to transition from no disability to mild disability, but this difference is explained in part by lower rates of physical activity in women (Gill, Gahbauer, Lin, Han, & Allore, 2013).Regular physical activity helps to maintain walking ability (Simonsick, Guralnik, Volpato, Balfour, & Fried, 2005), and prevent gait- and mobility-related disability in older adults (Alexander & Goldberg, 2005). But 52% of older adults engage in no leisure time physical activity, and physical activity levels are even lower in women (Hughes, McDowell, & Brody, 2008).

Neighborhood walking is a particularly convenient form of physical activity (King, 2001). Older adults who walk in their neighborhoods are more likely to meet the recommended 150 min of physical activity per week (Nelson et al., 2007), and trip frequency to neighborhood destinations is associated with higher levels of physical activity (Davis et al., 2011).This suggests that neighborhood walking is an important contributor to total physical activity in older adults. But little is known about how specific individual and neighborhood factors that may influence neighborhood walking differ between men and women. The purpose of this study was to compare the relationship between individual factors (self-efficacy, outcome expectations, and mobility limitations), neighborhood factors (density, destinations, and design), and neighborhood walking in older men and women.

Theoretical Framework

Social Cognitive Theory, in which behavior is described as dynamic and dependent on a reciprocal interaction among individual and the environmental factors (Bandura, 1997), was the basis for the theoretical framework for this study (Figure 1). Individual factors in Social Cognitive Theory include self-efficacy (belief in ability to perform a behavior), outcome expectations (belief that certain positive or negative consequences are likely to occur from a particular behavior), and demographic characteristics such as age and gender (Bandura, 1997). Mobility limitations were included as an individual factor in this study. The environment was operationalized using the "3 Ds" concept, including density, destinations, and design (Cervero & Knockelman, 1996). Design included seven categories of neighborhood characteristics that may influence neighborhood walking: neighborhood access, streets, sidewalks, surroundings, traffic, crime, and comfort (Gallagher et al., 2010; Saelens, Sallis, Black, & Chen, 2003).

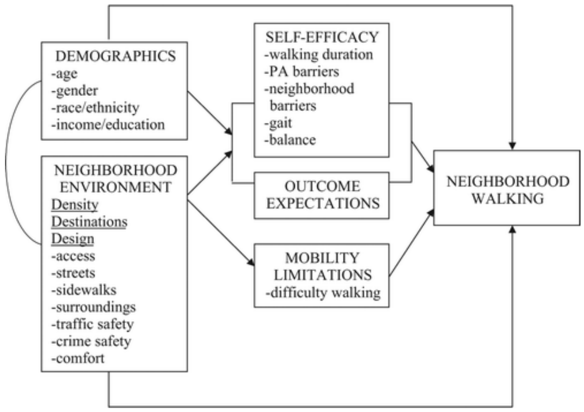

Figure 1. Theoretical model.

Background and Significance

Walking and physical activity are influenced by both individual and environmental/neighborhood factors (Nagel, Carlson, Bosworth, & Michael, 2008; Satariano & McAuley, 2003). The influence of the neighborhood environment on walking may be heightened in older adults who have hearing, vision, or musculoskeletal limitations (Clarke, Ailshire, Bader, Morenoff, & House, 2008; Frank, Engelke, & Schmid, 2003). Individual factors that may impact walking include gender (Conn, Burks, Pomeroy, Ulbrich, & Cochran, 2003), self-efficacy and outcome expectations (Resnick & Nigg, 2003), and mobility limitations (Shumway-Cook et al., 2003). Avoidance of walking may reduce older adults' opportunities for regular physical activity, increasing their risk of developing mobility limitations or disability (Balfour & Kaplan, 2002; Clarke & George, 2005). Identification of these factors, particularly those that are amenable to change, is critical for developing interventions and policies that will advance older adult health (Yen, Michael, & Perdue, 2009).

Neighborhood Environment

Neighborhood aesthetics, sidewalks, lighting, traffic, perception of neighborhood crime, and the presence of desired destinations within walking distance may be particularly relevant to walking in older adults (Cunningham, Michael, Farquhar, & Lapidus, 2005; Strath, Isaacs, & Greenwald, 2007). Some neighborhood factors such as adequate lighting, crosswalk speed, curbs or uneven surfaces, and other factors that may increase the risk of falls or injury are especially pertinent for older adults with mobility limitations (Shumway-Cook et al., 2003). Women perceive their environment as less conducive to physical activity than men (Lee, 2005), but little is known about gender differences in the influence of specific neighborhood factors.

Individual Factors

Self-efficacy is the confidence in the ability to perform a specific behavior (Bandura, 1997). Several types of self-efficacy have been associated with physical activity or walking in older adults and may be particularly relevant to neighborhood walking. These include self-efficacy for (a) overcoming individual physical activity barriers (Conn et al., 2003; Morris, McAuley, & Motl, 2008), (b) overcoming neighborhood barriers (Gallagher et al., 2012), (c) walking duration (Gallagher, Clarke, Ronis, Cherry, & Gretebeck, 2014; McAuley et al., 2007), (d) balance (McAuley et al., 2007; Myers, Fletcher, Myers, & Sherk, 1998), and (e) gait and safe navigation of obstacles (McAuley, Mihalko, & Rosengren, 1997, McAuley et al., 2006).

Outcome expectations are the beliefs that positive or negative consequences are likely to occur in response to a particular behavior in a specific situation (Bandura, 1997; Umstattd & Hallam, 2007). While older adults hold lower outcome expectations than younger adults (Conn, 1998; Netz & Raviv, 2004; Resnick, Palmer, Jenkins, & Spellbring, 2000), the evidence on their influence on physical activity in older adults is mixed (Conn, 1998; McAuley et al., 2009; Perkins, Multhaup, Perkins, & Barton, 2008; Resnick, 2001). Outcome expectations related to health are often cited by older adults (Brassington, Atienza, Perczek, DiLorenzo, & King, 2002; Wilcox, Castro, & King, 2006).

Mobility in older adults may be complicated by slow gait, pain, dizziness, numbness, and weakness (Alexander & Goldberg, 2005). Walking is often the first activity to be limited in older adults, particularly if there are difficulties with strength or balance, which may lead to further mobility decline (Bialoszewski et al., 2008; Hill, Schwarz, Kalogeropoulos, & Gibson, 1996).

Demographic Factors

Physical activity, self-efficacy, and outcome expectations related to physical activity, are lower in women than in men (Netz & Raviv, 2004), and may have a reciprocal relationship (Resnick et al., 2000). Gender may not independently influence physical activity in older women, but self-efficacy may mediate its influence; for example, women with lower self-efficacy are less physically active (Resnick et al., 2000).

Summary

Factors in the individual and the neighborhood environment may influence walking in older adults. Although a few studies have examined both individual and environmental influences on walking in older adults (Carlson et al., 2012; Gallagher et al., 2012; Michael & Carlson, 2009; Nagel et al., 2008) none were identified that compared the associations between neighborhood environmental factors, individual factors (psychosocial factors and mobility limitations), and neighborhood walking in older men and women.

Method

Setting and Sample

Recruitment for this cross-sectional study began after approval by the University Institutional Review Board. Inclusion criteria included (a) residence in an urban area, (b) aged 60 years or older, (c) living independently (e.g., not in a skilled nursing care facility), and (d) able to walk with or without an assistive device. Participants were recruited from a database of older adults receiving health care from a large academic health system and who had agreed to be contacted for research participation. Within the database of 950 older adults, 400 individuals were identified as both potentially eligible for the study and not involved in a conflicting research study. Surveys with cover letters explaining the study, informed consent forms and return envelopes were sent to the potential participants. Two weeks after the survey was mailed, a reminder postcard was sent to those who had not yet responded; 2 weeks later, a reminder phone call was placed to those who had still not responded (Dillman, 2000). No incentives were provided. Of the 400 surveys mailed, 340 were returned. Fourteen were excluded due to ineligibility, death, or undeliverable or unusable surveys, with a final sample size of 326 participants.

Measures

Neighborhood walking

The measures used in this study have been described in more detail elsewhere (Gallagher et al., 2012). Neighborhood walking (weekly duration in minutes) was measured with two walking items from the Neighborhood Physical Activity Questionnaire (NPAQ) developed by Giles-Corti and colleagues (2006). The neighborhood walking score was calculated by summing total minutes in a usual week the participant walked in their neighborhood for transportation or for recreation/exercise. Reliability has been established for the 21-item NPAQ but not for subcomponents such as neighborhood walking duration (Giles-Corti et al., 2006).

Neighborhood environment

Neighborhood environment was defined as the area within one-half mile or a 15-min walk from the home of the participant (Michael, Beard, Choi, Farquhar, & Carlson, 2006; Saelens et al., 2003). The neighborhood environment was conceptualized within the context of the "3 Ds" of the built environment outlined by Cervero and Knockelman (1996): density, destinations, and design. Participants' perception of their neighborhood environment was measured with the Neighborhood Environment Walkability Scale (NEWS) developed by Saelens and colleagues (2003). The measure is described in detail elsewhere (Gallagher et al., 2012). Neighborhood density was measured with the 6-item residential density subscale, which measures the presence of neighborhood residences with variable densities (e.g., single-family homes, apartment buildings, etc.); higher numbers indicate higher population density. Neighborhood destinations were measured with the 23-item Diversity subscale that measures how long it takes to walk (ranging from 1-30 min in 5-min increments) from the participant's residence to local stores and facilities (grocery stores, hardware stores, post office, library, park, etc.). A mean score was calculated, with higher scores indicating the presence of more stores and facilities within a shorter walking distance from the participant's home (Saelens et al., 2003). Cronbach's alpha for the subscale was .86 in this study.

The remaining NEWS subscales were used to measure neighborhood design: access to services, street connectivity, walking facilities, neighborhood surroundings, traffic safety, and crime safety. Two items, neighborhood places to rest and to use the bathroom, were added based on preliminary focus group results, for a new subscale, comfort (Gallagher et al., 2010). Mean scores were calculated for each subscale; a higher number indicated the presence of neighborhood characteristics supporting walking (range = 1 [*strong disagreement*] to 4 [*strong agreement*]). A summary mean of the subscales also was calculated; Cronbach's alpha was .85.

Mobility limitations

Mobility limitation was defined in this study as difficulty or inability to walk a short distance with or without use of an assistive device (Rejeski et al., 2008). Mobility limitations were measured with the mobility subscale from the Pepper Assessment Tool for Disability (PAT-D) scale. In the PAT-D Mobility subscale, the participant reports level of difficulty (range = 1-5) in performing specific mobility-related activities in the last month: walking one block, walking several blocks, lifting heavy objects, carrying a 10-pound bag of groceries, climbing one flight of stairs, and climbing several flights of stairs (Rejeski, Ettinger, Schumaker, Burns, & Elam, 1995). Two items were added to the scale due to relevance to neighborhood walking: difficulty walking 1/2 mile and difficulty running errands. A higher score indicates more difficulty. The Cronbach's alpha for the modified PAT-D scale in this study was .88.

Self-efficacy

A measure based on an index of five different types of self-efficacy was used to measure total self-efficacy. These measures were selected due to their potential relevance to walking in older adults: the Self-Efficacy for Walking Scale, Self-Efficacy for Physical Activity Barriers Scale, Self-Efficacy for Neighborhood Barriers Scale, Gait Efficacy Scale, and Activities-Specific Balance Confidence Scale. The Self-Efficacy for Walking Scale (McAuley, Blissmer, Katula, & Duncan, 2000) measures confidence in walking at a moderately fast pace at 5-min intervals from 5 min to 40 min. The Self-Efficacy for Physical Activity Barriers Scale measures confidence in engaging in exercise or physical activity 5 times a week for the next 3 months in the face of certain individual barriers, such as lack of time, poor weather, pain, and so on (McAuley, 1992). The Self-Efficacy for

Neighborhood Barriers Scale was developed for this study and measures self-efficacy for walking for at least 10 min at a time in the presence of neighborhood characteristics identified by older adults as barriers to walking: inadequate lighting, inclement weather, lack of or poorly maintained sidewalks, nowhere to walk to, unattractive scenery, lack of safety due to loose dogs or crime, heavy traffic, and lack of places to rest or use the bathroom (Gallagher et al., 2010). The Gait Efficacy Scale (McAuley et al., 1997) measures individuals' confidence in their ability to negotiate stairs, objects, and other situations commonly encountered in outdoor walking. For each item, participants rate their confidence to successfully navigate obstacles such as walking up or down a flight of stairs or stepping over an object in their path. The Activities-Specific Balance Confidence Scale measures participants' confidence in their ability to maintain balance while performing certain activities, such as walking up a flight of stairs, reaching for a can on a shelf at eye level, or walking on an icy sidewalk (Powell & Myers, 1995).

For each measure, participants reported their confidence on a scale comprised of 10-point increments ranging from 0% (*not at all confident*) to 100% (*highly confident*) in their ability to perform the behavior. A mean score was calculated for each of the scales, and the total self-efficacy score was calculated from the mean score of all five self-efficacy scales. A higher score indicates more confidence in ability to perform the behavior or to maintain balance under given situations. Cronbach's alpha ranged from .91 to .98 for the individual scales, and was .98 for the total self-efficacy scale. For parsimony, we include the total self-efficacy score in all models, but report on differences found using the subscales in the text.

Outcome expectations

Outcome expectations were measured with the Multidimensional Outcome Expectations for Exercise Scale (MOEES) developed by Wójcicki, White, and McAuley (2009). The MOEES is a 19-item scale in which participants rate their agreement that 30 min of physical activity on 5 days per week would lead to outcomes such as improved health, weight loss, or social life. A mean score was calculated for the scale; higher scores indicate higher expectations of positive outcomes from engaging in regular physical activity. The Cronbach's alpha for the scale was .92.

Demographic characteristics

Demographic characteristics measured included gender, race/ethnicity (Black/African American, Asian American/Pacific Islander, White/Caucasian, Hispanic, American Indian/Native American, or Other), education (less than high school; high school graduate; some college or trade, business, or technical school; associate's degree; bachelor's degree; graduate degree). Race was collapsed into White/non-White due to few non-White participants.

Data Analysis

SPSS (Version 21.0. SPSS Inc., Chicago, IL) was used to conduct the statistical tests. Bivariate correlation analyses examined associations between the variables; and *t* tests and chi-square tests were used to identify differences in the study variables between men and women. Hierarchical multiple linear regression was conducted to examine the impact of (a) demographic characteristics, (b) mobility limitations, (c) psychosocial factors (self-efficacy and outcome expectations), and (d) neighborhood environment on neighborhood walking duration in men and women. Missing responses were imputed with the mean of each participant's nonmissing responses for that scale. Except for the Self-Efficacy for Physical Activity Barriers Scale, no scales had more than 5% missing data.

Results

The sample was predominantly female, White, retired, and college-educated (Table 1). More than one third of the sample reported a fall in the last year. Women walked in their neighborhoods about 10 min more than men, but this was not statistically significant. Men engaged in significantly more moderate and vigorous physical activity (excluding walking) than women. Walking made up a larger proportion of total physical activity in women than in men.

Table 1. Sample Characteristics and Variable Means.

Variable	Men (n = 106) M (SD) or ƒ (%)	Women (n = 216) M (SD) or f (%)
Age	76.78 (8.12)	75.81 (8.46)
Marital status		
Single	6 (6%)	51 (24%)
Married	89 (84%)	103 (48%)
Widowed	11 (10%)	62 (28%)
Ethnicity		
White	99 (96%)	203 (96%)
Black/Other	4 (4%)	8 (4%)
Education***		
High school	6 (4%)	25 (12%)
Some college/bachelor's	52 (50%)	112 (52%)
Graduate school	48 (46%)	78 (36%)
History of a fall	39 (37%)	67 (31%)
Mobility**	1.49 (0.72)	1.75 (0.92)
Self-efficacy (mean of five scales)***	72.05 (20.04)	61.82 (21.47)
Outcome expectations	3.94 (0.53)	3.87 (0.59)
Density	204.09 (53.82)	205.84 (39.58)
Destinations*	2.06 (0.62)	1.90 (0.65)
Design (NEWS)		
Access	2.27 (0.99)	2.17 (0.93)
Street design	2.60 (0.79)	2.62 (0.87)
Sidewalks	2.88 (1.08)	2.85 (1.06)
Aesthetics	3.55 (0.49)	3.41 (0.54)
Comfort	1.74 (0.70)	1.62 (0.69)
Traffic	2.94 (0.63)	2.85 (0.66)
Crime	3.41 (0.43)	3.37 (0.44)
Neighborhood walking (minutes)	82.71 (112.39)	92.21 (115.48)
Nonwalking physical activity	36.86 (57.13)	22.76 (19.69)

Note. NEWS = Neighborhood Environment Walkability Scale. *p < .05. **p < .01. ***p < .001.

Descriptive statistics and group comparisons (Table 1) indicated that mean scores for total self-efficacy (t = 4.10, p < .001) and for each type of self-efficacy were significantly lower for women than men. Women were significantly less confident than men in their ability to walk for increasing durations of time (t = 2.35, p < .05), walk in their neighborhoods in the face of neighborhood (t = 4.51, p < .001) or personal barriers (t = 3.06, p < .01), safely navigate common obstacles (t = 4.39, p < .001), and maintain balance (t = 3.23, p < .01; results not shown). No significant difference in outcome expectations was found between men and women. Men were slightly more likely to report the presence of destinations within walking distance; however, although statistically significant, the difference in perception was very small. No significant differences in perception of neighborhood density or design characteristics were found between men and women.

Linear Regression

Hierarchical regression (Table 2) revealed that the total model explained 27% of the variance in neighborhood walking in women ($p < .01$), and 32% of the variance in men ($p < .001$). In women, demographic characteristics (Model 1a) explained 5% of the variance ($p < .01$) in neighborhood walking, with only age significant ($\beta = .22$, $p < .01$). Mobility limitations (Model 2a) added 9% to the explained variance, but became nonsignificant once total self-efficacy and outcome expectations were entered into the model (Model 3a). Total self-efficacy and outcome expectations added an additional 9% to the explained variance. Within total self-efficacy, only self-efficacy for walking despite individual barriers was significant ($\beta = .38$, $p < .001$). The addition of neighborhood environment (density, destinations, and design) explained an additional 4% of the variance in neighborhood walking (Model 4a). In the final model, total self-efficacy ($\beta = .48$, $p < .001$) and neighborhood destinations ($\beta = .15$, $p < .05$) were significantly associated with neighborhood walking. Neighborhood design and destinations did not significantly contribute to the explained variance in neighborhood walking.

Table 2. Multiple Linear Regression Results for Neighborhood Walking (Minutes) in Older Adult Men and Women.

	Women (n = 216)				Men (n = 106)			
	Model 1a [95% CI]	Model 2a [95% CI]	Model 3a [95% CI]	Model 4a [95% CI]	Model 1b [95% CI]	Model 2b [95% CI]	Model 3b [95% CI]	Model 4b [95% CI]
Demographic characteristics								
Age (years)	.22* [−4.88, −1.23]	.08 [−2.99, 0.88]	.01 [−1.73, 2.11]	.03 [−1.51, 2.35]	−.12 [4.33, 1.13]	−.08 [−2.95, 2.72]	.05 −2.12, 3.43]	.11 −1.05, 4.24]
Race	.00 [−57.59, 57.20]	.00 [−55.94, 53.47]	.06 [−26.72, 80.35]	.05 [−32.50, 73.37]	.05 [−62.68, 103.26]	.04 [−62.31, 98.18]	.08 [−45.85, 110.04]	.07 −42.59, 101.77]
Education	−.00 [−9.96, 9.58]	−.02 [−10.70, 7.94]	−.01 [−9.28, 27.45]	−.01 [−9.77, 7.87]	.00 [−13.51, 13.46]	−.05 [−16.68, 9.84]	−.09 [−19.02, 6.72]	−.13 [−21.15, 2.86]
Mobility		−.34** [−60.13, −24.68]	.02 [−22.25, 27.45]	.06 [−17.37, 31.87]		−.29* [−78.01, −13.83]	.09 [−35.17, 62.64]	.09 [−31.75, 58.79]
Self-efficacy			.49*** [1.56, 3.67]	.48*** [1.56, 3.64]			.49** [.880, 4.58]	.49** [.97, 4.47]
Outcome expectations			.04 [−18.83, 34.52]	.05 [−15.83, 36.72]			.04 [−35.06, 50.37]	−.02 [−45.67, 35.13]
Neighborhood Density				.04 [−0.25, 0.47]				.22* [0.08, 0.83]
Destinations				.15* [1.46, 49.89]				.13 [−14.07, 59.84]
Design				.07 [−16.72, 52.69]				.21* [1.49, 103.02]
R^2	.05*	.14***	.23***	.27**	.02	.09***	.17***	.32***

Note. CI = confidence interval; β = standardized coefficient. *p < .05. **p < .01. ***p < .001.

In men, demographic characteristics (Model 1b) contributed 2% to the explained variance (nonsignificant). As with women, mobility limitations were significantly associated with neighborhood walking when first entered into the model (Model 2b), and explained an additional 7% ($p < .001$) of the variance. Self-efficacy and outcome expectations (Model 3b) explained an additional 8% ($p < .001$) of the variance. Within total self-efficacy, only self-efficacy for neighborhood barriers was significant ($\beta = .30$, $p < .05$). Finally, the addition of neighborhood environment (Model 4b) added 15% ($p < .001$) to the explained variance. In this final model, only self-efficacy ($\beta = .49$, $p < .01$), neighborhood density ($\beta = .22$, $p < .05$), and neighborhood design ($\beta = .21$, $p = .05$) were significantly associated with neighborhood walking. Significant design characteristics in men included neighborhood sidewalks ($\beta = -.25$, $p < .05$), and crime ($\beta = .35$, $p < .01$). Despite the significant differences observed between women and men in total self-efficacy as well as in each of the five types of self-efficacy, gender did not moderate the relationship between total self-efficacy and neighborhood walking.

Neighborhood walking in this study included walking for both transportation and recreation. No significant difference in the duration of transportation and recreational walking was found between men and women but differences existed in the relationship between self-efficacy and each type of walking. The model explained 23% of the variance in neighborhood recreational walking in both men and women. Self-efficacy predicted neighborhood recreational walking in both men ($\beta = .44$, $p = .008$) and women ($\beta = .52$, $p = .000$). For transportation walking, the model explained 20% of the variance in women and 30% in men. Neighborhood transportation walking was significantly predicted only by neighborhood destinations ($\beta = .38$, $p < .001$) in women and by neighborhood density ($\beta = .44$, $p < .001$) in men (results not shown).

Discussion

This study compared the relationship between individual factors (self-efficacy, outcome expectations, and mobility limitations), neighborhood factors (density, destinations, and design), and neighborhood walking duration in older men and women. In women, the presence of local destinations was associated with neighborhood walking, while in men neighborhood density and design characteristics were significant. Total self-efficacy was significantly associated with neighborhood walking in both men and women, but the type of self-efficacy differed by gender. In women, self-efficacy for individual physical activity barriers was associated with neighborhood walking duration; in men, self-efficacy for neighborhood barriers was significant.

Neighborhood Environment

Neighborhood characteristics which encourage walking, including neighborhood aesthetics, lighting, maintained sidewalks, and safety from traffic and crime have been associated with walking in older adults (Cunningham et al., 2005). This study added to the evidence that neighborhood environment influences walking duration, specifically neighborhood sidewalk design and crime. The work of Panter, Jones, van Sluijs, Griffin, and Wareham (2011) supported the relationship between population density and commuting by walking in men. In addition, those who walk more than 150 min per week are more likely to perceive their environment as pleasant, safe, and a place for social interaction (Bird et al., 2010). In contrast, Bassett, Wyatt, Thompson, Peters, & Hill (2010) found that while men take more steps per day than women, the number of steps taken was not associated with living environment in either sex. However, this study included adults above 18 years and was not limited to older adults.

Women report fewer personal and environmental factors conducive to physical activity (Lee, 2005). But in this study, destinations within walking distance were associated with both total neighborhood walking and transportation walking in women, although neighborhood design characteristics were not. The most commonly cited destination for women was a friend's house, which may provide both a destination and social support.

Social support has been associated with physical activity in women (Carlson et al., 2012) but was not measured in this study. Future research should further examine the reason for walking as well as the role of social support.

In contrast, total neighborhood walking in men was influenced by neighborhood density and design, while transportation walking was influenced only by density. Men who walk for exercise may choose to walk only in an environment with characteristics—such as sidewalks and low crime—that are conducive to walking, particularly if they have access to other forms of physical activity. For men who walk for transportation, neighborhoods with higher density may offer more opportunities for this type of walking (Panter et al., 2011).

Self-Efficacy and Outcome Expectations

In women, total self-efficacy explained 27% of the variance in neighborhood walking duration, while it explained 32% in men. This relationship between self-efficacy and walking is consistent with the literature (Conn, 1998; Gallagher et al., 2012; Michael & Carlson, 2009; Nagel et al., 2008; Resnick, 2001), but it is interesting to note the differences in relevant types of self-efficacy.

In women, only self-efficacy for physical activity barriers was significantly associated with neighborhood walking duration; self-efficacy for neighborhood barriers was not. The relationship between self-efficacy for physical activity barriers and walking is supported in the literature (Conn et al., 2003; Morris et al., 2008). In contrast, in men, only self-efficacy for neighborhood barriers was significantly associated with neighborhood walking, although self-efficacy for physical activity barriers trended toward significance. Self-efficacy for neighborhood barriers has been found to be significantly associated with neighborhood walking in older adults with mobility limitations living in the community (Gallagher et al., 2012). Women in this study reported more mobility limitations than men, but no differentiation was made in analysis between women with and without mobility limitations. It also is interesting to note the significance of self-efficacy for neighborhood barriers in light of the significance of neighborhood design. If men are less likely to walk when self-efficacy for walking despite neighborhood barriers is low, then it is to be expected that the presence of neighborhood characteristics that are not conducive to walking may limit neighborhood walking duration. These potentially important relationships between gender, mobility, and neighborhood characteristics and self-efficacy require further examination.

Positive outcome expectations of physical activity were fairly high in this sample, but these expectations were not significantly associated with neighborhood walking in either men or women. The literature on the role of outcome expectations in physical activity is mixed, although they may have more influence in older adults as they age (Conn, 1998; Resnick, 2001) and in those with mobility limitations (Gallagher et al., 2012).

Mobility Limitations

Mobility limitations were significantly associated with neighborhood walking duration when first entered into the model, but became nonsignificant when total self-efficacy and outcome expectations were entered. Self-efficacy may be a more important influence on neighborhood walking than mobility limitations, or it may mediate the relationship between mobility limitations and neighborhood walking, consistent with Social Cognitive Theory (Bandura, 1997; Morris, McAuley, & Motl, 2007). However, few participants in this sample had difficulty with mobility. Some participants may be in a preclinical stage of mobility limitations and may not have acknowledged difficulty with mobility-related tasks. Fried, Bandeen-Roche, Chavez, and Johnson (2000) proposed a preclinical phase of functional limitation in which individuals modify how or whether they perform an activity prior to acknowledging difficulty with that activity. If participants in this study modified or decreased their walking behavior before reporting difficulty with walking, the potential influence of early mobility limitations may not be captured. The self-efficacy scales may have captured this preclinical mobility limitation through decreased confidence in the ability to walk under certain conditions.

Limitations

Limitations of the study include the cross-sectional design, which does not allow determination of causality, and the demographics of the sample, which was predominantly White and well educated. Information on comorbid conditions was not included in this study and may result in uncontrolled confounding. While it could be argued that self-report is a limitation, for the purposes of this research, it was important to capture the participant's perception of the ease or difficulty of walking in their neighborhood. Potential limitations include participant fatigue due to the survey length, although participants were instructed that they did not need to complete the survey in one session. Social desirability could have affected the participants' responses to the questions; however, a wide range of responses was made. Finally, selection bias could have influenced who decided to participate in the study, but the survey cover letter encouraged both those who did and did not walk in their neighborhoods to participate. The responses to the questions about physical activity—ranging from no physical activity to daily physical activity—suggest that social desirability and selection bias were not strong influences on the results.

Implications

The findings in this study have important implications. If we are trying to maximize physical activity in older adults, neighborhood walking for any reason is important, and efforts to increase neighborhood walking may need to tailor efforts differently for men and women. Walking interventions for all older adults should include enhancement of self-efficacy, but gender differences may exist in the type of self-efficacy on which to focus most effectively. Self-efficacy enhancing interventions for women may need to focus on self-efficacy for physical activity despite individual barriers; those for men may need to focus on overcoming neighborhood barriers. Walking interventions targeting older women may need to incorporate local destinations, while those targeting older men may need to focus on neighborhood density and design, particularly related to neighborhood sidewalks and density.

In addition, there are implications for policy makers. This research supports aging in place for older adults who have familiar, attractive destinations within walking distance of their homes that may help to motivate them to walk in their neighborhoods. This information also may inform the decisions of individuals and their families if they decide to move to a new location such as a continuing-care retirement community or independent-living facility, and may help to prevent or attenuate the reductions in physical activity and mobility function that may be associated with those residential changes (Ice, 2002).

Future research should include individuals of more varied racial, ethnic, and educational backgrounds. Additional studies should examine the role of social support in neighborhood walking, as well as recent modifications or reductions in walking activity in the last year that may suggest preclinical mobility limitations (Fried et al., 2000; Simonsick et al., 2008). Specific neighborhood characteristics associated with physical activity and walking in vulnerable subgroups of older adults, such as those with mobility limitations or impairments in hearing or vision, also need to be examined (Yen & Anderson, 2012). Finally, to develop individual and population interventions and policies that impact older adults' long term health and mobility, longitudinal studies are needed to identify trends over time in the relationship between neighborhood environment and physical activity (Satariano et al., 2012).

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