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The Role of Park Proximity and Social Support in Shaping Park Visitation, Physical Activity, and Perceived Health Among Older Adults

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Background: Health scholars purport that park proximity and social support promotes physical activity and health. However, few studies examine the combined contributions of these constructs in shaping physical activity and health. *Purpose*: In this study, the contributions of environmental and social characteristics in shaping park use, physical activity, and health are examined. *Methods*: A survey was distributed to 1515 older adults in Cleveland, Ohio. Results: Path analysis indicated that social support was directly related to health. Perceived park walking proximity was related to physical activity and health through park use frequency. Park proximity was directly related to park use duration. *Conclusions*: Results suggest that environmental and social characteristics contribute to physical activity and health, but perceptions may also be a prerequisite to park use, daily physical activity, and health.

Key Words: leisure, proximity, recreation, the built environment

The incidence of chronic diseases continues to increase across a broad spectrum of the US population. According to the Behavioral Risk Factor Surveillance System, the prevalence of obesity across the nationwide adult population has increased from 12% in 1990 to 22% in 2001.[1] But, according to *Healthy People 2010*, physical activity is the most modifiable aspect of a lifestyle that could improve health across the population.[2] According to Bouchard and Shephard's[3] physical activity and health framework, heredity, lifestyle, traits, physical environments, and social environments can *all* impact habitual physical activity patterns and health. A body of literature is now documenting the role of environmental characteristics in shaping physical activity and health.[4] While several studies have documented the

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relative strength of both social and environmental attributes in their relationship to physical activity and health, fewer have examined these relationships specific to public park environments and behaviors. In other words, less is known about the relative/unique contributions of park-based environmental, social, and behavioral characteristics in shaping physical activity and perceived health. An exploration of such relationships would inform social support and environmental strategies to promote active park visitation.

Study Purpose

Based on the relationships outlined in Bouchard and Shephard's[3] framework, our purpose was to examine the relative contributions of physical environmental characteristics (perceived and geocoded proximity to a public park) and social environmental characteristics (social support level and satisfaction with social support) in shaping the relationship between park-based physical activity (frequency and duration), daily physical activity, and perceived health.

Background Literature

Environmental Correlates to Park Visitation and Leisure Activity

Several studies have explored the contributions of built environment characteristics (e.g., street design, connectivity) in shaping activity and health. In particular, parks have been suggested as important settings for physical activity. Findings related to park proximity (e.g., the "closeness" of parks to residents) generally support a direct relationship between proximity and visitation and, to a lesser degree, an indirect relationship (through physical activity) between proximity and health. For example, numerous studies have documented the role of distance and proximity as they relate to park visitation, use of trails, and recreation activity.[5,6,7] These authors concluded that people who reside closer to recreation facilities are more likely to use them and use them on a more frequent basis. However, studies linking proximity to parks, exercise facilities, and physical activity have demonstrated mixed results. Sallis and colleagues[6] examined the distance between home and exercise facilities and found that people who lived in neighborhoods with a higher concentration of fee-based exercise facilities were more likely to report exercising three or more times per week. However, other studies[8] have not found a relationship between proximity to free facilities and increased physical activity. In terms of park proximity, findings more consistently support the notion that close proximity is associated with higher activity levels.[9,10] For example, Addy and colleagues found that neighborhood environments such as parks, playgrounds, sports facilities, and schools were significant predictors of physical activity and should be targeted in future interventions.

Social Support and Its Influence on Leisure, Physical Activity, and Health

In addition to physical environmental characteristics, psychosocial characteristics such as social support can also influence park-based and daily physical activity. Two models of social support have been developed to examine its influence on activity, health, and well-being: the main effect model and the stress buffering model (positing that social support protects people from the harmful effects of stress).[11] Reviews of the stress buffering effects on health have yielded inconsistent results. However, there has been evidence for a direct effect of social support on well-being and health.[11] In this main effect model, social support directly impacts illness or health, which may positively or negatively impact the risk for disease. The model also proposed that social support can influence physical activity and thus have an indirect effect on health.[12]

In epidemiological studies, social support has been related to physical activity across a variety of different populations using multiple measures.[13, 14] Few investigations have examined the role of social support in contributing to physically active leisure in outdoor environments (e.g., public parks). A recent study by Krenichyn[15] examined the role of social support in women's physical activity in an urban park. In that study, women stated that the social support provided by friends, acquaintances, and family members led to feelings of safety and enjoyment along with continued participation in organized park activities.

Relationships Between Physical Activity, Leisure, and Health

Positive relationships between physical activity and physical health are well-documented.[16] However, there is considerable debate concerning the relative influence of environmental and social strategies to increase physical activity across populations. Recently, Godbey, Orsega-Smith, and Payne[17] contended that the greatest potential for increasing physical activity levels (in the short term) will be through activities and settings that are inherently enjoyable and widely accessible to a broad population. Public parks often provide opportunities for inherently pleasurable leisure experiences and include low- or no-cost activity opportunities in virtually every community, making them an attractive asset in modifying a population's activity. In a study exploring relationships between stress, park-based leisure, and physiological health, Orsega-Smith, Mowen, Payne, and Godbey[18] found that, among high-stress respondents, length of time spent in a park was positively associated with physiological health conditions such as lower blood pressures. Overall, these early investigations suggest that leisure activities (many of which occurred in public park settings) are positively associated with health.

Despite the emerging research linking environmental and psychosocial characteristics with physical activity and health, there is a dearth of research concerning the combined role of environmental and social factors in relation to park-based leisure activity and health.[19] Recently, however, Giles-Corti and Donovan[20] investigated the relative efficacy of environmental, individual, and social characteristics in relating to physical activity. They found that individual and social determinants

outweighed the influence of environmental characteristics in the visitation of recreational facilities. While their investigation provided key insights, they did not examine the role of environmental and psychosocial characteristics across a wider range of park visitation characteristics (e.g., frequency and duration). Moreover, they did not test whether the contributions of environmental and psychosocial characteristics on daily physical activity and perceived health would be mediated *through* park visitation frequency and duration. To build on their work, our study examined the relationships between both environmental (e.g., park proximity) and psychosocial (e.g., social support) characteristics, park visitation, daily physical activity, and perceived health.

Methods

Study Setting and Sample

The study setting was Cuyahoga County, Ohio (e.g., Greater Cleveland). Trained staff distributed self-administered questionnaires in parks, grocery stores, shopping malls, and senior centers across various regions of the county. Researchers strategically selected these data collection sites to represent different levels/types of sociodemographic and socioeconomic status. In parks, field staff set up tables with signs announcing the study and offering free blood pressure checks. The table was set up in high traffic areas such as trails and parking lots. In shopping malls, the table was placed near information kiosks. In supermarkets, field staff were stationed just inside or outside store entrances/exits to systematically intercept and distribute questionnaires to shoppers. A systematic sampling technique (nth person sampling) was used at these data collection sites to obtain a demographically diverse sample evenly distributed geographically across the county. Interviewers approached every other group of people who appeared to be age 50 or over, asked a screening question to verify their age, and offered a free blood pressure screening and other incentives to encourage participation. In senior centers, the questionnaire was administered to groups of up to 30 people in conjunction with congregate meal programs. A total of 3374 questionnaires were distributed during the data collection period, and 1515 completed questionnaires were returned using a business reply envelope (45% response rate).

Measurement

Independent Variables. Two psychosocial variables, two environmental variables, and one socioeconomic variable served as the independent (exogenous) variables in our path analyses. For our psychosocial variable of social support, we used the Social Support Questionnaire (SSQ).[12] This six-item scale measured two constructs: the number of people available to provide support to a respondent and the degree of satisfaction with that support. The SSQ measured social support by asking respondents whom they can count on for help in a variety of situations. For each of the six situations presented, respondents were also asked to list how satisfied they were with the support they would get for this item. For each type of support,

respondents listed their relation to the individuals he or she could count on for help. Responses were measured on a six-point scale where 1 = *very dissatisfied* and 6 = *very satisfied*. Both a mean social support network size and a mean social support satisfaction score were then calculated for each respondent. Alpha reliability scale analyses yielded acceptable scores of 0.85.

For our environmental characteristics, we used both an objective and a perceived (self-reported) measure of park proximity. For the perceived measurement of park proximity, respondents were asked whether a public park was perceived to be within walking distance of their home (0 = *no*, 1 = *yes*). For the objective measure of park proximity, we geocoded the respondents' home addresses and calculated the straight-line distance (in 0.001 mile increments) from their house to the nearest park. Addresses that listed only a post office box ($N = 110$) were assigned a centroid location in the postal box region and geocoded to the nearest park. Furthermore, addresses outside of the county (2% of the respondent sample) were excluded from our sample. Missing distance data was excluded from subsequent analyses.

Exploratory analyses comparing gender across other study constructs (park proximity, physical activity, perceived health) revealed few differences. Socioeconomic status, however, has consistently been associated with park visitation, physical activity, and health status.[21,22] Analyses of our study data revealed that income was related to park visitation and physical activity. Based on these findings, only income was included along with proximity and social support as exogenous variables in our subsequent path model. Respondents were asked to report their household income from the previous year. The nine ordinal response categories used ranged from less than $10,000 to $120,000 or more.

Mediator Variables: Park Visitation and Daily Physical Activity. Measures of park visitation and daily physical activity were hypothesized to mediate the relationships between park proximity and social support on perceived health. Two dimensions of park-based leisure activity included frequency of visitation and duration of visit. These dimensions served as both independent and dependent variables depending on the path model stage.

Park visitation frequency was measured by asking respondents how often they visited local parks (1 = *not at all*, 2 = *occasionally*, 3 = *frequently*). Park visitation duration was measured by asking respondents how long they stayed during their most recent visit to their local park. Participants were asked to indicate (in hours and minutes) their length-of-stay from their most recent park visit.

Measurement of daily physical activity was derived from a single, ordinal item that queried respondents about their activity level (sedentary, moderate, or active) within an average day where a "1" was sedentary activity—"I spend most of my time sitting or standing, drive or take public transportation rather than walk, and I'm more likely to use an elevator than take the stairs," a "2" was moderate activity—"While my daily routine involves mainly sitting or standing, I take opportunities to get exercise by taking the stairs rather than the elevator, walking or cycling rather than using the car or public transportation," and a "3" was considered vigorous activity—"My daily routine involves a great deal of physical activity including a lot of walking, lifting, etc." This measure was used in prior studies examining overall physical activity levels.[23]

Dependent Variables. Perceived physical health was the dependent variable examined in our path analysis. This variable was derived from a sub-scale of the Rand Medical Outcomes Study (MOS) 20-Item Short Form Health Survey (SF-20).[24] Survey respondents were asked to describe the extent to which the following four statements were true: 1) "I am somewhat ill," 2) "I am as healthy as anybody I know," 3) "My health is excellent," and 4) "I have been feeling bad lately." Responses were coded on a five-point scale in which 1 = *definitely true* and 5 = *definitely false*. Following the procedures outlined by the scoring manual, we converted this five-point scale into a 100-point scale where 1 = *poorest health*, and 100 = *best health*. A mean score was then calculated from our four-item scale. Past use of the SF-20 indicates that it has a moderately high reliability ranging from 0.81 to 0.87 for the perceived physical health sub-scale across older adult and general population studies.[24] In our study, reliability analyses yielded a Cronbach's alpha of 0.78 for perceived physical health.

Data Analysis

Descriptive analyses (e.g., frequencies) were conducted for all independent, mediator, and dependent variables hypothesized in our model. Potential direct and indirect relationships between constructs were tested using path analysis. Path analysis was selected in lieu of structural equation modeling because several constructs (e.g., park proximity, and park-based physical activity) were measured by single items. According to Nunnally and Bernstein[25] structural equation analysis becomes less appropriate when the constructs of interest are measured with single items. We were interested in the nature of construct relationships (e.g., their relative strength and direction) for physical activity and perceived health. We posited a path relationship where park proximity, income, and social support would be positively related to levels of park visitation, physical activity, and perceived health. We also predicted that park visitation (e.g., frequency and duration) would mediate the relationships between park proximity, social support, physical activity, and perceived health. Our path analysis involved a calculation of standardized beta coefficients from a series of regression equations between the dependent, mediator, and independent variables. These beta coefficients reflect the strength of the relationships between study variables and are illustrated in the third column of Table 1 and in the model paths of Figure 1. Path analyses modeling involves a two-stage approach. First, all variables are entered into the model to determine initially significant relationships (initial model). Second, if the model is significant, the data is reanalyzed with insignificant variables (from the initial model) excluded. This final model is known as the trimmed model and is illustrated in Figure 1.

Results

The mean age of respondents was 67.4 y (range = 50 to 99 y, standard deviation = 9.0 y) and 66% were female. The sample was mostly white (88%) with about 10% African American, and the rest Hispanic, Asian, and other racial/ethnic groups. Thirty-eight percent reported household incomes of less than $20,000. Almost 60% indicated that they were retired and 9% reported being a homemaker. Respondents were moderately active with only 27% reporting that most of their day is sedentary

Table 1 Regression Analyses of Path Coefficients (Initial Model)

Outcome variable	R^2	Independent variables	β	P
Perceived physical health	0.161	Daily physical activity level	0.267	0.000
		Household income	0.123	0.004
		Park visitation frequency	0.097	0.026
		Social support satisfaction	0.090	0.030
		Social support network size	0.089	0.036
		Distance to the closest park [a]	0.051	0.233
		Length of park stay	–0.042	0.311
		Park within walking distance [b]	0.016	0.712
Physical activity	0.048	Park visitation frequency	0.136	0.003
		Distance to the closest park [a]	–0.042	0.354
		Household income	0.028	0.538
		Park within walking distance [b]	0.025	0.581
		Social support network size	0.014	0.751
		Length of park stay	0.011	0.805
		Social support satisfaction	0.007	0.866
Park visitation frequency	0.098	Park within walking distance [b]	0.193	0.000
		Household income	0.198	0.000
		Distance to the closest park [a]	–0.067	0.122
		Social support network size	0.056	0.206
		Social support satisfaction	–0.016	0.706
Park visitation duration	0.040	Distance to the closest park [a]	0.140	0.002
		Household income	–0.132	0.003
		Park within walking distance [b]	–0.046	0.300
		Social support network size	0.023	0.611
		Social support satisfaction	–0.014	0.754

[a]objective park proximity measure; [b]perceived park proximity measure

with a lot of sitting/standing, 43% indicating that they get some daily opportunities for exercise, and 30% noting that their day involves a great deal of physical activity. In terms of park visitation, 53% indicated that they were occasional visitors of local parks while 33.1% reported that they were frequent park visitors. For our measure of perceived park proximity, 51% indicated that a park was within walking distance of their home. The average geocoded distance from respondents'

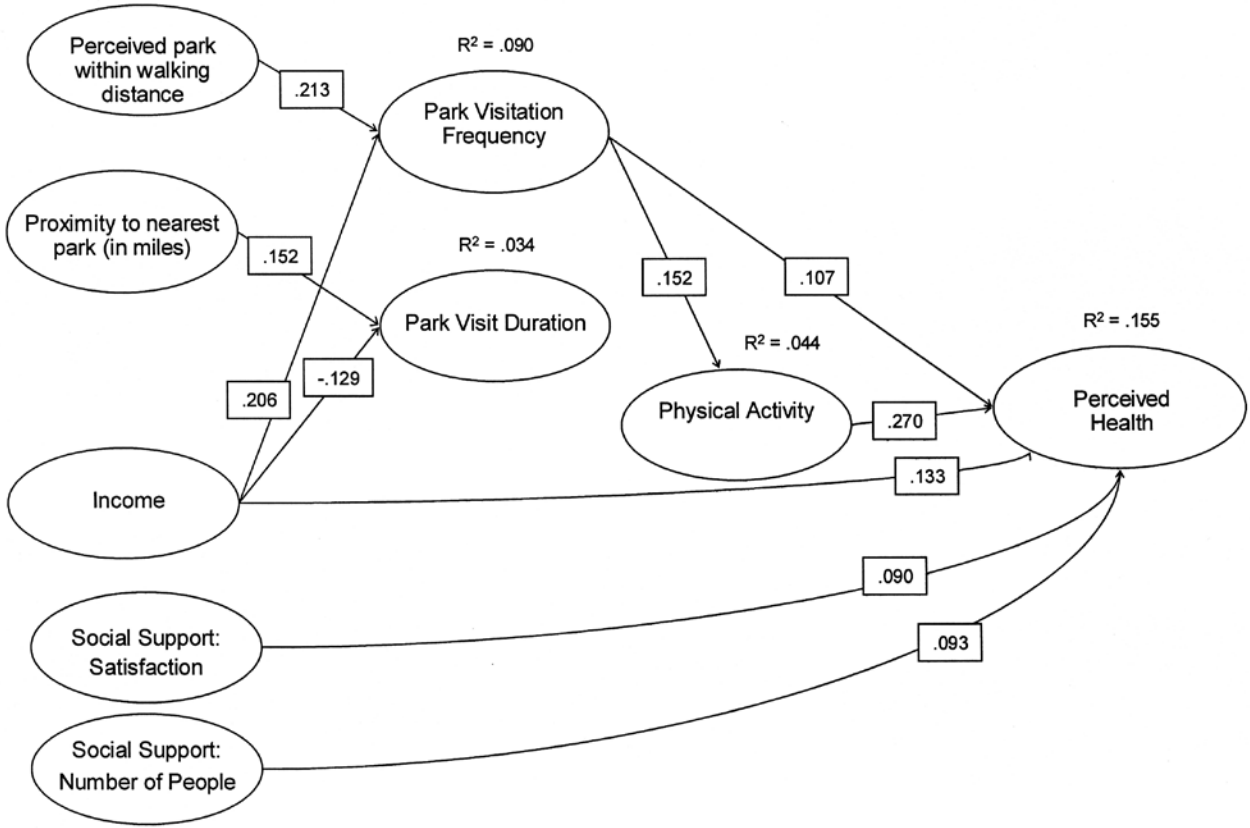

Figure 1—The role of proximity, income, and social support in relation to park visitation, physical activity, and health (trimmed model)

households to the nearest park was 1.34 miles (range = 0 to 4.54 miles, standard deviation = 0.98). Satisfaction with social support network was moderate with an average score of 5.3 (out of a possible score of 7.0) and the average number of individuals within respondents' social support network was 2.32 individuals. Finally, perceived health scores, as calculated by the SF-20, indicated moderate perceived physical health for this age group (50 + y) with average scores of 70.66 out of a total score of 100.

Path coefficients were estimated by simultaneously entering independent variables for each hypothesized dependent variable in the model using ordinary least squares regression. Collectively, the overall model was significantly related to perceived health. While the model was statistically significant, its overall explanatory power was relatively weak (R^2 = 0.161) (Table 1). This estimated model offered evidence concerning the relative strength of both environmental and social characteristics to park-based leisure activity, daily activity, and perceived health. Consistent with prior research, physical activity had a direct positive effect on perceived physical health (β = 0.267). Park visitation frequency had an indirect effect on perceived health through its effect on daily physical activity (β = 0.136) (Table 1). Of the park visitation variables, only park visitation frequency was directly related to positive perceived health (β = 0.097). Those who visited parks more frequently were more likely to report higher levels of perceived physical health. Household income (β = 0.123) and both domains of social support (i.e., social support network size and satisfaction) had direct and positive relationships with perceived health (β = 0.090 for social support satisfaction and β = 0.089 for size of the support network, respectively). However, neither the perceived park proximity measure (walking distance to a park) nor the objective park proximity measure (geocoded distance to the park) measure was directly related to perceived health. Across all study constructs, daily physical activity level had the strongest direct relationship to perceived health. There were no direct effects between park proximity, income, social support, or park visitation length of stay on daily physical activity. However, park visitation frequency had a direct and positive significant relationship on daily physical activity. In terms of indirect effects, park visitation frequency mediated the relationship between perceived park proximity and daily physical activity. However, there were no other significant mediating effects found in our analyses.

When using park visitation measurements as outcome variables, both the frequency and length-of-stay paths were significantly, but modestly related to the independent variables (R^2 = 0.098 and 0.040, respectively). Significant and positive relationships existed between a perceived park proximity (β = 0.193), household income (β = 0.198), and park visitation frequency. Positive relationships also existed between objective park proximity (β = 0.140) and park visitation length of stay while a negative relationship was found between income (β = –0.132) and park length-of-stay. In addition, perceived park proximity was not significantly related to park visitation duration and objective park proximity was not significantly related to park visitation frequency. Finally, it should be noted that social support measures were not significantly related to either of the two sub-domains of park visitation. Figure 1 summarizes the reduced path model with non-significant paths deleted. Given that all study constructs had at least one significant path, all variables from the hypothesized model remained in this trimmed model. The importance of

income, daily physical activity, and social support and their direct relationships with perceived physical health are evident in this reduced model.

Discussion

Results from this study indicate significant, but weak indirect relationships between park proximity, park visitation, daily physical activity, and perceived health *and* direct, but moderate relationships between social support and perceived health. The strength of the model was modest, supporting the need to explore the collective explanatory contributions of other individual, social, and environmental constructs (e.g., self-efficacy, perceived neighborhood "walkability," objective elements of community design and density) in relation to park-based leisure activity and perceived health.

Similar to prior health indicator models,[26] we found that daily physical activity and household income were the strongest correlates to perceived health. A direct and positive relationship between social support satisfaction, size of the social support network, and perceived health was also demonstrated. Social support outweighed the influence of environmental characteristics (e.g., perceived and objective park proximity variables) in their direct relationship to perceived health. However, our measures of park proximity were more robust than social support measures in their relationship to park visitation behaviors and their indirect relationships with daily physical activity. These findings contradict an earlier study by Giles-Corti and Donovan[20] who found that individual and social characteristics were more influential than environmental characteristics in relating to recommended exercise activity behaviors. However, our results are consistent with Giles-Corti and Donovan's[27] subsequent study of walking in which public open space was specifically examined. In that study, Giles-Corti and Donovan found that the relative influence of individual, social, and physical factors were of equal importance in explaining physical activity. Nevertheless, the reader is cautioned that our measure (SSQ) was a more global characterization of social support and was not specifically tied to exercise and physical activity behavior. Future studies should address this limitation by examining the role of social support for physical activity in its relationship to park-based leisure activity, physical activity, and perceived health.

We also found that perceived park proximity (e.g., whether a park was perceived to be within walking distance to their house) was directly related to the frequency of park visitation but not the duration of the park visit. As expected, respondents who reported that they lived within walking distance to a park were more likely to be frequent park visitors.

According to public health researchers, investigations that use objective (as opposed to perceived) environmental and physical activity measures are needed. Recall accuracy, over-estimation and social desirability biases are often cited as deficiencies in such self-reported measurements. However, our findings indicated that perceived park proximity was more robust than objective park proximity in relation to self-reported park visitation frequency and daily physical activity. Here, perceived park proximity had significant direct and indirect relationships with reported park visitation frequency, daily physical activity, and perceived health. Our objective measure of park proximity (e.g., straight-line mileage to the nearest

park edge) was related only to respondents' length of park stay. Visitors who lived farther from parks were more likely to stay longer. Such findings suggest that while objective distance measures are an important global correlate to physical activity behavior and perceived health, individual awareness and perceptions of such environments may also be important prerequisites to physical activity.

Our findings also indicated that park-based leisure activities played a small, but significant role in relating to perceived health through daily physical activity. Park length of stay, which had been linked to positive physiological health outcomes (e.g., lower blood pressure) in prior park-based health research,[18] did not contribute to daily physical activity nor to perceived health. One explanation could be that longer park visits were associated with more sedentary park behaviors such as picnicking, driving, etc. and, thus should not be expected to influence perceived physical health. However, logic might also suggest that longer park visits could still be positively related to *mental* health (e.g., providing more time to cope with stressful life events).

Study Limitations and Conclusions

This study was subject to a number of limitations that influence its generalization and interpretation. First, its design was cross-sectional and not longitudinal. As such, the relationships could be reciprocal rather than predictive. Second, our measure of social support was global and was only related to another global variable (perceived health). Future research should build on our findings and explore the role of social support for leisure in its relationship to health. Third, with the exception of our geocoded distance measure, study constructs were operationalized using self-reported measures. Future attempts to extend our analyses should incorporate additional objective measures of physical activity (e.g., accelerometer and observational data) and health (e.g., physiological measures such as blood pressure, cortisol levels, etc.). Fourth, the objective measure of park proximity (e.g., geocoded distance between residences and parks) had a relatively narrow range (0 to 5 miles). Given the predominantly motorized travel mode used by the sample, such a compressed range may not be sensitive enough to differentiate degrees of park proximity. Future studies that allow a wider range of access possibilities and travel distances are encouraged. Finally, our measure of park visitation duration was less global (e.g., length of their *most recent* park visit) than the park visitation frequency measure. Assessing the average visit duration across a longer time frame would have been more consistent with other park-based activity variables used in this study and, as such, should be addressed in future research. It should also be noted that participants' most recent visit may not have been indicative of their typical length-of-stay across the year (e.g., summer visits may be longer than winter visits).

Our analyses indicated that social and environmental characteristics were related to perceived health in an older adult population. Efforts to promote population health should follow a multi-pronged approach; focusing on proximity to physical activity opportunities, awareness of those opportunities, and promotion of social networks to support activity at those opportunities. Given the ubiquity of public parks in the United States, their latent potential for increasing a population's

physical activity is promising. As interdisciplinary research teams coalesce in their efforts to examine the role of environments in shaping physical activity, research in park settings should continue.

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