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Is "Walkability" A Useful Concept for Gerontology?

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Abstract

The study tested two hypotheses. 1) In a walkable neighborhood, residents will exercise more, eat healthier, and suffer from less obesity. 2) That relation will be stronger for the elderly. Health was measured by physical activity, number of portions of fruits and vegetables eaten, and BMI. "Walkability" was measured by a set of environmental items that formed three distinct factors. The three health outcomes were related to the three environmental factors. Age was not a significant predictor. While environment does play a significant role in health outcomes the ways that role is expressed and its relation to age is complex.

Keywords

walkability; environment; GIS

Introduction

"Walkability" is an idea that is increasingly popular with public health officials, government agencies, and advocates for "smart growth" and sustainability. The term is often used to identify and measure features of the built environment that either enhance or impede willingness and ability to walk to local amenities, especially those amenities that are thought to encourage healthy lifestyles. Research has tied measures of Walkability to health outcomes such as reduced obesity (Brown, et. al., 2009), lower rates of depressive symptoms (Berke, Gottlieb, Oudon, Vernez, & Larson, 2007), and even greater longevity (Tkano, Nakamura, & Watanabe, 2002). Other studies have associated Walkability to healthy behaviors, such as walking to food markets where fresh fruits and vegetables can be purchased (Rundle et. al., 2009). "Walkability" is also becoming an important concept in the field of aging, especially among advocates for programs that encourage active aging and helping older adults remain in their homes and communities.

(1) Our study was designed to test two hypotheses regarding the relation of "Walkable" neighborhoods to health outcomes based on commonly accepted definitions of "Walkability." While there is no single, universally accepted definition for the concept of

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Walkability, much of the literature is based on the assumption that there are three aspects to declaring a neighborhood Walkable. These three aspects include 1) high population density; 2) land use mix; and 3) street connectivity (measured by intersection density) (Van Dyck, et. al., 2010). All three items refer to characteristics of the general built environment and do not take into account the presence or absence of specific amenities or risk factors that might encourage or inhibit walking. Taken together, these items seem to provide a workable definition of what is "Walkable" and set a standard for measuring all neighborhoods on a single set of characteristics (Cutts, Darby, Boone, & Brewis, 2009; Sundquist et. al., 2011). While some researchers (Lovasi, Neckemann, Quinn, Christopher, & Rundle, 2000; Owen, et. al., 2007) add a measure of socio-economic status to their definition of a Walkable neighborhood, the idea that a single item or set of items can measure Walkability is assumed in much of the scientific literature. A second assumption often made is that people living in more Walkable neighborhoods are more likely to walk than residents of less Walkable neighborhoods. (12) There are two clear limitations on the common definitions of "Walkability" as described above. First, the construct assumes that the characteristics associated with Walkability (such as high population density) always encourage walkable neighborhoods. We questioned that assumption – for example, an area with bothhigh population density and high crime may not necessarily encourage walking. Second, we did not assume that residents would walk just because the physical environment meets the requirements for "Walkability" as described above. We felt that these assumptions needed to be tested by adding additional environmental items to the definition of "Walkability" and by testing the assumption that people are more physically active in "Walkable' neighborhoods.

Project WISH

In February 2011 the National Institute of Nursing Research of the National Institutes of Health awarded a two year exploratory study entitled "Walkability's Impact on Senior Health" (WISH) to Philadelphia Corporation for Aging (PCA). The authors of this article are respectively the Principal Investigator, GIS Specialist, Statistical Consultant and Research Analyst on that study. The primary goal of the study was to test two hypotheses regarding Walkability and older adults. The hypotheses and the methods used to study them were guided by the first assumption above, that Walkability was a single domain with positive and negative elements that was applicable in all neighborhoods and age groups.

Hypothesis One: In a walkable neighborhood, residents will exercise more, eat healthier, and suffer from less obesity. A neighborhood is walkable when a person in reasonably good health can walk to neighborhood amenities such as a grocery store, senior center, or park, and take public transportation. It is also a neighborhood where barriers to walking, such as high crime rates and physical barriers/obstacles, are minimized.

Hypothesis Two: The relation between walkable neighborhoods and health outcomes will be stronger for persons age 60 and older than for younger persons. We expected this result because older persons are more likely to spend the majority of their day in the neighborhood in which they reside, and therefore they will shop for food as well as engage in recreational activities in close proximity to their homes.

(6) We planned on testing our hypotheses by creating a "Philadelphia Walkability Score." This score was to be created through the development of a single scale that included both items that would encourage walking (such as the presence of desirable destinations) and items that would discourage walking (such as crime and vacant properties). The study team assumed, based on the published literature, that a scale could be created that would then be used to measure "Walkability" in terms of the relative presence of the positive items and absence of the negative items. That scale could then be associated with health behaviors in the city's neighborhoods to test our hypotheses.

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Since 2009 PCA has pursued an integrated research/policy agenda called "Age-friendly Philadelphia" (AfP). The WISH study was designed in part to extend these efforts (Clark & Glicksman, in press). The goal of AfP is to create an "age-friendly city committed to improving both the physical and social environments that surround the city's elders to facilitate independence and neighborhood cohesion" (Clark, K., 2011). Much of the AfP effort has focused on modifying the physical environment. AfP has taken the lead on efforts to include aging related issues into the new city zoning code; encourage better bus shelters that make it easier for older adults to use public transportation; increase access to city parks; and develop more gardening opportunities for seniors.

Analysis and Results

To complete our analyses we needed information on the health status and behaviors of adults in the City of Philadelphia as well as information on their social and physical environments. The data file used in the study to identify the health status of adult (age 18+) Philadelphians was the 2008 Public Health Management Corporation (PHMC) Household Health Survey (HHS) (PHMC, 2010). The HHS has been conducted in 1983, 1987, 1991, and every two years since 1994 and covers the city/county of Philadelphia and the four surrounding Pennsylvania counties. In 2008, 10,007 persons were interviewed by phone, of those 4,394 (3,051 ages 18–59 and 1,343 ages 60+) lived in Philadelphia.

Topics covered in the survey have included health status, sources of care and utilization of services, personal health behaviors, disease prevention and health promotion, social capital, hunger and access to food, housing repair, transportation, and demographic characteristics.

The survey has also included questions about income, years of education, living arrangements, and minority status. In addition, geographic locators including county, zip code and Census Tract were included for each case. Interviews were conducted in English and in Spanish.

We selected three outcome measures for the tests of our hypotheses. These included Body Mass Index (BMI), which was calculated by PHMC for each individual in the sample; (3) a measure of the number of servings of fruits and vegetables consumed each day (scale from 0 to 11+), and whether the respondent was physically active which was measured using a dichotomous yes/no scale (In general, would you say that you are physically active on a regular basis?). (4) Stata Version 12 was used for statistical analyses and ArcGIS Version 10 for spatial analyses.

To analyze environmental impact on health we used variables that measured the frequency of each environmental factor such as vacant properties, book stores, bus stops, and the number of murders in each Census Tract represented in the data set. The staff at Azavea (our GIS consultants) took responsibility for identifying and assembling data sets related to walkability for the city of Philadelphia. These data sets were selected from a range of sources including City agencies, the State of Pennsylvania's data clearinghouse, OpenStreetMap and Azavea's data archives. In addition, PCA's GIS Specialist acquired data sets from other sources, including the Philadelphia Police Department and the Pennsylvania Horticultural Society. As a first step to preparing the GIS files for analysis, Azavea organized the data sets so that they shared a common coordinate and projection system. As in traditional cartography, the projection of a map refers to the way in which the naturally curved surface of the earth is distorted in order to produce geographic information on a flat surface, such as a paper map or computer screen. Both the projection and coordinate system (the x,y grid used to pinpoint locations on a map, typically based on longitude and latitude) are used to provide consistent representation of geographical information, and it is important to standardize both of these in ArcGIS before any data is analyzed, to assure that relative

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location of the items is not skewed. The original GIS files were provided in a manner conducive to representation on a visual map- with single/smaller locations (such as a bus stop or the physical location of a crime) represented as points, and locations that cover larger areas (such as major parks) as polygons which show the entire area covered. Using the GIS software and a data layer representing the boundaries of each Census Tract in Philadelphia, we were able to quantify the number of items which fell inside the boundary of each Census Tract. Point data was counted if it fell inside these boundaries for a particular tract, and polygon data if it was found to intersect with the boundaries. The Census Tract was used as the level of study because it was the smallest geographic unit represented in the HHS.

Two Stata data files were created, one with the PHMC survey data and one with the items provided by Azavea. Each was sorted by Census Tract. The two files were combined using the Stata routine matching each case in the survey data with information on their Census Tracts from the GIS data. A single analytic file was then created combining this information with the PHMC survey data, using the Census Tract number as the common identifier to match the files.

Results

We computed the proposed Walkability Score by summing the scores on the environmental items. We included both positive and negative items in the analysis because we had assumed that a single scale would emerge that would include both positive and negative elements. The scale showed a weak Alpha (.72) even after removing several items from the analysis. The initial attempt at completing the analyses by testing the relation of this scale to our three outcome variables showed no statistically significant relation between our Walkability measure and any of the three health outcomes. We then rethought our assumptions and decided to complete a factor analysis to determine if there was really only one domain as assumed, or if in fact there were several domains being measured by this set of items.

Factor Analysis of Neighborhood Characteristics—Fourteen neighborhood characteristics (variables listed in Table 1) were factor analyzed using a principal axes method based on 4,394 (7) data points. The likelihood ratio test indicated that the correlation matrix was significant (χ^2 (91) = 22000, p = .0000). The factor analysis was a principal axes method, with the number of factors for rotation obtained through the use of the examination of eigenvalues and the scree diagram. The eigenvalues and scree diagram of the unrotated factor pattern matrix suggested 3 or 4 factors would be appropriate for rotation. An oblique, oblimin factor pattern rotation was used to test the 3 and 4 factor solutions. Since we had over 4,000 subjects in the factor analysis, the minimum factor pattern loading that we required for inclusion of a neighborhood variable in a factor was .30. (9) The 4 factor solution was less efficient, as it produced a poorly defined fourth factor and disturbed the other 3 factors. The 3 factor solution generated usable, defined rotated factors; without any double loadings (Table 1). The first factor was labeled “Amenities,” and contained the variables coffee-tea shops, book stores, restaurants, pharmacies, grocery stores and fitness centers. The second factor was labeled “Distressed Neighborhoods,” and its constituents were murder, proportion of vacant properties, corner-stores, murals and land reclamation sites. The third factor was labeled “Residential,” and it was composed of the variables bus-stops, owner and renter dwellings. Factor scores were calculated for the subjects in each of the three factors. Dummy variables were then generated from these factor scores for subsequent use in the MANOVA and ANOVA analyses. The factor score variables were median split, and zeros were applied to the lower values and ones to the upper values. Thus, the low values for “Amenities” indicated the paucity of such facilities in the subjects’ neighborhoods; dummy scores of 1 indicated the opposite, subjects who lived in neighborhoods with available Amenities. A zero score for “Distressed Neighborhoods”

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defined subjects who did not live in distressed neighborhoods; a “1” value specified subjects who did live in such neighborhoods. A zero score for “Residential” identified subjects who lived in neighborhoods that were not heavily residential; a score of “1” identified those who lived in more densely residential housing areas.

The correlations among the rotated factors (10) are shown in Table 2. The factors “Amenities” and “Distressed Neighborhoods” were positively correlated (.10). Thus, there were some subjects who lived in minimum amenities neighborhoods who were not living in distressed neighborhoods. On the other hand, some neighborhoods were distressed but also had amenities. The factor structure matrix combined the information in both the factor pattern loadings and the factor correlations. It provided no useful information with respect to double loadings between the Amenities and Distressed Neighborhoods factors, that is, both factors having loadings => .30. The factors “Amenities” and “Residential” had the highest correlation (.27). That is, there was a distribution of subjects who lived both in low Amenities, low Residential and high Amenities, high Residential neighborhoods. The factor structure matrix with its doubly loaded variables suggested that in particular, bus-stops, restaurants, pharmacies, groceries and renters were located primarily in high Amenities, high Residential housing areas. These neighborhood characteristics were substantially absent in low Amenities, low Residential neighborhoods. Finally, an inconsequential, very small negative correlation was found between “Distressed Neighborhoods” and “Residential” (-.05), and double loadings in the factor structure matrix were absent based upon the above +/− .30 correlation criterion.

MANOVA and ANOVA Analyses

Three subject criteria, physical activity, body mass index (BMI), and availability of vegetables and fruit in daily diets (fruit) were regressed upon the derived neighborhood factors of amenities (Amenities), distressed neighborhoods (Distressed Neighborhoods) and residential (Residential). There was no missing data in the environmental variables, but there was a minimum amount of missing data, less than or equal to 3%, in the physical activity, BMI and fruit criteria. In physical activity, obesity and fruit consumption there were respectively 21 (.48%), 89 (2.03%) and 149 (3.35%) missing cases. Missing values were imputed using Stata’s regression algorithm so that all the variables had legitimate values for the analyses. As indicated, the factor scores of the derived factors were transformed into dummy variables for use in analyses of variance by median splits, assigning zeros to the low and ones to the high factor scores. The individual MANOVA models were two factor, multivariate regressions of the three criteria (physical activity, BMI and fruit) on each of the derived factors (Amenities, Distressed Neighborhoods or Residential), a dummy age variable (age60, 0 = < 59; 1 = > 60) and the interaction of a particular factor with age60.

The first MANOVA model was physical activity, BMI and fruit regressed on the factors of Amenities, age60 and Amenities*age60. The analysis contained 4,394 subjects and the Wilks’ lambda (W) = .9953 (d.f. = 3) for the model with an F = 2.32 (d.f. = 9, 10679.4), p = .0134. The significance of this finding is founded entirely upon the large sample size, because W itself is quite minimal. The individual MANOVA factors of age60 and Amenities*age60 were clearly non-significant, but Amenities had a W = .9961 (1) and an F = 5.70 (3, 4388), p = .0007. Three individual anovas were then calculated to determine the significant basis of the MANOVA model. For example, physical activity was regressed on Amenities, age60 and Amenities*age60, which is a 2 factor ANOVA. The ANOVA factor age60 was not significant, but significance was found for Amenities (F = 9.45 (1, 4390), p = .0021) and for Amenities*age60 (F = 5.95 (1, 4390), p = .0147). The adjusted means for physical activity were 1.21 for Amenities = 0 and 1.19 for Amenities = 1, indicating that greater physical activity could be found in some subjects who lived in low amenities neighborhoods. With respect to the interaction term, the adjusted mean = 1.20 for the low

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Amenities, younger subjects, and the adjusted mean = 1.24 for low Amenities, older subjects, a relative mean difference = .04 in physical activity for some older subjects in the low Amenities neighborhoods. This was contrasted in the interaction with a relative difference in adjusted means for high Amenities, older subjects (1.17) when compared to the high Amenities, younger subjects (1.19), an opposite mean difference = .02. In short, it implied that there were some older people who were more physically active than some younger subjects in low Amenities neighborhoods. Likewise, some younger people were more physically active than their older counterparts in the high Amenities neighborhoods. Next, the physically active criterion was regressed on BMI, age60 and BMI*age60. Only BMI factor was significant (F = 7.95 (1, 4390), p = .0048). The adjusted mean for physical activity = 28.44 for subjects with low BMI scores, and physical activity = 27.92 for those with high BMI measures. To reiterate, subjects with lower BMI scores tended to be more physically active. Moreover, there were only non-significant relationships found in the regression of physical activity on fruit, age60 and fruit*age60.

The second MANOVA regressed the same criteria (physical activity, BMI and fruit) on the ANOVA factors of Distressed Neighborhoods, age60 and Distressed Neighborhoods*age60. The overall model was significant (W = .9934 (3) and F = 3.23 (9, 10679.4), p =.0006). Although significant, W was at a minimum level. Only the Distressed Neighborhoods factor was significant (W = .9966 (1) and F = 5.04 (3, 4388), p = .0017); both the main effects of age60 and Distressed Neighborhoods*age60 were non-significant. Once again, the two factor ANOVAs were repeated on the three criteria. The physically active criterion was regressed on Distressed Neighborhoods, age60 and Distressed Neighborhoods*age60. There was only one significant result, the interaction of Distressed Neighborhoods*age60 (F =4.12 (1, 4390), p = .0425). The adjusted mean for physical activity in the low Distressed Neighborhoods, low age60 group was 1.22, and the adjusted mean = 1.20 for the low Distressed Neighborhoods, high age60 group. For the younger, high Distressed Neighborhoods group the physical activity adjusted mean = 1.18, and for the older, high Distressed Neighborhoods group the physical activity mean = 1.22. Some older subjects in the high Distressed Neighborhoods group tended to be more physically active than their younger counterparts; and inversely in the low Distressed Neighborhoods groups, some of the younger subjects were more physically active than their elders. The ANOVA of BMI regressed on Distressed Neighborhoods, age60 and Distressed Neighborhoods*age60 produced a significant main effect only for the Distressed Neighborhoods factor (F = 9.94 (1, 4390), p = .0016). The adjusted BMI means were lower for the low Distressed Neighborhoods group (27.82) and higher for the high Distressed Neighborhoods group (28.52). Some subjects in the low Distressed Neighborhoods group had better BMI measurements than some other subjects found in the high Distressed Neighborhoods group. Finally, the regression of fruits on Distressed Neighborhoods, age60 and Distressed Neighborhoods*age60 had no significant main effects.

The final MANOVA regressed the criteria (physical activity, BMI and fruits) on the predictors of neighborhood Residential, age60 and Residential*age60. The overall model was significant (W = .9950 (3) and F = 2.43 (9, 10678.4), p = .0095). Once again, though significant, W was at a minimum level. Only the Residential factor was significant (W =. 9958 (3) and F = 6.15 (1, 4388), p = .0004). The individual ANOVAs for physical activity and BMI both had non-significant main effects. The criterion fruits, however, had a significant main effect for Residential (F = 15.09 (1, 4590), p = .0001). Some subjects in the lower Residential neighborhoods had higher consumption of fruits and vegetables (M = 2.61) than some subjects living in the higher Residential neighborhoods (M = 2.40).

Developing a Third Hypothesis—The Distressed Neighborhoods factor contains items that identify sources of distress (vacant lots, murder) as well as items that measure

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interventions in distressed neighborhoods designed to make them more livable, such as murals and land reclamation. This led our GIS Analyst on the project to propose a third hypothesis – that health outcomes would differ in those distressed areas that were receiving significant intervention versus those that were not receiving such interventions. To test the hypothesis we selected the Census Tracts with the highest number of vacant properties by splitting the sample into high and low and then testing whether the presence of murals (part of the city's effort to change the physical environment of neighborhoods) made a difference in health behaviors. We discovered that for older adults (age 60+) who lived in areas with high rates of vacant properties the presence of murals meant that they were more physically active (83% of elders living in areas with high rates of vacant properties and high numbers of murals report being physically active versus 73% of elders in areas with high rates of vacant properties and with few or no murals, with $\chi^2 = 19.7$, p = .02). While we cannot directly tie the presence of the murals to the increased physical activity of the older adults, the correlation between these items suggest that it is worth investigating the impact of these types of interventions on health outcomes. When we repeated this analysis in areas with lower rates of abandoned properties there were no health differences between areas with high numbers of murals and those without, suggesting that the impact of murals is more pronounced in the most distressed areas of the city.

Discussion

We did confirm that there is a relation between the physical/social environment and health outcomes, our first hypothesis. However, we did not confirm that there is a reliable single measure of "Walkability" or that the combination of fewer negative environmental features with more positive environmental features lead to all predicted health outcomes. Rather, we found that specific elements in the social and physical environment are related to specific health outcomes. Thus our findings have led us to question some of the assumptions on which the first hypothesis was based.

In regard to the second hypothesis, we found that although age has some effect on the relation between environment and health outcomes, that the relation is more nuanced than we expected. Indeed, age did not affect all relations between the three environmental factors we created and the three outcomes variables. This finding makes sense. Neighborhood environment, both social and physical, affects all residents, although in some cases it may have a greater effect on the frailer residents.

The results of these analyses point to five important lessons. First, we may require a rethinking of the concept of "Walkability." The assumption in much of the literature that "Walkability" is a uni-dimensional item was not confirmed by our analyses. Rather, we discovered that "Walkability" (if that is the correct term at all) is composed of different dimensions (Amenities, Distressed Neighborhoods and Residential factors) and that each of these dimensions interacts differently with the selected outcome measures of health behaviors and risks. For example, some middle class neighborhoods may not be very distressed but may be so residential in character that it is impossible, without driving or having adequate public transportation, to get to a store that sells fresh fruits and vegetables, so an intervention in such a neighborhood would need to be designed to deal with the lack of access to healthier foods. That there are complex interactions between type of neighborhood and health outcomes was further confirmed by the finding from the third hypothesis which seems to suggest that an intervention that has a positive health effect in certain types of neighborhoods (in this case, the most distressed) may not have the same effect in other types of neighborhoods. This has tremendous implications for designing interventions at the neighborhood level to increase Walkability. A neighborhood with little mixed land use but

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which also has low crime and few vacant properties will require a different type of intervention that one with a high level of distress but many amenities.

Second, we also discovered that the relation of age to “Walkability” is more complex than we first hypothesized. Although age is a significant element in some of our analyses it is not as central to defining the relation between “Walkability” and health outcomes as we first hypothesized. This is an important finding in itself because it suggests that neighborhoods have similar effects on persons of all ages and that the frailty of the neighborhood may be as big a factor in whether a neighborhood is “Walkable” as the frailty of the individual.

The third lesson learned is the importance of using GIS in examining the impact of environment on health. Current methods, which often rely only on survey research samples need to be expanded to include spatially based analyses in order to take into account the often overlooked effects of a populations’ physical (and social) environment. The use of GIS data for theory design, data analysis and interpretation should be considered in any future study of the impact of the environment on health outcomes.

In addition to providing the location based data used to measure environmental factors in the study, GIS is also useful as a tool for understanding initial results and creating further hypotheses. By viewing these results as a map in ArcView (or other GIS software), we can visually compare them to other known data (for example, income levels or minority status from the Census Bureau), see where the highest and lowest concentrations of different items/factors are located, and use our knowledge of local communities (and where they are situated) to draw further conclusions about why these concentrations exist as they do.

For example, when we looked at the Residential factor distributed over a map of the city, we could see that it seemed strongest in neighborhoods that had very few commercial areas, and therefore could hypothesize that perhaps the reason for low fruit and vegetable consumption was a lack of mixed-use or commercial properties. This is a theory we will be testing with new data.

We can also take the Distressed Neighborhoods factor which was created from physical attributes (i.e. vacant land, et.) and compare it both visually and in statistical analysis to poverty levels taken from the PHMC data set or from Census data. This type of analysis is critical because it can help us better understand the impact of Distressed Neighborhoods on persons of all ages by linking low income to distressed physical environments and to begin to examine how each of these factors affect health outcomes. In the future we hope to add other measures of the environment to our analyses, such as the slope of the land, to improve our understanding of the relation of the physical environment to health and aging.

The fourth lesson is the need to rediscover theoretical approaches to the study of environment and aging, whether from sociology (Human Ecology) or gerontology (Lawton’s Environmental Press). For example, Lawton’s theory of the Environmental Press can help us understand why interventions in more distressed environments may have a greater impact on health than interventions in less distressed environments. Lawton proposed that there was a dynamic relation between the individual and the environment. Each has an impact on the other. However, when an individual becomes frail, the impact of the environment, whether for good or for ill, becomes greater because the individual has less ability to modify the environment and thus reduce or enhance its effect. If his hypothesis that the environment has a greater impact on frailer adults than on the less frail is correct, than perhaps the same is true for neighborhoods. As the application of these theories regarding the relation between environment and health could have important real-world consequences, a next step in research should be to formally test these theories in the neighborhood environment (Lawton, 1982).

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The fifth lesson is that researchers must work closely with policy makers to help them incorporate these findings into new efforts to help older adults remain in their homes. (13) Although the findings reported here need further study before they can be practically implemented, only by working closely with policy makers as the research progresses can we hope to eventually turn these research findings into practice. Changes to the physical environment are usually the work of government, regional planning authorities, and community organizations. The ability to integrate research findings into the plans of these groups requires an understanding of the ways in which they accomplish their goals and the ability to translate research findings into language that is meaningful to them. This would require understanding of complex policy issues including zoning, land reclamation, etc. The policy work needed is not something that the scientific community can undertake by itself – there needs to be collaboration between scientists and policy makers for any of this to be useful in the real world. The Age-friendly Philadelphia effort, of which this study is part, has already created real change by influencing the revised City Zoning Code (Clark, 2011). This is just one example of what can be accomplished when policy planners and researchers work together on a common goal.

Conclusions

The results of this research are only a beginning and the findings need to be confirmed, a task we have already begun. But they contribute to a trend in some of the literature that argues the need to go beyond traditional notions of health and look at environmental factors (both social and physical) in understanding health status and health changes for both older and younger adults. Finally, we need to determine if indeed there is a domain called “Walkability” or whether that term actually includes multiple aspects of the environment which have an impact on health. Rather than “Walkability” being a concept that is familiar to us, it seems that it is a concept that we are only beginning to understand.

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Table 1

	Factors			Uniqueness
	Amenities	**Distressed Neighborhoods**	**Residential**	
Murder		0.53		0.70
Proportion of Vacant Properties		0.64		0.52
Corner Stores		0.61		0.62
Coffee/Tea Shops	0.88			0.30
Book Stores	0.63			0.60
Bus Stops			0.50	0.68
Murals		0.61		0.56
Restaurants	0.88			0.14
Pharmacies	0.41			0.67
Groceries	0.37			0.71
Fitness Centers	0.77			0.43
Land Reclamation Projects		0.51		0.72
Owner Occupied Dwellings			0.60	0.58
Renter Occupied Dwellings			0.46	0.58

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Table 2

Correlation Matrix of Oblim Rotated Common Factors

Factor	Amenities	Distressed Neighborhoods	Residential
Amenities	1		
Distressed	0.1	1	
Residential	0.27	−0.05	1