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## A Travel-Livability Index for Seniors, Phase 1: Livability Attribute Importance

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A Report from the University of Vermont Transportation Research Center

# **A Travel-Livability Index for Seniors, Phase 1: Livability Attribute Importance**

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## **A Travel-Livability Index for Seniors, Phase I:** Livability Attribute Importance

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## **Disclaimer**

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the UVM Transportation Research Center or the AARP. This report does not constitute a standard, specification, or regulation.

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# 1 Introduction

The term “livability” has been finding its way into policy discussions in the United States steadily over the last decade. Organizations like the American Planning Association (APA) and AARP have been concerned about livable neighborhoods and communities in the United States for decades (Pollack, 2000; Bosselmann and Macdonald, 1999), but the influence of livability on federal policy accelerated rapidly in 2009 when USDOT Secretary Ray LaHood began to use the term extensively including as a potential selection criteria in transportation projects (LaHood, 2009). Some transportation professionals and communities hope that a new selection process will replace travel-time reduction as the top priority dictated by the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU), with a more multi-modal, multi-faceted measurement which includes environmental protection, economic development, and community improvement in general. It is possible that livability, and methods that measure it, will be a fundamental part of the next surface transportation program. USDOT’s new initiatives dovetail with a new partnership with HUD and EPA, which seeks to combine the agencies’ resources to meet shared goals centered on the concept of livability.

Livability is a concept that relates to many characteristics of a community or neighborhood, and lends itself to a multitude of planning and maintenance considerations for physical infrastructure. As evidenced by the USDOT’s attachment to the term, its relevance is critical in the planning and evaluation of our transportation systems. A new attitude in the transportation community regards transport systems as a “public good” and the users of those systems as “consumers”. Under this framework, it becomes the responsibility of planners to meet the market’s demand for mobility and access.

The research community tends to agree that livability may be defined differently for different groups – urban and rural, young and old. While many different definitions of livability exist, there is growing agreement that it is best defined by the users, or “consumers”, of the system. This assumption makes it critical to understand what users of our transportation system value, and then to develop methods that can assimilate those values into measures of progress and success (Miller, 2010). In this way, the concept of livability dictates the research methods needed to inform policy.

This localized approach to defining livability is contrasted with the approach implicit in some federal programs such as the Surface Transportation Program (STP), which seek to allocate funding according to pre-determined standards like investing primarily in transit (FTA, 2011). In this context, a national-level definition of livability is used as the criterion for project selection and evaluation.

The AARP’s commitment to research and policy advocacy for livable communities is evident in the Livable Communities Evaluation Guide (Pollack, 2000; Kihl et al, 2005), which was originally produced in 2000 and then updated in 2005. Focus group participation was used to define livable communities for older adults as having:

- nearby quality health facilities,



- reliable public transportation,
- variety in housing types,
- safe and secure environment,
- access to shopping,
- a physical environment that fosters walking ("walkability"), and
- opportunities for recreation and culture.

Although only two of the 7 factors identified by the Evaluation Guide are directly related to transportation (reliable public transportation and a “walkable” environment), all of the factors are indirectly related. Opportunities, access, and proximity are an integral part of several factors, and these concepts are afforded by an effective transportation system. In other words, better transportation means better access, more opportunities, and improved proximity (usually measured by time). So, an assessment of livability in the context of these 7 attributes requires a focus on the effectiveness of the transportation system.

These factors, of course, can also be afforded in other ways. Widespread internet service, for example, can provide access and opportunity in lieu of travel. This non-travel access is considered by many transportation researchers in the same framework as travel. In fact, several questions in the 2009 National Household Travel Survey (NHTS), collected by the Federal Highway Administration (FHWA) of the U.S. Department of Transportation, are related to internet use as a substitute for travel.

AARP has also conducted extensive research using survey methods and data analysis to assess the needs and preferences of seniors in specific regions. AARP’s research, including the data used for this report, includes attributes both directly and indirectly related to transportation in considering “Livable Communities” for seniors.

For example, a safe and secure environment may seem unrelated to transportation, but a closer look at the results of the surveys reveals the connection. Low crime is reinforced in many of the survey assessments as one of the most important factors in livable communities for seniors. However, many of the surveys also suggest that seniors’ concerns about crime are strongly related to travel. These concerns include concerns about crime during automotive and bus travel as well as concerns about crime while walking. These are three of the four most common forms of travel for seniors in many of the surveys. Therefore, it is really safety and security concerns while travelling that brings this factor to the top of community attribute lists, as opposed to safety and security while in their homes or at their destinations.

Having a variety of housing types may also seem unrelated to transportation, but the connection between land use and transportation is complex. Housing affordability and availability affect effective access to goods and services, which is in turn a factor for ensuring an effective transportation system.

Overall, AARP’s existing research is in agreement with new policy statements by the USDOT Secretary, which assert that livability and transportation are inextricably related, and that one major key to livable communities lies with a

successful transportation system. However, there remain gaps in the knowledge related to transportation and livability, how these concepts are perceived in communities, and how they vary across people and places.

The overall purpose of this project is to develop a localized livability index that is particularly sensitive to the travel needs of seniors. The specific objectives of this phase are to:

- Synthesize the survey data from each of the previous AARP surveys which included livability attribute-importance.
- Rank these attributes by their stated importance, and identify the critical attributes in the determination of livability for seniors, for both urban and rural zip codes.

## 2 Data and Methodology

### 2.1 Data

The previous studies of livability undertaken by the AARP are summarized in Table 1.

**Table 1 Previous Studies of Livability by AARP**

Region	Year*	Respondents:		Geography:		Assesses:	
		Number	Age (years)	Urban	Rural	Livability	Livability Attributes
Texas (TX)	2003	2,677	50+	X	X	X	
Nationwide	2004	1005	50+	X	X	X	
Maryland (MD)	2005	989	50+	X	X		X
MD-District 11	2005	540	50+	X	X		X
MD-District 12A	2005	526	50+	X			X
MD-District 28	2005	508	50+		X		X
Utah	2006	1,188	50+	X	X	X	
Burlington, VT	2006	800	45+	X		X	X
Colorado	2007	1,062	50+	X	X	X	
Marietta, OH	2007	801	45+	X	X	X	X
Delaware	2008	1,000	35+	X	X	X	X
Vermont	2008	800	18+	X	X		
Clermont County, OH	2008	1,002	45+	X	X	X	X
Westchester County, NY	2008	800	50+	X	X	X	X
Honolulu County, HI	2008	800	50+	X	X	X	
Dallas County, TX	2009	1,343	60+	X	X		
Kingsport, TN	2009	1,439	18+	X	X	X	X
Vermont	2010	500	50+	X	X		

\*Survey year can be used to locate the survey report in the *References* section at the end of this report.

Most of the surveys included the respondents' zip code, and the Kingsport, TN survey includes the respondents' neighborhood as well. Most of the surveys included only respondents 50 years of age or older. Others included a smaller subset of

respondents under the age of 50, but primarily for non-statistical comparison purposes as the under-50 respondents often did not constitute a statistically-viable data set alone. Respondents in urban and non-urban regions are represented. The statewide surveys typically included substantial numbers of non-urban respondents whereas the county- or city-level surveys focused primarily on urban areas, but included a token number of respondents in non-urban areas for non-statistical comparison purposes. As noted in the right hand columns of Table 1, many but not all of the existing surveys assessed the seniors' perceptions of livability and which community attributes were important for livability.

## 2.2 Data Synthesis and Reduction

This phase of the project began with a data-synthesis step. This step initiated the effort to combine the existing data in Table 1 into a single database. This synthesis will expedite future analyses of "livability attribute importance" and livability rating. Since our focus in Phase I was on the "livability attribute importance", only the data from the 10 surveys identified in Table 1 which included questions about attribute-importance were considered. To isolate those community characteristics that seniors value, we focused on questions that explicitly asked respondents to rate the importance of a particular community characteristic (e.g., proximity of their home to a hospital, well-maintained sidewalks).

These surveys were collected between 2005 and 2009, so the conclusions reached here are specific to that time period. Changes in the communities relating to livability are considered to be negligible through the time period, so that all of the data could be aggregated. The surveys were filtered to select only those respondents aged 55 years and older.

From these surveys, the common questions related to attribute importance were extracted. Generally, these questions began with some variation of the phrase "How important is (are)...", then identified the attribute, and concluded with a summary of the possible responses – Extremely Important, Very Important, Somewhat Important, Not Very Important, and Not At All Important, coded 1 through 5, respectively. Some of the surveys also allowed the responder to opt out of answering with additional responses including "Not Sure", "Refused", or "No Response". As shown in Table 2, the response rates for these responses were extremely low (none higher than 3.4%). This rate indicates that the respondents understood the questions and the response options quite well.

**Table 2 Attribute-Importance Variables**

<b>How important is (are)...</b>	<b>"Opt Out" Responses</b>	<b>n</b>
affordable cost of living?	2.9%	2,166
accessible public facilities?	1.5%	2,489
affordable shopping?	0.7%	1,880
delivery of groceries and prescriptions?	0.0%	592
alternatives to driving?	0.0%	67
cultural events/entertainment?	2.2%	3,422
grocery store within half mile?	0.4%	2,517

<b>How important is (are)...</b>	<b>“Opt Out” Responses</b>	<b>n</b>
hospital in community?	0.7%	2,443
a variety of housing options for older citizens?	1.7%	4,009
affordable housing?	1.4%	625
well-run public parks and recreation centers?	1.6%	4,661
drugstore within half mile?	0.5%	2,514
convenient public transportation?	2.1%	4,614
convenient public events?	1.3%	626
safe neighborhoods?	1.7%	4,675
senior center in your community?	1.5%	1,928
access to shopping?	3.4%	2,702
adequate sidewalks?	1.7%	2,484
sidewalks which improve quality of life?	0.0%	592
maintenance of streets?	0.4%	2,447
trails?	1.3%	1,257
transportation services for the elderly?	1.1%	1,238
place of worship?	0.6%	2,445

Following the compilation of this list, it was determined that the Burlington, Vermont survey (Bridges, 2007) used a 4-point response-scale for the Attribute-Importance questions. Due to the inconsistency of the response scale, the Burlington data was dropped from the Attribute-Importance data set. After dropping the Burlington data, the sidewalks which improve quality of life and delivery of groceries and prescriptions variables dropped since they had only been asked in the Burlington survey.

Next, the remaining variables were grouped into each of the seven “attribute categories” from the Livable Communities Evaluation Guide (Kihl et al, 2005):

1. nearby quality health facilities –HEALTH
2. reliable public transportation – PUBLIC TRANS
3. variety in housing types – HOUSING
4. safe and secure environment – SAFE
5. access to shopping –SHOPPING
6. a physical environment that fosters walking ("walkability") – WALK
7. opportunities for recreation and culture –RECREATION

There is at least one variable related to each of the seven categories, indicating that the survey data is consistent with the information derived from the focus group work conducted prior to the publication of the Livable Communities Evaluation Guide. A summary of the variables related to Attribute Importance cross-tabulated with the survey region best describes their occurrence in the overall dataset, as shown in Table 3. Most attributes were measured by more than one variable and in more than one survey region.

**Table 3 Survey Regions by Attribute-Importance Variable**

<b>Variable</b>	<b>Attribute Category</b>	<b>All MD</b>	<b>All OH</b>	<b>DE</b>	<b>NY</b>	<b>TN</b>	<b>n</b>
accessible public facilities	RECREATION		X		X		2,489
affordable cost of living	HOUSING	X					2,166
affordable shopping	SHOPPING		X		X		1,880
cultural events & entertainment	RECREATION	X		X	X	X	3,422
alternatives to driving	PUBLIC TRANS					X	67
grocery within 1/2-mile	SHOPPING		X	X	X	X	2,517
hospital in the community	HEALTH		X	X	X		2,443
variety of senior housing options	HOUSING	X	X	X		X	4,009
affordable housing	HOUSING			X		X	625
well-run parks and recreation centers	RECREATION	X	X	X	X	X	4,661
pharmacy within 1/2-mile	SHOPPING		X	X	X	X	2,514
convenient public transportation	PUBLIC TRANS	X	X	X	X	X	4,614
convenient public events	RECREATION			X		X	626
safe neighborhoods	SAFE	X	X	X	X	X	4,675
senior center in your community	RECREATION		X		X	X	1,928
access to shopping	SHOPPING	X		X			2,702
adequate sidewalks	WALK		X	X	X	X	2,484
maintenance of streets	WALK		X		X	X	2,447
trails	WALK			X	X	X	1,257
transportation services for the elderly	PUBLIC TRANS		X				1,238
place of worship	RECREATION		X	X	X		2,445

The loss of the Burlington, Vermont data set, which eliminated the variable “sidewalks which improve quality of life”, did not adversely impact the overall attribute-importance data set. Three other variables related to the “walkability” category remain, so this category is still well-represented.

To avoid potential regional biases, the next step in the data reduction was to eliminate variables that were only collected in one survey. The remaining variables represent the seven attribute categories as shown in Table 4.

**Table 4 Number of Variables, Observations, and Regions by Attribute Category**

<b>Attribute Category</b>	<b>Description</b>	<b>No. of Variables</b>	<b>n</b>	<b>No. of Regions</b>
<b>HEALTH</b>	nearby quality health facilities	1	2,443	3
<b>PUBLIC TRANS</b>	reliable public transportation	1	4,614	5
<b>HOUSING</b>	variety in housing types	2	4,634	4
<b>SAFE</b>	safe and secure environment	1	4,675	5
<b>SHOPPING</b>	access to shopping	4	9,613	5

Attribute Category	Description	No. of Variables	n	No. of Regions
WALK	walkability	3	6,188	4
RECREATION	opportunities for recreation and culture	6	15,571	5

A total of five separate regional AARP livability surveys were used in our analysis - Maryland 2005, Westchester, NY 2007, Ohio 2007, Delaware 2008, and Tennessee 2009. These surveys span a variety of neighborhood types (urban and rural) and regions throughout the eastern portion of the United States. Responses to these questions are considered ordinal variables, collected on a 5-point scale which allow for comparisons across surveys and for the creation of a single livability data set for our analysis.

The n values in Table 4 indicate that all of the attribute categories are well represented, but the RECREATION category may be over-represented. In fact, this category has a large survey population (n) due to the high number of variables that have been classified as RECREATION. A closer look at these variables indicates that they may actually fall into two discrete groups – a group representing more discretionary travel for entertainment and a group of representing less discretionary travel for educational, civic, and worship activities. Other travel surveys treat educational, civic, and worship activities separate from social and recreational travel (FHWA, 2011). Therefore, it may be suitable to treat the RECREATION category as two separate categories for future analyses.

## 2.3 Data Analysis

### 2.3.1 Attribute Importance Ranking

Methods for ordinal-categorical analysis were implemented for this study (Agresti, 2010). Three methods were used to score the attribute importance variables for the purpose of ranking them:

- A. Means of the response-scores are calculated and compared to generate a ranking of the variables. Use of ordinal data directly as quantitative scores and analysis of means allows the coded response-scores themselves to act as a quantitative measure (as well as an ordinal).
- B. Medians or the cumulative probability (minimum  $j$  such that  $F_j \geq 0.50$ ) of ordinal data. This approach uses the 50th percentile of the data to compare and rank variables. One drawback of this procedure is that it is likely to result in ties in the ranking.
- C. “Top Box” or “Top 2 Box” involves conversion of ordinal data to quantitative scores using mid-ranks. This approach is more commonly used in market assessments of customer satisfaction. The true distinctions between scores are actually quantified by converting the scale to equivalent mid-ranks, revealing a critical “break” in the scale. So if the critical break lies between responses 3 and 4, then only the fraction

of responses in the top-two bins are used (top-two box, or % of 4s and 5s). Another possibility is that the critical break is between 4 and 5, in which case only the top-box, or % of 5s is used.

### 2.3.2 Geographic and Age Classifications and Comparisons

Geographic (urban/rural) and age classifications were assigned to each respondent using their reported age and the estimated residential density of their reported zip code from the U.S. Census. Zip codes with a population density of greater than 1,000 people per square mile were designated as urban, and all others were designated as rural, in accordance with the designations in the US Census. In addition, respondents were divided into two age classifications - 55-65 years of age and greater than 65 years of age. All of the classification groups are well represented in the data set. Table 5 shows the number of responses in the data set which fell into each classification group.

**Table 5 Number of Responses by Classification Group**

Age Class (years)	Geographic Class			
	Rural		Urban	
	%	Respondents	%	Respondents
<b>55-65</b>	47	957	53	1,073
<b>65+</b>	46	1,186	54	1,363

Separate attribute-importance rankings were developed for each geographic and age classification using the third method described above. The rankings for each classification groups were then compared using the Wilcoxin Rank-Sum test for each variable. We used a Bonferonni correction in these analyses to control for multiple comparisons among these variables. The Bonferonni-adjusted alpha level of  $p \leq 0.003$  was calculated by dividing the standard alpha value of  $p \leq 0.05$ , by 18, the number of comparisons (Kutner et al., 2005). All analyses were performed in SAS v9.2.



### 3 Results

#### 3.1 Attribute-Importance Rankings

The results of the Attribute-Importance Ranking analysis for all three methods, and the attribute ranking corresponding to each, are found in Table 6.

**Table 6 Attribute-Importance Ranking Results for 3 Methods**

Variable	Method A		Method B		Method C				Overall Rank
	Mean	Rank	50th Percentile	Rank	Top-Two Box (4s and 5s)	Rank	Top-Box (5s)	Rank	
safe neighborhoods	4.5	1	5	1	95.2%	1	58.5%	1	1
hospital in the community	4.1	3	4	2	82.2%	3	35.2%	2	2
variety of senior housing options	4.0	4	4	2	76.0%	7	30.8%	3	3
affordable housing	3.9	7	4	2	75.4%	8	30.2%	4	4
place of worship	3.9	6	4	2	77.5%	5	28.5%	5	5
maintenance of streets	4.1	2	4	2	87.2%	2	26.3%	6	6
convenient public transportation	3.8	11	4	2	67.3%	11	25.6%	7	7
affordable shopping	4.0	5	4	2	79.1%	4	24.9%	8	8
grocery within ½ mile	3.8	9	4	2	72.3%	9	24.3%	9	9
pharmacy within ½ mile	3.8	10	4	2	70.6%	10	23.2%	10	10
senior center in your community	3.9	8	4	2	76.3%	6	21.0%	12	11
accessible public facilities	3.7	13	4	2	64.2%	12	17.6%	15	12
adequate sidewalks	3.6	14	4	2	62.8%	13	20.5%	13	13
well-run parks & recreation centers	3.7	12	4	2	62.8%	14	18.8%	14	14
access to shopping	3.5	15	4	2	55.3%	15	22.6%	11	15
convenient public events	3.5	16	4	2	51.4%	16	13.1%	16	16
trails	3.3	18	3	17	46.7%	17	11.3%	18	17
cultural events & entertainment	3.3	17	3	17	43.2%	18	11.4%	17	18

After each numerical value for each variable is its rank in the list for that method. The Method C rankings were determined to be the most effective. Methods A and B use traditional statistical methods to analyze the data, under the assumption that the scores can be considered continuous variables. In fact, it can be problematic to assume that the scores are continuous measures (Agresti, 2010). In addition, Methods A and B do not provide sufficient resolution to determine a defensible ranking of the attributes. For Method B, most of the attributes are tied at a ranking of “2” with median score of “4”. For Method A, there are a total of seven tied

rankings when the means are expressed to one decimal point. Means expressed with no decimal points (consistent with the significant digits used in the scores) would result in a ranking identical to Method B. Only Method C provides a defensible ranking of all attributes with a resolution that is adequate for this study. The specific results of the Method C mid-rank analysis are shown in Table 7.

**Table 7 Mid-Ranks by Survey Score**

Variable	Mid-Ranks by Survey Score				
	1	2	3	4	5
accessible public facilities	0.02	0.07	0.23	0.59	0.91
affordable shopping	0.01	0.03	0.13	0.48	0.88
cultural events & entertainment	0.02	0.11	0.37	0.73	0.94
grocery within 1/2-mile	0.01	0.06	0.18	0.52	0.88
hospital in the community	0.02	0.08	0.18	0.47	0.85
variety of senior housing options	0.01	0.04	0.12	0.41	0.82
affordable housing	0.01	0.03	0.15	0.47	0.85
well-run parks and recreation centers	0.01	0.06	0.23	0.59	0.91
pharmacy within 1/2-mile	0.01	0.07	0.20	0.53	0.88
convenient public transportation	0.02	0.07	0.22	0.54	0.87
convenient public events	0.02	0.09	0.31	0.68	0.93
safe neighborhoods	0.00	0.01	0.03	0.23	0.71
senior center in your community	0.01	0.04	0.15	0.51	0.89
access to shopping	0.03	0.14	0.33	0.61	0.89
adequate sidewalks	0.04	0.12	0.27	0.58	0.90
maintenance of streets	0.01	0.02	0.08	0.43	0.87
trails	0.04	0.15	0.37	0.71	0.94
place of worship	0.02	0.06	0.16	0.47	0.86
<b>All</b>	<b>0.02</b>	<b>0.07</b>	<b>0.21</b>	<b>0.53</b>	<b>0.88</b>

For most of the variables, the largest gap in mid-ranks comes between the score of 4 and 5, indicating that this distinction was the most meaningful to the survey respondents. This finding suggests that the “top box” or the fraction of “5” responses would be the critical measure for the ranking. However, the largest gap for a few variables comes between the scores 3 and 4, suggesting that a “top-two box” ranking is more meaningful. Therefore, both measures were used in this analysis.

For the Method C results, the sub-method which the mid-ranks (from Table 7) suggested to be the most meaningful for each variable is shown in bold in Table 6. From these sub-methods, an overall ranking was created which utilized either the top-box rank where it was most critical or the top-two box ranking where it was most critical. This overall rank is the final column in Table 6.

### 3.2 Attribute-Importance Rankings for Geographic Classes

For the geographic classifications, only the top-box (% of 5s) rankings were considered. These rankings, along with the top-box results are shown in Table 9. The results of the Wilcoxin Rank-Sum tests for the geographic comparisons are also shown in Table 8.

**Table 8 Attribute-Importance Ranking Results by Geographic Classification**

Variable	All		Rural		Urban		p-value	z score
	Rank	% 5s	Rank	% 5s	Rank	% 5s		
safe neighborhoods	1	58.5	1	53.3	1	63.0	<b>&lt;0.001</b>	<b>6.287</b>
hospital in the community	2	35.2	2	35.3	2	34.9	0.38	
variety of senior housing options	3	30.8	4	30.3	3	31.4	0.62	
affordable housing	4	30.2	3	35.1	5	28.6	0.4	
place of worship	5	28.5	5	30.2	7	26.1	<b>0.002</b>	<b>-3.128</b>
maintenance of streets	6	26.3	8	23.3	4	30.5	<b>&lt;0.001</b>	<b>5.924</b>
convenient public transportation	7	25.6	10	22.2	6	28.5	<b>&lt;0.001</b>	<b>-5.158</b>
affordable shopping	8	24.9	6	24.2	9	25.9	0.17	
grocery within 1/2-mile	9	24.3	7	23.8	10	25.6	0.019	2.351
pharmacy within 1/2-mile	10	23.2	9	22.4	11	24.6	0.006	2.743
access to shopping	11	22.7	15	16.6	8	26.0	<b>&lt;0.001</b>	<b>-9.443</b>
senior center in your community	12	21.0	11	21.7	14	19.8	0.39	
adequate sidewalks	13	20.5	13	19.7	12	21.7	0.04	2.065
well-run parks and recreation centers	14	18.8	14	17.5	13	20.4	0.059	-1.89
accessible public facilities	15	17.6	12	20.6	15	13.2	<b>&lt;0.001</b>	<b>-4.732</b>
convenient public events	16	13.1	17	14.2	17	10.4	0.05	-1.967
cultural events & entertainment	17	11.4	18	10.2	16	12.1	<b>&lt;0.001</b>	<b>-3.824</b>
trails	18	11.3	16	14.3	18	10.0	0.69	

From Table 8, it is evident that the classification groups produced similar rankings, particularly at the top. After the top 3, the attribute-importance values become more similar, producing more variation in the rankings.

Small p values in Table 8 (less than 0.003, following the Bonferonni correction) represent a significant difference between urban and rural respondents. For a total of seven values (shown in bold) in the geographic classification, significant differences were found between groups. Place of worship was ranked significantly higher by rural seniors. For all other variables where a significant difference was found (safe neighborhoods, maintenance of streets, convenient public transportation, access to shopping, accessible public facilities, and cultural events & entertainment), scores were significantly higher among urban residents.

Overall, these results demonstrate that the geographic distinction between urban and rural respondents is considerable, since significant differences were uncovered amongst variables that both groups regarded fairly high (place of worship and maintenance of streets). The two groups rated convenient public transportation and maintenance of streets differently.

### 3.3 Attribute-Importance Rankings for Age Classes

For the age classifications, only the top-box (% of 5s) rankings were considered. These rankings, along with the top-box results, are shown in Table 9. The results of the Wilcoxin Rank-Sum tests for the age comparison are also shown in Table 9.

**Table 9 Attribute-Importance Ranking Results by Age Classification**

Variable	All		55-65		65+		p-value	z score
	Rank	% 5s	Rank	% 5s	Rank	% 5s		
safe neighborhoods	1	58.5	1	61.3	1	56.3	<b>&lt;0.001</b>	<b>3.451</b>
hospital in the community	2	35.2	2	38.3	2	32.7	0.12	
variety of senior housing options	3	30.8	4	33.4	3	28.8	0.009	2.621
affordable housing	4	30.2	3	34.2	5	26.5	0.035	2.111
place of worship	5	28.5	6	28.5	4	28.5	0.037	-2.084
maintenance of streets	6	26.3	5	29.7	8	23.5	<b>0.002</b>	<b>3.1</b>
convenient public transportation	7	25.6	9	26.4	6	25.0	0.638	
affordable shopping	8	24.9	7	27.5	9	22.8	0.067	
grocery within 1/2-mile	9	24.3	8	27.2	11	22.0	0.92	
pharmacy within 1/2-mile	10	23.2	10	24.3	10	22.2	0.169	
access to shopping	11	22.7	13	21.1	7	23.9	<b>&lt;0.001</b>	<b>-3.797</b>
senior center in your community	12	21.0	12	23.3	12	19.1	0.241	
adequate sidewalks	13	20.5	11	23.6	13	17.9	0.34	
well-run parks and recreation centers	14	18.8	14	20.6	14	17.3	0.296	
accessible public facilities	15	17.6	15	20.6	15	15.1	<b>&lt;0.001</b>	<b>4.455</b>
convenient public events	16	13.1	16	14.3	16	12.0	0.22	
cultural events & entertainment	17	11.4	18	12.4	17	10.6	0.31	
trails	18	11.3	17	12.6	18	10.1	0.019	2.343

The age classification groups generally produced similar rankings, particularly at the top. For a total of four values (shown in bold – safe neighborhoods, maintenance of streets, access to shopping, and accessible public facilities) in the age classification, significant differences were found between groups. Overall, these results demonstrate that the distinction between respondents above or below 65 years of age is considerable, since significant difference amongst variables that both groups regarded fairly high was uncovered (maintenance of streets and access to shopping). However, the overall difference for the age classification was not as strong as it was for the geographic classification.

### 3.4 Classifying Livability Attributes

The critical livability attributes are those which were ranked most highly by respondents in the AARP surveys. Table 10 provides a summary of the top 7 attributes for each geographic and age classification included in this report.

**Table 10 Summary of Critical Livability Attributes by Classification Group**

<b>Rank</b>	<b>Rural</b>	<b>Urban</b>	<b>55-65</b>	<b>65+</b>	<b>All</b>
<b>1</b>	Safe Neighborhood	Safe Neighborhood	Safe Neighborhood	Safe Neighborhood	Safe Neighborhood
<b>2</b>	Hospital in the Community	Hospital in the Community	Hospital in the Community	Hospital in the Community	Hospital in the Community
<b>3</b>	Affordable Housing	Variety of Senior Housing Options	Affordable Housing	Variety of Senior Housing Options	Variety of Senior Housing Options
<b>4</b>	Variety of Senior Housing Options	Maintenance of Streets	Variety of Senior Housing Options	Place of Worship	Affordable Housing
<b>5</b>	Place of Worship	Affordable Housing	Maintenance of Streets	Affordable Housing	Place of Worship
<b>6</b>	Affordable Shopping	Convenient Public Transport	Place of Worship	Convenient Public Transport	Maintenance of Streets
<b>7</b>	Grocery Store Within ½ Mile	Place of Worship	Affordable Shopping	Access to Shopping	Convenient Public Transport

Notably, all seven of the attribute categories identified by the AARP (Pollack, 2000; Kihl et. al., 2005) and shown in Table 4 are represented by at least one of the top 7 attributes for at least one of the classifications.

Also notable in Table 10 are the variables which move the farthest in ranking from one classification group to another. Places of Worship and Maintenance of Streets are exchanged as we go from rural to urban, or from 55-65 to 65+. In fact, the exchange of these variables makes the top 5 variables identical for the rural and 65+ groups, and for the urban and 55-65 groups. This relationship does not hold when the 6<sup>th</sup> and 7<sup>th</sup> critical attributes are considered. At these rankings, seniors 65 and over share their desire for convenient public transportation with their urban counterparts, but differ significantly in their value of places of worship.

## 4 Conclusions

The synthesis of the existing AARP survey data revealed that 9 of the 19 existing surveys had measures of the importance of livability attributes that could be used for a combined analysis. In 2005, AARP focus groups resulted in the creation of 7 categories of livability attributes. The combined survey data provided at least one measure in each of the seven categories, and four of the categories had multiple measures.

The ranking of the livability attributes by their stated importance and comparison by age and zip code type revealed several important patterns. First, safe neighborhoods with a nearby hospital dominate the livability concerns of older Americans in both age groups and area types. Housing was also deemed important. Attributes related to recreational opportunities tended to be unimportant, while attributes related to shopping, places of worship, and infrastructure were of varying importance between groups.

All of the surveys included at least one attribute importance question related to safety. In most of the surveys the questions asked specifically about the importance of a “safe neighborhood”, but in the Maryland survey (Burton, 2005) the question asked about the importance of “low crime” in the neighborhood. The response rates were very similar. Therefore, it appears that references to “safe neighborhoods” in the surveys were interpreted by respondents as neighborhoods with low crime, but they may also include considerations of personal injury from an accident or non-criminal activity. Crashes involving motorized vehicles, cyclists, and pedestrians while traveling can certainly be included in this attribute.

Statistics on criminal activity and injury or death from non-criminal activity in a community will be critical as we move toward the development of a livability index for seniors, but equally critical is the community-member’s perception of these attributes of their neighborhood. Other research has suggested that often the perceptions of criminal activity and accidental injury do not match the actual occurrence (Wilson and Kelling, 1982; Caldini, 1998). The “Broken Windows” theory developed by Wilson and Kelling attests to the importance of perceptions in the control of crime in cities. As individuals perceive that their neighborhood is less safe (likely due to the prevalence of non-violent crimes like graffiti), they go outside less and walk less. This response creates more opportunities for crime in the neighborhood, since the streets are empty. If this hypothesis holds true, then it may be important to understand a community’s perceptions about crime in addition to the actual incidence of crime.

## 5 Future Directions

The overall purpose of this project is to develop a localized livability index for seniors. The first phase has successfully identified the ranks of livability attributes for seniors in rural and urban communities. Phase II will include the identification of spatial and temporal livability metrics from other data sources to represent these attributes. National coverage at the zip code level will be sought for the data that is used to create the livability metrics. Additional data sources to get the most effective zip-code resolution may be needed. The goal will be to ensure that all seven attribute categories are represented by at least one objective metric.

Once metrics for each highly ranked attribute have been defined and their data sources identified, weights will be applied to the metrics to account for their relative importance rankings in this Phase I report. Ultimately, the calibration of the model will require that its estimation of livability for the zip codes in AARP data set (see Table 1) match the rating provided in the surveys. At that point it will be necessary to return to the raw data and process the livability-assessment variables in much the same way that the attribute-importance variables were processed in Phase I. The model produced in Phase II will be calibrated to match the rankings in AARP surveys.

Once the model has been developed and calibrated, Phase III of the project will include making the model available to AARP members. The model will estimate the average livability of most zip-codes in the United States with the input of a few user-specific attributes, such as zip code and age. A web-based application would make this model widely available to AARP members. Other publishers and websites have produced indices based on livability, sustainability, and environmental factors, but few of these have attempted to produce a defensible model that can identify areas at the zip-code level. In addition, none of them are focused on seniors. Most of them use a few large-scale (metropolitan area or larger) data sets and implement an arbitrary model with no rational basis. This project will result in the nation's first robust, senior-specific livability metric, providing reliable, spatially disaggregate information to seniors and planners nationally.

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