

FACTORS AFFECTING SEASONAL WALKABILITY IN A COLD CLIMATE COMMUNITY: A CASE STUDY OF EAST LANSING, MICHIGAN, IN COLLABORATION WITH MICHIGAN STATE UNIVERSITY

Joanne M. WESTPHAL
John SCHWEITZER
Lori MULLINS
Sagata BHAWANI

Joanne M. WESTPHAL (corresponding author)
Professor, Landscape Architecture Program, Michigan State University, East Lansing, MI, United States of America
Tel.: 001-517-355.9729
E-mail: westphal@msu.edu

John SCHWEITZER
Professor, Community and Economic Development Program, Michigan State University, East Lansing, MI, United States of America

Lori MULLINS
Planner, Office of Planning and Community Development, City of East Lansing, East Lansing, MI, United States of America

Sagata BHAWANI
Masters Student, Construction Management Program, School of Planning, Design and Construction, Michigan State University, MI, United States of America

Abstract

At its most basic level, community involvement has as its primary goal the betterment of the community. In this study, we investigated how community involvement (a form of social capital) interrelates with seasonal walkability, cycling, and running in a cold climate community like East Lansing, Michigan. A head of household survey (of 505 individuals in three different neighborhoods) was conducted that asked residents about their weekly exercise patterns, and their personal service involvement with others in their neighborhoods. Poor walkability in a community is thought to be an important limiting factor to human health and a contributing factor to obesity due to an increased dependency on the automobile. Previous studies show strong correlations between physical characteristics of the built environment and the incidence of obesity in a community. In this study, we integrated dimensions of seasonal weather phenomena, socio-demographic characteristics of neighborhoods (including current levels of physical activity), and expressions of social capital into a social-environmental model of the built environment and human health. Results of this community-university partnership suggest ways to enhance the city's ability to mobilize community resources, and prioritize its own resources, in creating a more pedestrian- and cyclist-friendly environment for its citizens. It also provides insight into how, when and why citizens engage in community life, and what public officials can do to improve long-term citizen involvement in issues affecting health and quality of life in East Lansing, Michigan, USA.

Keywords: public health, obesity, built environments, seasonal barriers, walkable communities.



1. Introduction

The most recent report from the Center for Disease Control (CDC, 2012) indicates that obesity in the U.S. continues to rise despite increased awareness on the part of citizens, health officials, and medical practitioners. Research has shown that children tend to maintain body habits as they grow older, which means they will contribute to the adult population that is classified as obese or morbidly obese. In 2002, Flegal *et al.* reported that nearly 31% of US adults were obese, irrespective of state residency, gender, age group, ethnicity, and education level (Frank *et al.*, 2004); by 2010, the CDC reported an increase in obesity to 36.7% of adults and 17% of children (Flegal *et al.*, 2010). Statistics on mortality and morbidity show that obesity is responsible for an estimated 280,000 deaths/year in US adults (Allison *et al.*, 1999) and 9.1% of the total annual US medical expenditures in 1998 (Finkelstein *et al.*, 2004) and over \$147 billion in 2008 (CDC, 2011). A significant part of the problem is that American life styles are marked by: 1) increased dependency on the automobile; 2) built environments that discourage walking; and 3) greater sedentary lifestyles – all known factors that contribute to obesity.

Aging, obesity, and sedentary lifestyle are known to contribute directly to a number of health issues. Data from the CDC and other medical specialty fields indicate that these conditions place Americans at higher risk for the incidence of cardiovascular accident (CVA), diabetes, and depression (CDC, 2011; Case and Paxton, 2009; Guyer *et al.*, 2000; Benson and Stuart, 1993).

Sedentary lifestyle places humans at risk for high blood pressure, high cholesterol, arthritis, de-conditioned musculoskeletal systems, asthma, poor health status, and of course, overweight. Some estimates suggest that even modest increases in the level of physical activity for those in the population that are presently most inactive, could reduce the incidence of sedentary-related diseases by almost one-third (Powel and Blair, 1994).

Aging, as a biologic process, is not clinically considered a disease or disability *per se*, although progressive physiologic changes can result in a higher incidence of acute and chronic illness. These changes influence the aging process by affecting organ system reserves and homeostatic controls (Clark and Siebens, 1998). Physically impaired older people tend to become socially isolated, which can result in exacerbation of medical problems, functional deficits, and mental health problems, particularly depression (Mirowsky and Ross, 1992). Work by Rowe and Kahn (1997) indicates that ‘successful aging’ can be achieved that minimizes physiological losses in organ systems by increasing levels of physical activity, supporting increased frequency of exercise, and improving diet/nutrition. Positive changes in lifestyle cannot address all aspects of aging; over time, aging simply will cause us to be less capable of carrying out some of our social obligations – e.g, property maintenance like yard care or sidewalk snow removal, due to decreased muscle-strength and range-of-motion, increased frailty, and/or seasonal absenteeism. Progression to that point of personal dependency to carry out one’s activities of daily living (ADLs) can be significantly slowed by addressing variables

known to improve human health in the built environment; these variables include physical characteristics that encourage walking, social interaction, and neighborliness.

Active lifestyle practices, like yard and sidewalk maintenance, walking to school or work, and planned exercise routines, afford opportunities for spontaneous interactions with friends and neighbors. In the process, these practices maintain healthy levels of conditioning and positive perceptions of well-being – all known to significantly reduce heart attacks, stroke, and depression in older Americans and obesity and suicide in younger Americans. Positive perceptions of oneself (in the social context of community) are known to contribute to greater interpersonal trust and civic participation; both of these elements are essential to community involvement (Pettigrew *et al.*, 1999; Pettigrew, 1999; Pettigrew, 1998; Nadler and Fisher, 1986; McMillan and Chavis, 1986; Batson *et al.*, 2002).

In this study, the authors sought to define significant barriers to walking and/or bicycling in the cold climate community of East Lansing, Michigan. East Lansing, Michigan, is a university community of approximately 50,000 residents (13,141 households). University policies from the late 1960's allowed students to live off-campus, and this fact has significantly influenced the social and physical characteristics of certain geographic neighborhoods in the city. Three well-defined neighborhoods within a one mile (1.2 km) walking distance to the Central Business Area and the north boundary of the Michigan State University campus were selected for their location and residential mix of renter (principally student) versus owner-occupied housing. Census data (US Census Bureau, 2012) indicates that the socio-demographics of these neighborhoods are distinct from one another. In the study, we examined the concept of seasonal walkability and/or bicycling (both real and perceived) among residents within these three neighborhoods. We used that data to build baseline information on the factors that affect levels of physical activity within each households and the influence of external factors on these levels including weather, social capital, and observed snow removal practices within the neighborhoods.

2. Objectives of the study

Several objectives served to direct the study. These included:

Objective 1: To establish exercise levels of residents, including seasonal patterns of walking and/or bicycling among heads of households in three different socio-demographic neighborhoods in the East Lansing, MI community.

Objective 2: To examine factors that influence these levels of exercise, including inter-household and inter-neighborhood peer practices, presence or absence of pets, seasonal weather phenomena, physical characteristics of neighborhoods, and personal practices of engagement that could be considered forms of 'social capital' in a community.

Objective 3: To observe whether current practices of snow removal (as exhibited by private citizens on public sidewalks and by city personnel on public right-of-ways) served as tangible barriers to walking and bicycling in the city in winter.

3. Research methodology

A household survey was developed to gather information on perceived and actual seasonal barriers to walking and/or bicycling in East Lansing, MI, and factors that might influence an individual's likelihood to be active in the out-of-doors (Appendix A).

3.1. Household survey

The household survey was distributed in late-March to head of households in the three neighborhoods described above. The survey queried patterns of walking, bicycling, and/or running during the Fall versus the Winter season that just passed. Information on the normal level of physical activity engaged by the respondent and members in his/her household, along with perceptions and practices of neighborliness (including snow removal from public sidewalks adjacent to the respondent's household) were a part of the survey. General neighborhood characteristics, along with the response rate to the survey, follow.

3.1.1. Bailey Neighborhood West (Tract 1)

The household survey was distributed to the 11 blocks defined as Tract 1 in the US Census (2000) data (Figure 1). These 11 blocks ranged from 100% commercial zoning to 100% residential, single family. Commercial lots in Tract 1 were not surveyed, nor were city property or churches. This neighborhood has a high percentage of renter occupied households, and it includes large fraternity/sorority houses and cooperative households. Surveys were prepared for 170 households. However, five households were vacant; two household addresses were non-existent, and one household declined to participate. Therefore, 162 households received surveys. A little more than one-third of the households were home at the time of delivery (N=57) and received the survey personally. The remaining residences in the study area received their surveys without contact from the research team. Team members were instructed to place the surveys in mail drop slots in front doors or to place the surveys inside storm doors on front door knobs or taped to the inside of glass storm doors if a resident was not home.

Two to three days after delivery of the survey, team members returned to the study area and picked up 28 surveys from the front doors of residences; another 15 surveys were received in the mail by April 1, the deadline date for returning the surveys. Another survey was mailed into the university after April 1, and it was included in Tract 1 data. The total number of surveys returned was 44, a response rate of 27.2%; however, only 28 were completed in their entirety (or were fully useable surveys). This meant that the overall effective response rate was 17.3%, which is below the expected 22-25% response rate for mail-out, mail in surveys (Dillman, 1978). Of the households personally contacted on the date of delivery, 13 (23%) returned a completed survey. This suggests that personal contact can elevate response rate only slightly (4.7%) in neighborhoods with high percentages of renter-occupied (predominantly university student) neighborhoods.

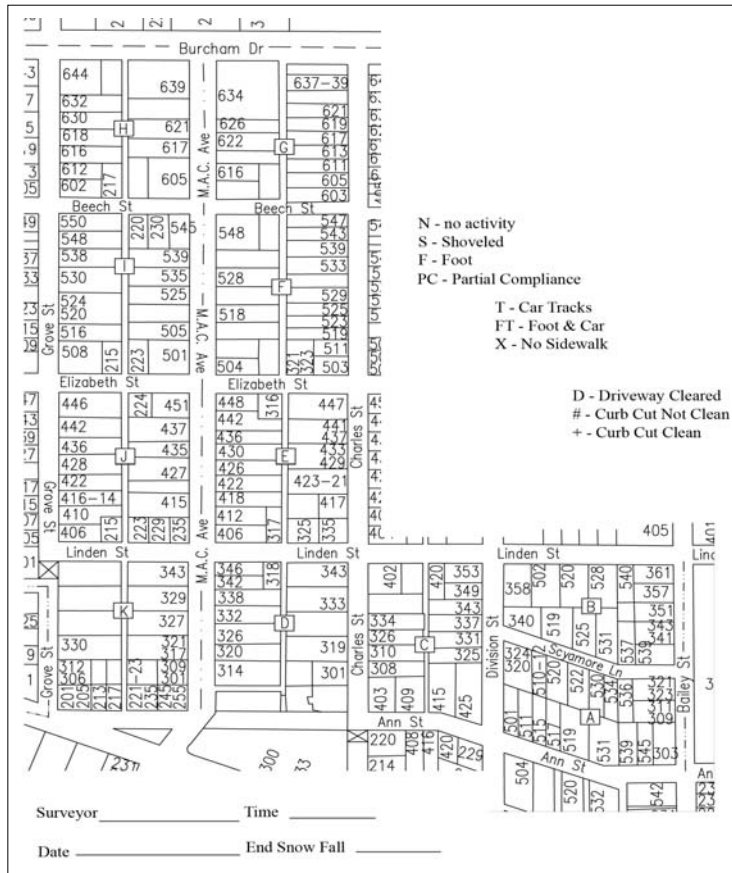


Figure 1: Bailey Neighborhood West, East Lansing, Michigan, USA

3.1.2. Glencairn Neighborhood Northeast (Tract 2)

The household survey was distributed to 274 of the 292 households that exist in the twenty-two (22) block area constituting the northeast quarter of the Glencairn Neighborhood (Figure 2). Surveys were not delivered to 11 households that were vacant; 7 households declined to do the survey. Of the 274 surveys delivered, approximately one-third (N=97) of the households were at home at the time of delivery, and members of the research team were able to directly solicit participation in the survey with residents. The remaining residences in the study area received their surveys without contact from the research team, because team members were instructed to place the surveys in mail drop slots in front doors or to place the surveys inside storm doors on front door knobs or taped to glass storm doors.

Two to three days after delivery of the survey, team members returned to the study area and picked up 132 surveys from the front doors of residences. Another 53 surveys were returned by April 1 in the mail. Total returned surveys for the Glencairn study area were 185 for a response rate of 67.52%. Only 18 of the 185 surveys were incomplete in one or more parts of the survey; this meant that researchers received 167 surveys that

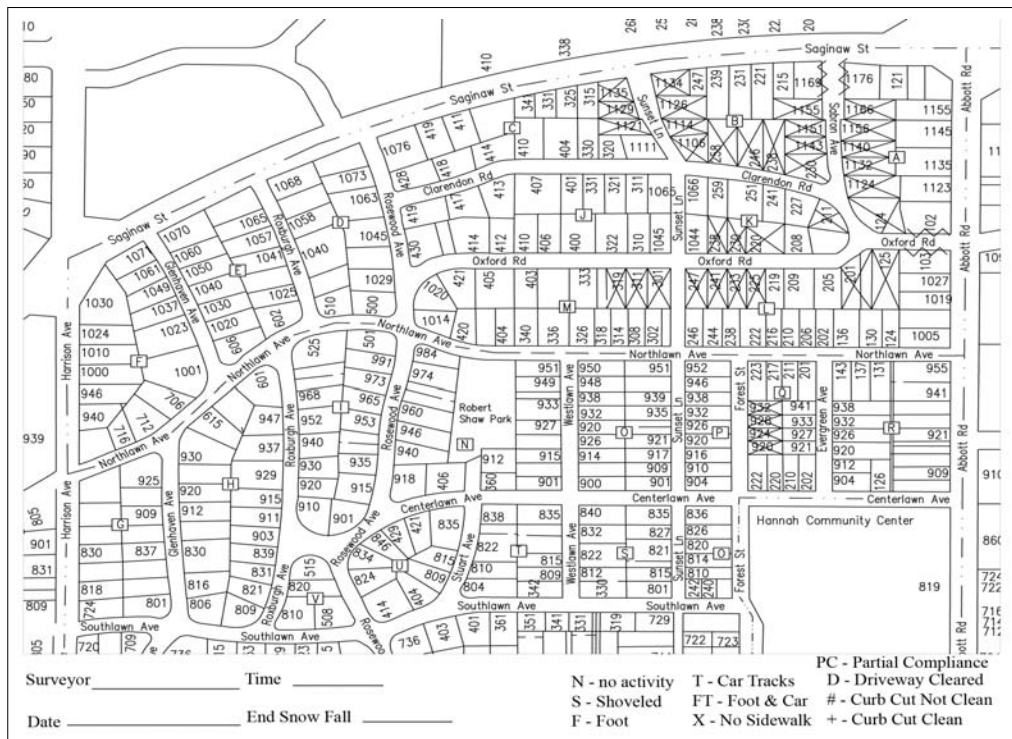


Figure 2: Glencair Neighborhood Northeast (Tract 2)

were 100% complete for information contain therein (or 90.27% fully useable surveys). Of those households personally contacted on the day of delivering the survey 70 of 97 households (71%) returned the survey. This meant that households that were not personally contacted also responded in a nearly like fashion, leaving the research team to conclude that this neighborhood would have responded equally well from a mail-out, mail-in surveying strategy as from the personal delivery surveying strategy. Figure 2 contains information about neighborhood response to the survey effort in Glencair.

3.1.3. Oakwood Neighborhood (Tract 3)

This neighborhood consists of 15 blocks immediately adjacent to the west boundary of Bailey Neighborhood and to the south of Glencair Neighborhood study area (Figure 3). It constitutes Tract 3 in the US Census Bureau (2000) data.

Oakwood is a neighborhood in transition, with a high percent of renter occupied, sorority/fraternity houses in the south and central parts of the tract and a high percent of owner occupied houses in the northwest part. Seven apartment complexes occur in the middle part of the tract; they entail at least 41 additional housing units (the exact number is not known due to controlled access to some of the complexes). One hundred fifty two (152) surveys were delivered to single-family residences, and 41 surveys were distributed in the apartment complexes where access was available. Two houses and one apartment were vacant at the time of delivery, and no survey was left at these

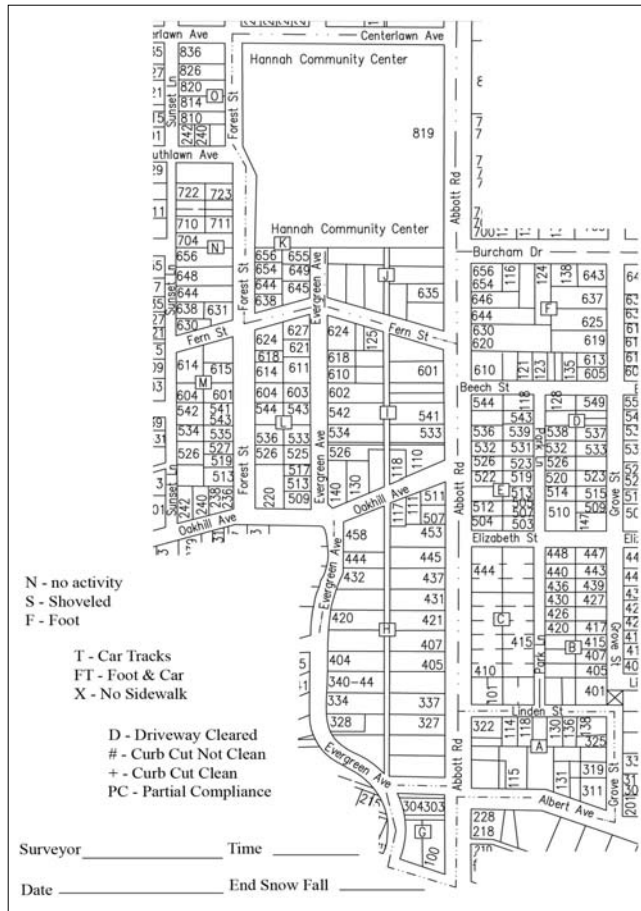


Figure 3: Oakwood Neighborhood (Tract 3)

locations. One household declined. Altogether, 190 surveys were delivered by the research team in Tract 3.

Two to three days later, 23 surveys were returned on the doors of residences, 25 surveys were returned by mail before April 1, and no surveys were returned after April 1. The total number of returned surveys was 48, for a response rate of 25.0%. Of the 48 surveys returned, 43 were completely filled out, making the total useable survey return rate of 23.0%. This is within the normal range of response expected for mail-out, mail-in surveys (Dillman, 1978). Ninety-three (93) households were home at the time of delivery; of those at home, 27 returned completely filled surveys for a rate of 29.0%. This suggests that personal contact helped improve the response rate; this was particularly true in blocks predominated by owner-occupied residents. A higher percent of partially completed surveys were found in renter-occupied (predominately student) households, drawing one to conclude that the additional expense associated with personal contact (versus mail-out, mail-in surveys) may not be justified in predominantly university student occupied neighborhoods.

3.1.4. Non-response bias

To establish how generalizable the data of Tracts 1 and 3 were to the total population of those two respective tracts, a non-response check was conducted on 10 households (>5% <10% of total households) in both neighborhoods. Five blocks in each tract that had the lowest response rate to the initial household survey were identified for each tract, and research team members revisited these blocks on Friday, April 13, 2007. A shortened form of the original survey was administered by interview (Appendix B). Members of 23 households (12 in Bailey Neighborhood; 11 in Oakwood Neighborhood) actually completed the interviews.

The high response rate of the Glencairn neighborhood made the need for a non-response check almost a mute issue, since every block in the study area had at least a 50% response rate. Therefore, the research team did not revisit the neighborhood for a follow-up interview.

4. Findings

A summary of the data from the household survey can be found under each general category of questions. The survey was composed of five parts. Each part was designed to address a particular issue relating to seasonal walkability and bicycling in the study area and to issues surrounding social capital.

4.1. Personal levels of physical activity

Research shows that certain conditions, within and outside of a household, can influence the level of physical activity in which a person engages. Part I of the household survey looked at current levels of physical activity (as recommended by the President's Council on Fitness, Sports, & Nutrition, Dawes, 2012) as well as contemporary and historical influences surrounding that level of activity.

In reviewing the overall responses to the survey/interviews, the following information reflects current physical activity levels for respondents, and their perceptions relating to the physical activity of others, within and outside of, their households. The majority of respondents ($n=288$; $\text{mean}=3.5$; $\text{SD}=1.3$) indicated that they meet or exceed the current recommendations of the President's Fitness Council for moderate exercise (e.g., brisk walk, weight training etc. for 30 minutes, five times per week), and as children, they met or exceeded the current recommendations ($\text{mean}=4.1$; $\text{sd}=1.2$). A majority of respondents also stated that one of their parents ($\text{mean}=3.2$; $\text{SD}=1.5$) and/or other members of their household ($\text{mean}=3.2$; $\text{SD}=1.3$) also met or exceeded the exercise standards. Respondents were less sure ($\text{mean}=2.7$; $\text{SD}=1.1$) that adult neighbors in their neighborhood met the President's Fitness Council standards. The preferred place to exercise was at home, outdoors and/or around the neighborhood ($x=41.4$; $\text{SD}=33.9$); this was followed by exercising at a gym or exercise facility ($x=28.7$; $\text{SD}=33.5$), at home indoors with or without equipment ($x=20.0$; $\text{SD}=29$), at a mall, school or other indoor facility ($x=4.7$; $\text{SD}=15.4$); and other ($x=4.6$; $\text{SD}=16.0$).

On a neighborhood-by-neighborhood basis, responses to personal levels of physical exercise found that the more student-occupied neighborhoods of Bailey (n=45) and Oakwood (n=59) had slightly higher overall means than the largely owner-occupied neighborhood of Glencairn (n=184). Oakwood and Bailey respondents also tended to exercise more often at a gym or exercise facility than the Glencairn respondents. Differences in respondent views among the three neighborhoods differed only slightly in mean values when considering the other four questions on exercise levels (i.e., household members, childhood, parent, and neighbor exercise patterns). Table 1 provides a summary of the data pertaining to exercise levels and preferred locations to exercise.

Table 1: Exercise patterns and location in the overall study area and individual neighborhoods

Exercise Levels	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Q1-Personal	3.5	1.3	3.8	3.5	3.6
Q2- Household Individuals	3.2	1.3	3.4	3.2	3.2
Q3- Historic Personal	4.1	1.2	4.1	4.1	4.0
Q4- Historic Parent	3.2	1.5	3.5	3.0	3.6
Q5- Neighbors	2.7	1.1	2.8	2.7	2.7
Location of Exercise	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
At home, indoors with or without equipment	20.0	29.0	15.0	21.4	17.5
At home, outdoors & around neighborhood	41.4	33.9	41.4	43.2	35.1
At a gym or exercise facility	28.7	33.5	36.1	25.1	37.0
At a mall, school or other indoor facility	4.7	15.4	5.0	4.0	7.4
Others	4.6	16.0	1.8	5.5	3.1

These findings suggest that residents from different neighborhoods tend to exercise in different locations with residents from student dominated neighborhoods tending to exercise indoors as a part of a gym or programmed recreation activity. For these individuals, availability of equipment, instruction, skills development, and/or socialization with peers may be the strongest incentive to travel to a gym for exercise. In the Glencairn neighborhood (Tract 2), the level of exercise is still above average; however, the activity tends to take place indoors on personal equipment owned and housed at the residence or around the house. In this case, the definition of ‘exercise’ is broader and less focused on amenities that are housed at a gym, but rather possessed by the residents both within and outside of the residence. Outdoor activities also tend to be encompassed in activities that improve the appearance of the home, yard, or neighborhood. Because these latter types of activity have a ‘home-base’, they present an opportunity to maintain or increase the value of one’s property as well as interact with neighbors to learn about situations in the neighborhood that may require a collective investment in time and energy to resolve (e.g., the elder neighbor who is no longer able to maintain a sidewalk in winter; school route that children take that needs snow removal for safe passage; etc.).

4.2. Seasonal walking and bicycling patterns

Part II of the survey asked respondents about normal patterns of walking and bicycling during the year, and specifically, during fall and winter. Since the survey was administered in late March, the research team felt confident that those patterns of activity would be relatively fresh in each respondent's mindset to avoid recall bias. In the survey, we made the distinction between walking and bicycling for pleasure or health versus walking and bicycling for transport to work, school, or shops. We also asked respondents about perceived barriers to walking and bicycling in East Lansing, Michigan, during fall versus winter; pet ownership on its influence on walking; changes to walking and bicycling patterns after a major snow event (defined as 6 inches [0.15 m] of snow in a 24 hour period); and the likelihood of using public transit after a major snow event.

4.2.1. Walking and bicycling patterns

Over three quarters (77.6%) of the 238 respondents returning useable surveys indicated that they walked or bicycled regularly in East Lansing. If one breaks out the responses, 82.2 % of 28 respondents from Bailey neighborhood walk or bicycle regularly in East Lansing. This contrasts with 73.4% of 167 respondents from Glencairn, and 87.5% of the 43 Oakwood respondents, who walk or bicycle regularly. This difference in neighborhood percentages may be reflecting the median age of residents in the Glencairn neighborhood, which is older in median age than the other two neighborhoods.

When considering walking or bicycling outdoors for pleasure during the fall, those surveyed stated that they walked (n=206) on average 8.7 miles per week (SD=8.4) and bicycled (n=68) on average 15.5 miles per week (SD=31.5). Among the three neighborhoods, Oakwood respondents walked and bicycled for pleasure further in fall on a weekly basis than respondents from the other two neighborhoods. In winter, Glencairn respondents walked and cycled further for pleasure than the other two neighborhoods. When considering winter walking and bicycling patterns, fewer respondents walked for pleasure (n=156), and the distance walked on a weekly basis fell nearly 2 miles on average for the respondents (\bar{x} =6.9, SD=6.8). Bicycling in winter showed a higher median value due to the presence of one respondent in the Glencairn neighborhood, who was an avid cyclist; weekly bicycling was experienced by a substantially smaller population (n=8) than in fall. However, because of the avid cyclist, the average miles cycled in the winter registered 24.5 miles per week (SD=51.4). A break out of the average miles traveled by bicycle in winter for each neighborhood shows a substantial drop in mileage traveled for pleasure between fall and winter. The fact that either walking or bicycling for pleasure are under consideration, this suggests greater discretion in these two pursuits in winter. Pleasurable walking and cycling may not be practical or possible under the cold, snowy conditions of a northern latitude community, and the research team believes that the data is reflecting this fact to a certain extent. This becomes more obvious when the team asked about walking and/or bicycling for transport.

When considering walking or bicycling for transport to work, school, or shops on a seasonal basis, fewer overall respondents participated in walking in either fall (n=138) or winter (n=112) for this purpose. Bicycling for transport in fall found fewer residents using bicycles to travel to work, school or shops when compared to bicycling for pleasure; however, in winter, a few more individuals maintained their travel pattern of using a bicycle to go to work etc. than those using their bikes for pleasure. Bicycling for transport reflects only slightly lower numbers of miles per week on average (8.8 miles in fall versus 8.2 miles in winter) and the standard deviation was substantially smaller (SD=8.4 versus 9.9, respectively). This suggests that bicycling for transport is more of a necessity rather than a preference as was seen in the data presented on bicycling for pleasure. This suggestion appears to bear weight when considering neighborhood distribution in responses to this question for fall or winter. Respondents from Oakwood again dominated walking for transport in fall, but Bailey respondents reported more miles/week in bicycling for transport in fall. Both neighborhoods have a high percentage of university students. In winter, Bailey respondents reported the highest number of miles walked for transport per week, while the Glencairn respondent who cycled avidly in winter caused the Glencairn neighborhood to have the highest number of miles per week for transport in winter.

4.2.2. Effects of pet ownership

Almost 30% of the survey respondents owned a pet that required daily walking (n=70 households), and they tended to walk about 2.1 miles on average (SD=4.2) to exercise their pets. Bailey respondents indicated the lowest pet ownership at 13.3% of respondents, followed by Oakwood at 22.8%, and then Glencairn at 35.7%. This reflects the more stable household situation that tends to occur in owner-occupied neighborhoods, and the general tendency of renter-occupied households to have prohibitions on pets, particularly dogs. The importance of pets to induce exercise in the outdoors, however, should not be overlooked. If residents are walking an average of 2.1 miles to exercise their pets, especially in neighborhoods with older residents, this represents an important factor in encouraging Americans to be less sedentary and more active physically. Pets also present opportunities to interact with other residents in a neighborhood while on walks, and this can contribute to knowing about one's neighbors in an area and ultimately to community bonds.

4.2.3. Effects of snow on walking or bicycling activities

Overall, 51.4% of respondents said that 6 inches or more of snow (major snow event) in East Lansing greatly reduced their weekly walking or bicycling activities significantly (51.9% Bailey; 53.2% Glencairn; 43.9% Oakwood). Another 25% of respondents said that 6 inches of snow reduced their walking and bicycling activities somewhat (29.6% Bailey; 21.6% Glencairn; 34.1% Oakwood). Only 13.5% said that 6 inches of snow reduced their walking or bicycling slightly (Bailey 3.7%; Glencairn 15.8%; Oakwood 12.2%), while only 10.1% of the respondents stated that 6 inches of snow did not affect walking or

bicycling at all (14.8% Bailey; 9.4% Glencairn; 9.8% Oakwood). These responses may be reflecting the age distribution of the different neighborhoods or the proximity of Bailey neighborhood to the commercial shopping district and university, where public sidewalks are maintained in winter by the city. Tables 2 and 3 summarize this data.

Table 2: General exercise patterns by neighborhood

Exercise description	Overall		Tract 1	Tract 2	Tract 3
	'Yes'	'No'			
Pet requires daily walking	29.5%	70.5%	13.3%	35.7%	22.8%
Run, walk or bicycle regularly in East Lansing	77.6%	22.4%	82.2%	73.4%	87.5%

Table 3: Seasonal changes in walking and bicycling by neighborhood

	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Activity Level in Fall for Pleasure					
Walking or Running (miles)	8.7	8.4	8.5	8.5	9.4
Bicycling (miles)	15.5	31.5	12.4	14.3	25.0
Activity Level in Fall for Transport					
Walking or Running (miles)	6.2	6.4	7.6	4.6	8.8
Bicycling (miles)	8.8	8.4	11.6	9.0	6.0
Activity Level in Winter for Pleasure					
Walking or Running (miles)	6.9	6.8	5.6	7.4	7.1
Bicycling (miles)	24.5	51.4	1.0	32.4	0.5
Activity Level in Winter for Transport					
Walking or Running (miles)	5.8	5.5	6.7	4.7	6.4
Bicycling (miles)	8.2	9.9	3.0	12.1	4.1

4.2.4. Use of public transit as an alternative

The three neighbors have public bus routes that run along at least one and sometimes two edges of a neighborhood, and in the case of Bailey neighborhood, a major bus line bisects the neighborhood. Respondents indicated that 10.7% of respondents overall use public transportation as an alternative to walking or bicycling in East Lansing, when 6 or more inches of snow falls (assuming normal road and sidewalk conditions). Oakwood residents showed the highest increase in public transit use (22.0%) while Glencairn residents the smallest increase (7.2%). This may be reflecting neighborhood distance factors and bus lines relating to school and shops, as well as age and convenience related issues. A continued discussion of factors relating to transportation during times of high snowfall continues in the next section on neighborhood characteristics.

4.3. Neighborhood characteristics

Part III of the survey asked respondents to define their neighborhood in relation to their house, and to provide information about neighborhood characteristics of a social and physical nature that could directly or indirectly affect their walking and bicycling in the community.

4.3.1. Walkability and bikability of neighborhoods in Fall

Table 4 summarizes respondent’s perceptions of walkability in their respective neighborhoods in fall. From the table, one can see that weather and conditions related to natural occurrences (e.g., wind, leaf litter etc.) represented nearly 30% of the barriers to walking in fall. However, factors of the built environment – *i.e.*, traffic, congestion, poor lighting and sidewalk conditions – constituted nearly 40% of the barriers in fall.

Table 4: Barriers to walking reported by respondents in the fall of the year

Barriers experienced in Fall	Percent	Overall no. of responses	Tract 1	Tract 2	Tract 3
Weather and natural conditions	28%	65	12	36	17
Traffic, congestion, poor lighting conditions	20%	49	4	33	12
Sidewalk conditions	17%	41	7	30	4
Time constraints	11%	27	4	17	6
Public response/ attitude to pedestrians and cyclists	6%	15	2	11	2
None	18%	44	8	28	8
Total	100%	241	37	155	49

Eighteen percent of the respondents felt there were no barriers to walking in fall; while time constraints (11%) and public interaction with pedestrians (6%) rounded out the remaining barriers to walking in fall. It appears that respondents in the Glencairn neighborhood stated ‘minimal barriers’ the most frequently to a question on walking and bicycling in fall in the city; however, there were many other respondents in the same neighborhood who identified poor infrastructure, high traffic flows, poor weather and other factors as deterrents to walking and bicycling in fall. One of the most important findings in this part of the survey was the sensitivity that the Glencairn respondents expressed regarding the social interactions that they may encounter while walking or bicycling in the city in fall. Eleven of the fifteen responses on the issue of negative public encounters while walking or bicycling came from Tract 2 respondents. The low number of respondents from the other two neighborhoods may suggest that this is not a deterrent to walking and bicycling in East Lansing in the fall; however, when one considers 1 in 7.5 respondents from the other two neighborhoods seem to perceive this as a problem, this may be an issue that warrants further investigation. The university has recognized some of the problems of students living in housing off-campus (unsupervised outdoor parties, littering, loitering, drunkenness etc.) and has worked hard to improve university-community relations. This study suggests however, that there is still a problem, and it appears to affect walking and bicycling in the city in fall.

4.3.2. Walkability and bikability of neighborhoods in Winter

Table 5 summarizes the types of barriers that respondents identified as a part of winter conditions affecting walking or biking. In winter, barriers to walking shifted significantly to weather and natural conditions as factors affecting walking in East Lansing, MI. Over twice as many respondents (61%) identify forces of nature as a barrier to walking, and identify sidewalk conditions as the second greatest barrier to

walking in winter. Other factors – traffic/congestion/lighting, time constraints, and public attitudes – represented only 6% of the remaining barriers mentioned.

Table 5: Barriers to walkability in study neighborhoods in the winter

Barriers experienced in Winter	Percent of responses to question	Overall no. of responses to question	Tract 1 (n=28)	Tract 2 (n=167)	Tract 3 (n=43)
Weather and natural conditions	61%	130	25	73	32
Traffic, congestion, poor lighting conditions	1%	2	0	1	1
Sidewalk conditions	29%	62	15	32	15
Time constraints	2%	6	1	4	1
Public response/ attitude to pedestrians & cyclists	3%	6	2	2	2
None	4%	8	1	7	0
Total	100%	214	44	119	51

And those respondents stating ‘none’, dropped from 18% in fall to 4% in winter. Data in Table 5 show distinct neighborhood perceptions of barriers to winter walking and bicycling in the city. For example in Tract 1, 25 of the 28 respondents identified ‘weather and natural conditions’ as a barrier to walking and bicycling – perhaps suggesting why so many respondents from this Tract prefer to go indoors to meet their fitness requirement for exercise in winter. Likewise, 32 of the 43 respondents in Tract 3 cite ‘weather...’ as a barrier to high levels of walking and bicycling in winter. Glencairn (Tract 3) had ‘weather...’ cited the most frequently among respondents from the three neighborhoods, but only 73 of the total 167 respondents (less than 50%) cited it as a barrier. Infrastructure (particularly sidewalks) seemed to an important barrier to walking and bicycling in winter in the city. And the social interactions that seemed to bother respondents during the fall as an impediment to more walking and bicycling in the city, they seem to have dissipated (perhaps the guilty parties have gone indoors to socialize and party in winter and are no longer on the streets!).

4.3.3. Walkability and bikability of neighborhoods within 24 hours of a major snow event

On a scale of 1 to 5 (1 being not walkable; 5 being very walkable), respondents rated the effect of a major snow storm (6 inches or more) on the walkability of their neighborhoods during the first 24 hours (Table 6); the average response at 2.8 (SD=1.2). However, when comparing neighborhoods, Glencairn respondents rated their neighborhood more walkable (x=3.0) than either Bailey (x=2.3) or Oakwood (x=2.6) respondents. This may be reflecting the degree of snow removal compliance on the part of residents for sidewalks in front of their properties within each of the three neighborhoods; a parallel study on snow compliance removal that preceded the household survey showed that a significantly higher level of occurrence occurred in Glencairn neighborhood than in either of the other two neighborhoods.

Table 6: Walkability in your neighborhood during the first 24 hours after a major snow event

On a scale of 1 to 5 (not walkable to walkable)	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
		2.8	1.2	2.3	3.0

In addition to neighborhood walkability, we asked respondents if major snowstorms changed their normal patterns of walking or bicycling for transport after a snowstorm; specifically we asked if they tended to the use of public transportation. If no, what other means of transport did they use? From Table 7, one can see that over 70% of respondents from all neighborhoods tended to say the major snow storms affected weekly walking ‘greatly’ or ‘somewhat’. However, respondents in Bailey and Oakwood neighborhoods tended to continue walking or share rides at a much higher frequency than residents in the Glencairn neighborhood. Glencairn residents shifted to the use of private automobiles for transport. Table 7 provides a summary of respondent reactions to a major snow event.

Table 7: Walkability of neighborhoods within 24 hours of a major snow event and changes in walking/bicycling for transport as reported by survey respondents

	Overall	Tract 1	Tract 2	Tract 3
Affect on outdoor weekly walking activity				
Greatly	51.4%	51.9%	53.2%	43.9%
Somewhat	25.0%	29.6%	21.6%	34.1%
Slightly	13.5%	3.7%	15.8%	12.2%
Not at all	10.1%	14.8%	9.4%	9.8%
Use of public transport as an alternative to walking or bicycling; per cent = ‘yes’	10.7%	10.3%	7.2%	22.0%
Public Transport	6%	3.2%	2.35%	3.5%
Shared Transport	7%	16.15%	0%	20.7%
Private Transport	77%	61.30%	92.95%	62.0%
Walk	10%	19.35%	4.70%	13.80%

4.4. Social capital exhibited in neighborhoods

Part IV of the survey presented respondents with a series of questions used to assess personal perceptions of neighborliness to others as well as types of services that an individual would be willing to provide to others in the neighborhood (social capital).

4.4.1. Social capital as exhibited in actions taken by respondents after a major snow event

Overall, 76.9% of respondents stated that they personally clear the public sidewalk in front of their residence after a major snow event. However the percent of respondents indicating that type of action differed among neighborhoods, often reflecting the presence of public sidewalks, neighborhood assistance, city sidewalk snow removal routes, and/or contractual agreements. Table 8 provides a summary of this information.

Table 8: Actions taken by residents in East Lansing in regard to clearing public sidewalks of snow

Actions	Overall	Tract 1	Tract 2	Tract 3
Absence of public sidewalk along property	9.4%	2.2%	14.1%	0.0%
Resident personally keeps sidewalk clear	76.9%	81.8%	76.7%	74.5%
Neighbors help resident to help keep their public sidewalk clear	12.7%	9.1%	13.9%	10.9%
Neighbors keep sidewalk clear	19.6%	20.5%	23.3%	9.1%
Hire a neighbor (adult or youth) to help clear public sidewalk	1.5%	0.0%	1.3%	1.8%
Hire professional to help clear public sidewalk	12.7%	18.2%	14.5%	3.8%
The City of East Lansing sends a snow remover to clear the sidewalks along at least one side of my property	23.0%	9.1%	26.9%	21.8%

4.4.2. Desirable neighborhood characteristics

Six different neighborhood characteristics were evaluated for desirability in selecting a new neighborhood location. All of them addressed issues of proximity to certain amenities. The characteristic receiving the highest median response in terms of selecting a new neighborhood was ‘ability to walk to a city park’ ($x=3.8$; $SD=1.3$), with ‘ability to walk to the local post office or library’ as second in importance ($x=3.6$; $SD=1.3$). The third characteristic that made a neighborhood desirable was ‘ability to walk to work or school’ ($x=3.5$; $SD=1.5$). However, when the research team looked at individual neighborhood responses, priorities in desirability shift somewhat (Table 9).

Table 9: Neighborhood characteristics that are important to respondents in selecting a residence location

Neighborhood Characteristics	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Ability to walk to work or school	3.5	1.5	3.7	3.3	4.0
Ability to take a city bus to work, school or shopping	2.6	1.5	2.9	2.5	2.9
Ability to walk to a grocery store	2.8	1.4	2.7	2.8	2.8
Ability to walk to a local house of worship	2.2	1.3	2.2	2.3	1.9
Ability to walk to city park	3.8	1.3	3.6	3.9	3.5
Ability to walk to a local post office or public library	3.6	1.3	2.8	3.9	3.2

Clearly, respondents from Bailey and Oakwood neighborhoods valued proximity to work or school higher than parks, and this may be a reflection of the higher renter-occupied, predominately MSU student populations in these two neighborhoods.

4.4.3. Characteristics of neighborhoods tied to walkability

Six characteristics of neighborhoods were examined for their influence on making an area more ‘pedestrian and cyclist friendly’. These characteristics were taken from previous studies on factors affecting active living in the US, Europe, Australia, and New Zealand. Table 10 provides a summary of the responses to these six variables for the overall study and for individual neighborhoods. The single most important characteristic was the perception of neighborhood safety ($x=4.1$; $SD=0.9$), followed by sidewalk availability ($x=3.7$; $SD=1.1$), and quality of street lighting at night ($x=3.6$; $SD=1.0$). This ranking varied only slightly among the neighborhoods, with ‘the quality of street lighting’ falling out of the top three characteristics for one neighborhood (*i.e.*, Bailey).

Table 10: Characteristics of neighborhoods tied to walkability

Neighborhood Characteristics	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Quality of street lighting	3.6	1.0	3.3	3.7	3.4
Sidewalks along the street	3.7	1.1	3.8	3.7	3.8
Amount of traffic on the street	2.9	1.2	3.6	2.8	2.9
Speed of traffic on the street	3.1	1.1	3.3	3.0	3.0
Amount of road noise in the neighborhood	2.8	1.3	3.5	2.6	2.7
Safety in neighborhood	4.1	0.9	3.5	4.3	4.0

4.4.4. *Random and planned services that occur among neighbors*

Three variables were rated by respondents that tie to issues of neighborliness, trust, and social capital. These variables came from earlier research on community networking and social capital. The service most frequently indicated as being performed by the respondent for other neighbors as well as other neighbors for the respondent was ‘keeping an eye on my house to prevent burglars/vandalism’ ($x=3.9$; $sd=1.3$); this was true overall and for each individual neighborhood. ‘Removing newspaper so it appears someone is home’ received the second highest rating overall and for the three individual neighborhoods. ‘Keeping a key to my house to check for problems’ was rated third overall and for each neighborhood. One significant difference in rating is the degree to which Glencairn respondents rated each of the services positively versus the respondents from the other two neighborhoods. The research team believes this to be a consequence of greater knowledge of one’s neighbors due to owner-occupancy and long tenure in a neighborhood. Table 11 provides a summary of the data.

Table 11: Random and planned services that occur among neighbors

When away from home, resident feels comfortable to ask neighbors to	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Keep an eye on house to prevent burglar/vandalism	3.9	1.3	2.8	4.4	3.4
Keep a key to the house to check for problems	3.3	1.6	2.0	3.8	2.6
Remove news papers so it appears someone is home	3.7	1.4	2.7	4.1	3.1

4.4.5. *Neighborliness and assistance*

Five variables were examined related to neighborliness and social capital. Respondents indicated their willingness and ability to count on neighbors to ‘say hi and carry on a brief conversation’ most frequently ($x=4.5$; $sd=0.9$), followed by ‘get help in medical emergency’ ($x=4.3$; $sd=1.0$), and ‘lend tools from time to time’ ($x=4.1$; $sd=1.2$). This ranking was consistent across neighborhoods, but was somewhat lower for Bailey and Oakwood when compared to Glencairn. Likelihood of assistance in ‘keeping the public sidewalk clear of snow and debris’ received the lowest ranking among all three neighborhoods but was substantially lower in Bailey than in either Oakwood or Glencairn. This is an important factor in walking, bicycling, and running during the

winter months, and it may be a significant reason for the drop in walking and bicycling during the winter months in the city. Table 12 provides a summary of this data.

Table 12: Neighborliness and assistance practices within the study areas

Resident can count on their neighbor and neighbor can count on them to:	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Lend tools from time to time	4.1	1.2	3.5	4.3	3.9
Get help in a medical emergency	4.3	1.0	3.8	4.5	4.1
Say hi and carry on a brief conversation when they see each other	4.5	0.9	4.0	4.6	4.3
Help each other with tasks that are too difficult or heavy for one individual to handle	3.8	1.3	3.2	4.0	3.7
Keep respective sidewalks clear of snow that people can walk safely throughout the year	3.3	1.4	2.5	3.5	3.1

4.4.6. *Personal perceptions of neighborhood involvement*

Five variables were examined as surrogates to neighborhood involvement, based on the literature and previous research on social capital. Overall, respondents rated each variable at or above the mean of 3.0. Strong personal perceptions of ‘oneself as a good neighbor’ were recorded with very little deviation from the mean ($x=4.1$; $SD=0.8$). Respondents in Bailey and Oakwood neighborhoods, in particular, rated self-neighborliness the highest, despite personal testimonies that indicate to the contrary. More data analysis is needed to determine factors contributing to this rating. Table 13 provides a summary of these five variables.

Table 13: Personal perceptions of neighborhood involvement

Resident personally sees:	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Themselves as a strong supporter of organized neighborhood activities	3.0	1.2	3.1	3.1	3.0
Neighborhood involvement as a way to share knowledge or experience	3.5	1.1	3.3	3.5	3.3
Neighborhood involvement as a way to increase my personal contacts	3.5	1.2	3.8	3.5	3.3
Being involved with my neighbors as a way to improve neighborhood conditions	3.7	1.1	3.7	3.8	3.4
Them self as a good neighbor	4.1	0.8	4.4	4.1	4.6

4.4.7. *Reactions to others bicycling and walking*

This question asked respondents to indicate their personal perceptions relating to people they may see walking or bicycling in their neighborhood. The research team was trying to establish whether any stigma is held toward those who walk or bicycle. Overall, most respondents indicated that they ‘admired’ those who walk or bicycle in their neighborhood ($x=66.0\%$) while 28.8% said they had ‘no reactions’. 21.9% said ‘it depends on whether or not I know them’, or ‘I wish I had the energy to walk or bicycle myself’. Bailey and Oakwood respondents tended to have the highest suspicions surrounding people walking or bicycling in their neighborhoods. This may be a reflection of the higher number of renter-occupied residents in these neighborhoods. Table 14 summaries this data.

Table 14: Reactions to others who bicycle and/or walk

Reactions	Overall	Tract 1	Tract 2	Tract 3
Think they can't afford a car	2.8%	2.2%	2.7%	3.5%
Admire them	66.0%	63.0%	75.3%	40.4%
Feel suspicious of them	5.2%	6.5%	3.8%	7.0%
I wish I had the energy to walk or bicycle myself	21.9%	26.1%	23.1%	14.0%
I wonder where they are going	18.4%	23.9%	14.8%	22.8%
It depends whether or not I know them	21.9%	30.4%	15.9%	33.3%
It depends on how they are dressed or look	18.4%	26.1%	14.8%	21.1%
I have no reactions	28.8%	26.1%	25.8%	40.4%

4.4.8. Socio-demographic profile

Variables in this part of the survey were selected to profile the differences among respondents in different neighborhoods and to help researchers understand factors affecting responses to various questions in the survey. In particular, we were interested in the effects of owner-occupancy, tenure, age, and occupation on physical activity levels, perceived barriers to walking and bicycling in East Lansing, perceptions of neighborliness and social capital, and biases toward those who walk or bicycle in a neighborhood. Table 15 summarizes the data for the variables identified below.

Table 15: Summary table of the socio-demographic characteristics of the respondents

Variables:	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Age	44.0	18.9	29.1	52.0	29.9
Body Mass Index (BMI)	25.0		24.23	24.77	24.16
Height in feet and inches	5'7"	5.6"	5'8"	5'7"	5'9"
Weight in pounds	159.9	33.5	164.0	157.8	163.0
Percentages of households having at least one other member in an age group:					
Category	Overall percent		Tract 1	Tract 2	Tract3
0-12	23.5%				
13-24	37.8%				
25-36	19.8%				
37-48	13.4%				
49-60	24.9%				
61-72	10.1%				
Above 72	6.0%				
Percentage that consider themselves Head of the household:					
Yes	57.7%		38.2 %	67.0 %	36.2 %
No	21.5%		61.8 %	33.0 %	63.8 %
Student rental	15.8%		47.1 %	0.6 %	51.1 %
Couple	5.0%				
Male	42.8%		37.8%	39.7%	56.9%
Female	57.2%		62.2%	60.3%	43.1%
Households with individuals with disability:					
Yes	6.9%		9.1%	7.8%	2.1%
No	93.1%		90.9%	92.2%	97.9%

Variables:	Overall mean (x)	Standard Deviation (sd)	Tract 1 mean	Tract 2 mean	Tract 3 mean
Owner occupancy versus renter occupancy					
Own	73.5%		30.4%	98.3%	28.1%
Rent	26.5%		69.6%	1.7%	71.9%
Tenure in neighborhood in years	Mean (x)	SD			
	12.42	13.75	5.1	16.0	6.1
Occupation of respondents					
Currently working	74%		34.09%	79.14%	79.53%
Retired- previous experience	17.20%		6.82%	19.02%	18.13%
Student	0.09%		59.09%	1.84%	2.34%
Winter occupancy- Live out of town for more than a month during the winter					
Yes	3.9%		3.0%	3.5%	4.3%
No	96.1%		97.0%	96.5%	95.7%

a. Age

The mean age for respondents to the survey was 44.0 years (SD=18.9), indicating a predominance of respondents in middle age, with extremes of age on either side. Since the survey requested that head of household or second head of household respond to the survey, data was skewed in terms of age distribution from the offset. However, mean values for age of respondents on a neighborhood-by-neighborhood basis indicate substantial differences in neighborhood composition (Bailey 29.1 years of age; Glencairn 52.0; Oakwood 29.9). This is likely a factor of student-occupied housing in Bailey and Oakwood versus more traditional owner-occupied housing in Glencairn.

b. Body Mass Index (BMI)

Body Mass Index (kg/m^2) takes into account the weight adjusted for stature, and is used in descriptive epidemiologic studies and clinical applications to estimate the prevalence of healthful weight, overweight, and underweight. High and low BMI values are associated with increased risks of disease. BMI values of >25 indicate overweight status, while BMI values >30 indicate an obese condition. Research indicates that self-reported height measurements tend to be over-reported while self-reported weight tends to be under-reported, particularly in women seeking weight loss assistance (Kuzmierski *et al.*, 2001). The average error for height is +0.35 inches while the average error for weight is -3.75lbs. Another study (Nawaz *et al.*, 2001) shows that age influences the accuracy of self-reported heights and weights, with individuals over the age of 60 tending to self-report their height and weight inaccurately. Nevertheless, BMI is one of the best indicators of obesity in a population.

Given these caveats, respondents in our study indicated that on average their overall weight was 159.9 lbs (72.53 kg) with a standard deviation of 33.5 lbs (15.2 kg), and their average height was 5'7" (1.70 m) with a standard deviation of 5.6 " (0.14 m). Using the formula for BMI and the following conversions (2.2046 lb=1 kg; 39.37 in=1 m), the average overall BMI value for the population of respondents under study is 25.0, indicating that population is at the upper limits of having a healthful weight. When comparing the average weight and height of respondents from each neighborhood,

the BMI values were as follows: Bailey 24.23; Glencairn 24.77; Oakwood 24.16. All of these were within the healthful weight range, although opportunities exist for some error in self-reporting.

c. Percentages of households having at least one other member in an age group

About one-quarter of all households (23.5%) had at least one child at home (age 0-12 y). Nearly forty percent (37.8%) had at least one teen/young adult at home (age 13-24). 19.8 % had at least one other person age 25-36. 13.4% had one other person in the age group of 37-48 years. One quarter of households (24.9%) had one other person, age 49-60. One tenth (10.1%) had one other person age 61-72, and about 6% of households had one other person, age 72+.

d. Head of household

Almost 60% of respondents considered themselves the head of household. Almost 16% lived in student housing and checked the 'not appropriate' box for this question, with nearly half of the respondents in Bailey and over half the respondents in Oakwood checking the box for student housing.

e. Gender

Almost 43% of the overall respondents were male, while about 57% were female. This data, when broken out for neighborhoods, found that 37.8% of respondents in Bailey were males, 39.7% in Glencairn were males, and 56.9% in Oakwood were males.

f. Households with individuals with disabilities

Slightly under 7% of all households indicated that someone with disabilities was present. This incidence was highest in the Bailey neighborhood (9.1%) with Glencairn (7.8%) and Oakwood (2.1%) registering lower rates.

g. Owner occupancy versus renter-occupancy

Nearly 73.5 % of respondents indicated that they owned their own home. However, when one examines the neighborhood distribution patterns of home ownership, the influences of the large response rate from Glencairn become more evident. Home ownership by respondents in Bailey was 30.4%; Glencairn was 98.3%; Oakwood was 28.1%.

h. Tenure in neighborhood

The average tenure of all respondents to the survey was 12 years 5 months (sd=13 years, 9 months). On a neighborhood basis, respondent tenure tended to be: 5.1 years for Bailey; 16.0 years for Glencairn; and 6.1 years for Oakwood.

i. Occupation of respondents

The vocations of respondents in the survey indicate a high percent of individuals in education from the Glencairn neighborhood, while the number of MSU students was nearly non-existent. This is due in part to the off-campus housing policy established by the city to manage rental units for students and to a general attitude in the community that student housing tends to lower housing values in a neighborhood. Well-defined neighborhoods like Glencairn tend to exert peer-pressure among its residents to not rent

or sell properties to students. This is a well-known, but seldom discussed practice in this university community with 45,000+ students enrolled at Michigan State University.

Table 16: Distribution of respondent occupation of the three neighborhoods based on household survey responses

Occupation/ Industry	Tract 1	Tract 2	Tract 3	Total
Education	3	44	6	53
MSU Student	27	4	38	69
Health care/ Medical	3	20	0	23
Musician	1	1	1	3
Business, Sales Marketing, Hospitality	2	6	4	12
Priest	2	1	0	3
Blue Collar (Construction/ Landscape, Mechanic)	1	6	1	9
Sports	1	1	0	2
White Collar (Lawyer/ insurance/ Government, Manager/ Office-Personnel/ IT/ Engineer, Media, Consultant)	3	51	6	60
Self-employed	0	4	0	4
Social worker	0	3	0	3
Total	43	141	56	240

j. Winter occupancy

Fewer than 4% of the respondents indicated that they lived out of town more than a month during the winter. This percentage seemed to be relatively stable across neighborhoods. It was surprising to the research team that so few respondents actually winter out of town, especially in the Glencairn neighborhood.

5. Conclusions

As stated earlier in the study objectives (see section 2. Objectives), the research team was interested in factors that constituted perceived and real barriers to seasonal walking and bicycling in East Lansing, MI, a cold climate community. Three neighborhoods with distinctly different socio-demographic profiles (Table 17) were selected for the study based on their proximity to the Central Business District and Michigan State University, and their well-defined boundaries.

Table 17: Comparison of the three tracts on selected demographic, housing, and economic variables

	Bailey	Glencairn	Oakwood
Total Population	1041	1301	1900
Percent Female	64.4	53.0	55.1
Percent in Family Households	5.9	69.8	38.6
Percent in Nonfamily Households	69.9	29.1	57.7
Percent in Group Quarters	24.2	1.1	3.7
Median Household Income	\$35,000	\$75,691	\$24,551
Total Housing Units	196	500	1077
Percent Owner Occupied	13.8	82.4	28.0
Percent Renter Occupied	86.2	17.6	70.8
Percent One Person Households	6.6	16.6	54.5
Percent Built Over 70 Years Ago	42.8	39.6	29.2
Percent Moved in 1999 to March 2000	70.9	21.6	37.7
Median Rent	503	514	499

Data from the US Census Bureau (2000) show significant differences in the types of housing stock, renter versus owner occupancy rates, median income, age, and other factors. Glencairn had the highest income level, highest percent living in family household units and highest percent of home ownership. Bailey had almost one quarter of residents living in group quarters, highest percent of renters, and the highest mobility rate as indicated by the fact that 71 percent had moved in the prior year at the time of the census. Oakwood was characterized by a higher percent of one person households and a lower median family income as compared to the other tracts.

These three neighborhoods recreated differently, expressed clear differences in perceived barriers to walking and bicycling in fall and winter, exhibited seasonal declines in both walking and bicycling in winter over fall levels of engagement, and tended to see themselves as 'good' neighbors (although the types and degree of services extended to their neighbors and neighborhoods differed somewhat).

The most significant finding in terms of physical exercise and general health was that the majority of respondents scored above average in terms of complying with the President's Recommendations on Physical Fitness (*i.e.*, 30 minutes of moderate to strenuous exercise, five times per week) and that respondent BMI indicated that a high percentage of respondents were approximately 5 units or more below the BMI value of 30, which indicates obesity. Respondents addressed their need for physical exercise in different ways, with respondents from the owner-occupant neighborhood of Glencairn tending to exercise more at home or around the house, and the more renter-occupant neighborhoods with high student populations, tending to go to gyms and other exercise facilities. From the data it appears that family levels of exercise based on previous generations (*i.e.*, learned behavior) and levels of physical activity of neighbors (*i.e.*, peer pressure) does not influence today's respondent. Pets, however, particularly dogs, do affect walking levels; they were responsible for an average of slightly over two miles of walking per day among respondents, to accommodate the practical need for pet defecation.

The greatest barriers to walking and bicycling in East Lansing, Michigan in winter were of natural causes – snow, ice, treacherous footing etc. – but a surprising number of respondents also conveyed concerns about natural causes in fall – e.g., leaf litter, debris on sidewalks or in bicycle lanes etc. A surprisingly high percent of barriers came from traffic, road congestion, and poor infrastructure (like the absence of sidewalks). An unsuspected response involved public interactions and/or altercations while bicycling or walking in the community in fall, a secondary effect of high concentrations of student housing (fraternity and sorority houses, and student housing cooperatives) near the MSU campus.

The value of tenure or longevity in a neighborhood cannot be understated. In Glencairn neighborhood, the average tenure of owner-occupied housing is 16.0 years. This length of tenure contributes to both social stability in a neighborhood and to collective knowledge about individual residents, their property practices, and personal needs. The research team witnessed high levels of citizen involvement in maintaining

both personal and neighbor properties during two of the winter months preceding the household survey. Impromptu discussions and formal interviews revealed high levels of knowledge pertaining to neighbor characteristics, including personal needs for assistance, among individuals in various blocks of the neighborhood. We did not ascertain a similar level of knowledge in the Bailey neighborhood, where student turnover in many housing units occurred on an annual basis. In the Oakwood neighborhood, pockets of neighborhood identity were apparent where owner-occupancy tended to constitute the majority of the block and the blocks surrounding. In this latter neighborhood, the field survey study for snow removal compliance revealed those pockets with individuals most engaged in tasks of neighborliness over a two year basis.

Recommendations to the City of East Lansing, Michigan, for increasing walking and bicycling in the city fell into two general categories: 1) improvements in snow removal practices among city employees charged with clearing road right of ways and curb cut areas or enforcing snow compliance ordinances in neighborhoods with low compliance; and 2) the need for improved infrastructure that encourages walking and bicycling by creating sidewalks and dedicated bicycle lanes, traffic calming devices to slow and control motorized vehicle flow, and bicycle racks that enhance security in public places. The city also needs to work more closely with the Capital Area Transit Authority (CATA) to insure that bus stops are clear of snow for safe ingress and egress to and from public buses; and they need to coordinate the efforts of other public agencies (e.g., the US Post Office, the Secretary of States Office etc.) as well as private businesses to insure that sidewalks remain open for pedestrians and cyclists during the fall and winter months.

References:

1. Allison, D.B., Fontaine, K.R., Manson, J.E., Stevens, J. and VanItallie, T.B., 'Annual Deaths Attributable to Obesity in the United States', 1999, *Journal of the American Medical Association*, vol. 282, no. 16, pp. 1530-1538.
2. Batson, C.D., Ahmad, N. and Tsang, J., 'Four Motives for Community Involvement', 2002, *Journal of Social Issues*, vol. 58, no. 3, pp. 429-445.
3. Benson, H. and Stuart, E.M., *The Wellness Book: the Comprehensive Guide to Maintaining Health and Treating Stress-Related Illness*, New York: Fireside, 1993.
4. Case, A. and Paxson, C., 'Early Life Health and Cognitive Function in Old Age', 2009, *American Economic Review: Papers and Proceedings*, vol. 99, no. 2, pp. 104-109.
5. Centers for Disease Control and Prevention (CDC), 'Halting the Epidemic by Making Health Easier: at a Glance 2011', 2011, [Online] available at <http://www.cdc.gov/chronicdisease/resources/publications/aag/obesity.htm>, accessed on November 15, 2012.
6. Centers for Disease Control and Prevention (CDC), 'Prevalence of Obesity: United States, 2009-2010', Atlanta, Georgia: National Center for Health Statistics, Brief no. 82, 2012, [Online] available at <http://www.cdc.gov/nchs/data/databriefs/db82>, accessed on November 15, 2012.
7. Clark, G.S. and Siebens, H., 'Rehabilitation of the Geriatric Patient', in DeLisa, J. and Gans, B. (eds.), *Rehabilitation Medicine: Principles and Practice*, Philadelphia: Lippincott Williams & Wilkins, 1998, pp. 963-995.

8. Dawes, D., 'The Importance of Physical Activity for All Americans', Washington, DC: President's Council on Fitness, Sports & Nutrition, 2012, [Online] available at <http://www.fitness.gov/>, accessed on November 10, 2010.
9. Dillman, D.A., *Mail and Telephone Surveys: The Total Design Method*, New York: Wiley & Sons, 1978.
10. Finkelstein, E.A., Fiebelkorn, I.C. and Wang, G., 'State-Level Estimates of Annual Medical Expenditures Attributable to Obesity', 2004, *Obesity Research*, vol. 12, no. 1, pp. 18-24.
11. Flegal, K.M., Carroll, M.D., Ogden, C.L. and Johnson, C.L., 'Prevalence and Trends in Obesity Among US Adults, 1999-2000', 2002, *Journal of the American Medical Association*, vol. 288, no. 14, pp. 1728-1732.
12. Flegal, K.M., Carroll, M.D., Ogden, C.L. and Curtin, L.R., 'Prevalence and Trends in Obesity Among US Adults, 1999-2008', 2010, *Journal of the American Medical Association*, vol. 303, no. 3, pp. 235-241.
13. Frank, L.D., Andresen, M.A. and Schmid, T.L., 'Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars', 2004, *American Journal of Preventive Medicine*, vol. 27, no. 2, pp. 87-96.
14. Guyer, B., Freedman, M.A., Strobino, D.M. and Sondik, E.J., 'Annual Summary of Vital Statistics: Trends in the Health of Americans during the 20th Century', 2000, *Pediatrics*, vol. 106, no. 6, pp. 1307-1317.
15. Kuczmarski, M.F., Kuczmarski, R.J. and Najjar, M., 'Effects of Age on Validity of Self-Reported Height, Weight, and Body Mass Index: Findings From The Third National Health and Nutrition Examination Survey, 1988-1994', 2001, *Journal of the American Dietetic Association*, vol. 101, no. 1, pp. 28-34.
16. McMillan, D.W. and Chavis, D.M., 'Sense of Community: A Definition and Theory', 1986, *Journal of Community Psychology*, vol. 14, no. 1, pp. 6-23.
17. Mirowsky, J. and Ross, C.E., 'Age and Depression', 1992, *Journal of Health and Social Behavior*, vol. 33, no. 3, pp. 187-205.
18. Nadler, A. and Fisher, J.D., 'The Role of Threat to Self-Esteem and Perceived Control in Recipient Reaction to Help: Theory Development and Empirical Validation', 1986, in Berkowitz, L. (ed.), *Advances in Experimental Social Psychology*, vol. 19, Orlando: Academic Press, 1986, pp. 81-122.
19. Nawaz, H., Chan, W., Abdulrahman, M., Larson, D. and Katz, D.L., 'Self-Reported Weight and Height: Implications for Obesity Research', 2001, *American Journal of Preventive Medicine*, vol. 20, no. 4, pp. 294-298.
20. Pettigrew, K.E., 'Agents of Information: The Role of Community Health Nurses in Linking the Elderly with Local Resources by Providing Human Services Information', 1998, in Wilson T.D. and Allen, D.K. (eds.), *Exploring the Contexts of Information Behaviour. Proceedings of the 2nd International Conference on Research in Information Needs, Seeking and Use in Different Contexts, 13/15 August 1998, Sheffield, UK*, London: Taylor Graham, 1999, pp. 257-276.
21. Pettigrew, K.E., 'Waiting for Chiropractic: Contextual Results from an Ethnographic Study of the Information Behavior among Attendees at Community Clinics', 1999, *Information Processing & Management*, vol. 35, no. 6, pp. 801-817.
22. Pettigrew, K.E., Durrance, J.C. and Vakkari, P., 'Approaches to Studying Public Library Networked Community Information Initiatives: A Review of the Literature and Over-

- view of a Current Study', 1999, *Library and information Science Research*, vol. 21, no. 3, pp. 327-360.
23. Powell, K.E. and Blair, S.N., 'The Public Health Burdens of Sedentary Living Habits: Theoretical but Realistic Estimates', 1994, *Medical Science Sports and Exercise*, vol. 26, no. 7, pp. 851-856.
 24. Rowe, J.W. and Kahn, R.L., 'Successful Aging', 1997, *The Gerontologist*, vol. 37, no. 4, pp. 433-440.
 25. US Census Bureau, 'State and County Quick Facts, East Lansing, Michigan', Washington DC: US Department of Commerce, 2012, [Online] available at <http://quickfacts.census.gov/qfd/states/26/2624120.html>, accessed on November 15, 2012.