

# 行政院國家科學委員會補助專題研究計畫成果報告

## 社區環境建構與高齡者休閒性身體活動參與關係之研究

計畫類別：個別型計畫 整合型計畫

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## *Introduction*

Older population is increasing rapidly in Taiwan. Currently, there are more than fifty-six million adults older than 65 years old which accounts 10.6 % of total adult population. In order to reduce the impact of aging population to the society, governments and scientists strive to enhance the overall quality of life in later lives. Physical activity has been approved to be an effective and efficient method in delaying the onset of chronic diseases or reducing the health care cost (Dunn et al., 1999; Pate et al., 1995)

However, a large proportion of older adults in Taiwan remain inactive. According to the data from National health Interview Survey, Taiwan, for older adults age 65-74, regular exerciser for males and females were 45% and 39 %, respectively. For those who are older than 75 years old, regular exerciser drop to only 44% for males and 29 % for females. The regularly exerciser was defined as one who exercised more than five times a week and accumulating more than 150 minutes in moderate intensity or greater than three times a week for at least 20 minutes per time in vigorous intensity (Lin, Wen, & Wai, 2007). Thus, promoting PA level among the elderly is becoming more and more important.

Recently, the public health has shifted from individual based programs intervention to the overall socio-ecological model in increasing the public's physical activity level (Marcus & Forsyth, 1999). Older adults have been considered to be a particular vulnerable population in engaging in physical activity due to its limited mobility. Older adults deserve special attention especially the environmental design has great impact on their mobility (Clarke & Nieuwenhuijsen, 2009; Yen, Michael, & Perdue, 2009). Past literature has indicated the neighborhood environmental factors associated with older adults physical activity level includes: housing density and land-use diversity (Yen, et al., 2009), socioeconomic status(Annear, Cushman, & Gidlow, 2009) . As most of the studies of neighborhood characteristics and physical activity level are from North America (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009) or Austria (Annear, et al., 2009; Duncan, Mummery, Steele, Caperchione, & Schofield, 2009) perspective, the differences of environmental design, such as population density, land use policy, culture difference, individual preferences, might have considerable impact on seniors' perception on built environment, health perception and their physical activity level. Therefore, the purpose of this study was to investigate the relationship among built environment, health perception, and

physical activity level from southern Taiwan's setting with the aim to fulfill the gap of insufficient Asia's perspective.

### *Methods*

This study embraced two-steps using both qualitative and quantitative approach to investigate the relationship among built environment, health perception and physical activity for seniors in Tainan. At first, a questionnaire was developed, validate by pilot studies and reliability in order to conduct a cross-sectional design, self-reported survey research. Secondly, two focus groups were conducted with the intention to further understand the perceptions of built environment on their daily physical activity from seniors' point of view.

#### Research instrument

The questionnaire consisted of four parts to obtain information on (1) demographic variables, (2) perception of built environment, (3) physical activity, and (4) Self-rated health condition.

#### Demographic variables

The demographic variables include age, gender, district, education level, working status, income, regular physical activity habit, membership of exercise club, and histories of chronic diseases.

#### Measurement of built environment

Measurement of the perception of built environment variables were modified from Neighborhood Environment Walkability Scale (NEWS) developed by Saelens et al. (2003). The original NEWS questionnaire has a total of 98 items and was divided into seven subscales. As the long list of questions is difficult for the older adults to complete and some of the questions might not be applicable in the environmental settings in Taiwan, the research team consulted the experts in related areas and has modified the questions into two major sections. The first section list 21 popular local services (see table 2) in the neighborhood and asked the participants to indicate how long will it take for them to walk from their home to those service destinations.

#### *Measurement of physical activity*

The Physical Activity Scale for the Elderly (PASE), a 12-item questionnaire, was used to assess self-reported physical activity. The PASE score is based on leisure, household, and occupational activities that have been performed in the previous seven days.

### *Self-rated health condition*

We used three questions to evaluate the seniors' self-rated health condition, which were: how do you feel about your health condition "right now?", "in the past year?" and "compare to the other people with the same age?"

### *Focus groups interviews*

What are the factors influencing older adults' physical activity? This is the general question underlying this qualitative study. Based on the theme, the researcher concentrated on how did the seniors perceived of the built environment affecting their daily physical activities.

### *Study sites*

Tainan city, which is located in southern Taiwan, is the study target/site. There were a total of six districts at the time of study and two districts (east district and central-west district) were selected to represent the differences of geographic locations.

### *Recruitment of participants*

The target samples were community-dwelling older adults who were over 50 years old. Individuals were recruited from seniors' organizations such as the elderly college and community seniors' centers. Data was collected by on-site survey.

Two qualitative focus groups were conducted to elicit older adults' perception of the environment and their physical activity participation. All information was confidentially handled. Two focus group sections lasted between 60 to 90 minutes.

### *Data analyses*

The questionnaire data were analyzed using SPSS software for Windows, version 17 (SPSS, Inc., Chicago, IL). Descriptive statistics were performed to illustrate the characteristics of the sample. Pearson correlations were executed to investigate relations between the perception of built environment and seniors' physical activity level. Interviews were transcribed from their video-taped and audio-recorded form into text editing Word software and then imported into the qualitative data analysis software, NVIVO. The researcher used constant comparison to assess the reliability and validity of coding and themes (Creswell, 2003; Denzin & Lincoln, 2000). This iterative process was continued until data saturation was reached and no new themes were identified (Glaser & Strauss, 1967; Morse, 1994).

## Results

### Results from quantitative questionnaires

#### Sample Characteristics

A total of 600 surveys were distributed to seniors in various seniors centers in Tainan city during spring 2010, 405 surveys were returned with a response rate of 67.5%. After exclude 9 subjects who were younger than 50 years old, a total of 396 subjects were used for final analysis. As can be seen from Table 1, 65% of the participants were females, with a mean age of 66 years old (SD=9.6). Participants were from all districts from Tainan city and some from Tainan County. Almost 40% of them have university degrees or above. Most of them were retired (88.5%). Majority of them have regular exercise habit (77.8%). 45.7% of them do not have membership of any exercise club. 73.7% of the participants state that they have at least one chronic disease. The average seniors' physical activity level is 134 in PASE score with a standard deviation of 74.

Table 1- General sample features

Variables	N	(mean)	% (SD)
Sex			
Male	140		35.4
Female	256		64.6
District			
East	96		24.2
West Central	121		30.6
North	50		12.6
South	48		12.1
Anping	43		10.9
Annan	16		4
Tainan County	19		4.8
Age	66.2		9.6
Education			
Has not been educated	15		3.8
Primary school	62		15.7
Middle school	45		11.4
Higher school	115		29.0
College	146		36.9
Graduate school and higher	9		2.3
Employment status			
Employed	44		11.5
Not employed	340		88.5
Monthly Income (NT dollars)			

<10000	131	33.1
10000-30000	134	33.8
30000-50000	49	12.4
50000-70000	31	7.8
>70000	15	3.8
Living status		
Alone	41	10.4
With others	353	89.1
Housing style		
Apartment	74	18.7
High floor buildings	26	6.6
Townhouse	286	72.2
House	5	1.3
Regular exercise		
Yes	308	77.8
No	86	21.7
Exercise club membership		
Yes	181	45.7
No	203	51.3
Have chronic diseases		
Yes	291	73.7
No	104	26.3
PASE	134	74

As can be seen from Table 2, most of the shops and daily service destination are within 1-10 minutes of walking distance from seniors' residences. Interestingly, as we compared the time of proxy walking time with the transportation methods, most seniors choose scooters rather than walking or cycling (figure 1).

Table 2 Descriptive Statistics of Walking Distance to Local service

Destination	1-5 mins	6-10 mins	11-20 mins	21-30 mins	Over 30 mins	Don't know
Grocery Store	52.5	37.6	7.3	0.5	0	0.3
Supermarket	23.5	38.4	24.2	4.8	4.0	3.3
Hardware store	23.2	34.1	21.7	4.0	2.0	11.4
Traditional market	24.2	40.4	23.0	5.3	2.5	2.0
Laundry	29.6	25.7	22.0	2.5	0.5	17.0
Clothing store	13.9	22.0	29.3	10.4	5.1	16.4
Post office	23.2	33.8	31.1	6.1	1.8	2.3
Library	6.8	17.7	27.5	12.6	11.1	22.0
Schools	21.5	32.6	26.5	4.5	2.3	10.1

Book store	8.6	21.0	33.3	8.8	7.3	18.2
Fast food/ restaurant	30.3	40.9	16.4	2.8	2.8	4.8
Coffee/drink shop	30.3	37.9	12.4	3.0	1.5	12.4
Bank/credit union	17.4	25.3	38.4	5.3	5.1	6.1
Video shop	12.1	19.2	21.5	5.3	2.5	36.1
Pharmacy/drug store	28.0	30.6	26.0	2.3	1.5	8.3
Salon/barber shop	29.3	31.8	25.5	3.8	3.0	3.5
Your job or school	9.1	22.5	31.3	8.8	7.8	16.4
Bus stop	23.0	35.4	17.2	2.3	2.3	15.9
Park	31.3	37.1	19.2	3.0	1.5	4.5
Temple or church	21.0	29.0	25.3	6.6	4.5	10.4
Recreation center/gym	18.4	25.8	32.3	5.1	3.0	11.6

Table 3 Perception of Built Environment

item	Strongly disagree	Disagree	Average	Agree	Strongly Agree
Stores are within easy walking distance of my home	1	4.3	20.2	59.1	14.6
There are many places to go within easy walking distance of my home.	0.8	4.3	21.0	55.3	17.2
It is easy to walk to a transit stop (bus, train) from my home.	3.8	9.6	29.5	42.4	12.9
There are sidewalks on most of the streets in my neighborhood.	4.3	14.4	19.7	48.0	11.1
The sidewalks in my neighborhood are well maintained (paved, even, and not a lot of cracks).	6.6	19.7	22.5	36.1	13.6
There are bicycle or pedestrian trails in or near my neighborhood that are easy to get to.	5.8	24.0	25.0	33.3	9.3
There are trees along the streets in my neighborhood.	5.3	19.7	23.7	35.9	13.9
My neighborhood is generally free from litter.	2.8	14.1	31.1	42.2	9.1
There are many attractive natural sights in my neighborhood (such as landscaping, views).	2.8	28.5	27.0	29.3	10.6
There are attractive buildings/homes in my neighborhood.	3.3	31.8	29.5	26.8	7.3
There are a lot of street dogs	13.1	23.0	21.5	24.5	15.7
There are a lot of mosquitos and fly on the street	15.4	21.0	33.6	24.5	4.3
There is so much traffic along nearby streets that it makes it difficult or unpleasant to walk in my neighborhood.	6.1	20.5	36.6	28.8	6.3
The speed of traffic on the street I live on is usually slow	7.8	22.5	34.8	27.0	5.1
There are crosswalks and pedestrian signals to help walkers cross busy streets in my neighborhood.	2.5	10.4	27.0	46.0	11.4
When walking in my neighborhood, there are a lot of exhaust fumes (such as from cars, buses).	9.8	14.4	28.0	32.3	13.6
My neighborhood streets are well lit at night	0.8	3.5	24.0	53.3	16.7

There is a high crime rate in my neighborhood	12.4	29.8	44.9	8.8	1.5
The crime rate in my neighborhood makes it unsafe to go on walks during the day	12.9	44.2	28.3	10.4	2.5
The crime rate in my neighborhood makes it unsafe to go on walks at night.	9.1	33.8	35.9	15.4	4.0

Table 4 Subjects' Health Perception

	Excellent	Very good	good	average	Not good	Very bad
My current health status	3.2	14.6	31.4	43.0	6.4	0.2
My health status in the last 12 months	2.0	16.0	26.2	48.1	5.9	0.5
	Much better	better	About the same	worse	Much worse	
My health status compared to my peers at this age	5.4	23.7	57.8	10.4	1.5	

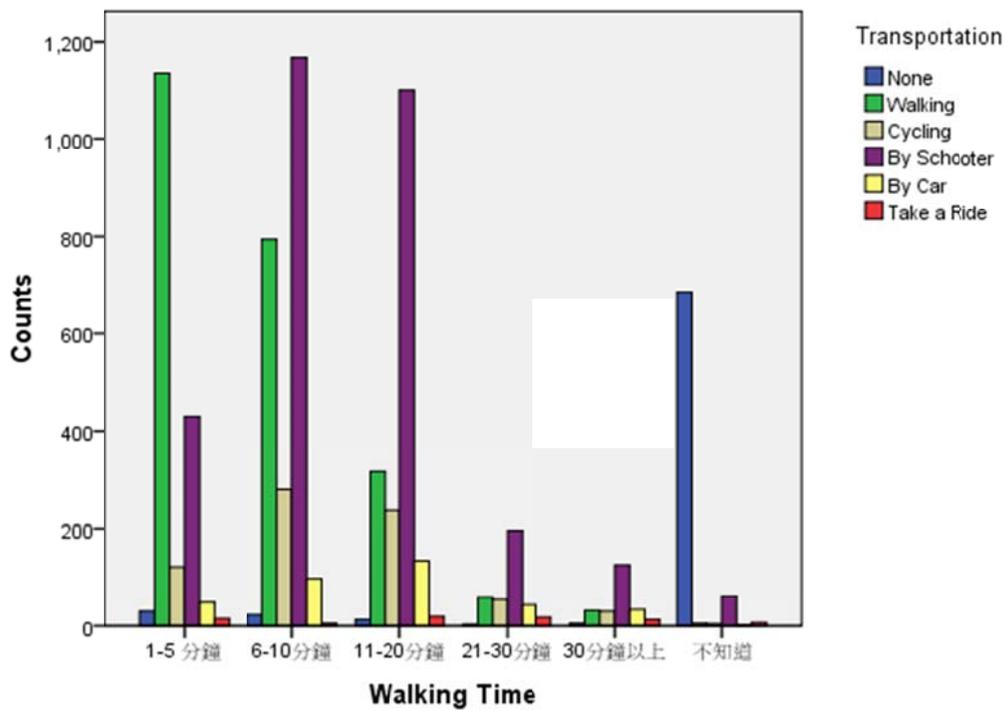


Figure 1. Walking Time vs. Transportation Methods

Table 5 Bivariate Correlation of physical activity level, subjective health status and perception of built environment

	PASE	Environment	Health
PASE	1		
Environment	.173**	1	
Health	.282***	.177***	1

\*p<.05, \*\*p<.01, \*\*\*p<.001, 2-tailed test

*Results from qualitative focus group interviews*

*Lack of well-maintained pedestrian infrastructure*

Walking is the major method older adults identified for them to getting around in their daily living. However, a lot of participants complain about lack of well-maintained pedestrian infrastructure. In Taiwan, most of the buildings have arcade design with the intention to make it more convenient for people to walk in the rainy days or cover from the hot sunshine. However, most of the arcades are being used by the shops for business operation. This situation blocks the way for people to get through the street.

*Clean public space*

Clean public space is associated with older adults' health in regarding to both their mental and physical health (Jacobs et al., 2008; Takano, Nakamura, & Watanabe, 2002). The results from the two focus groups revealed different public space's impact on their daily physical activity. For the first group, as most of the participants live in the east district, which is close to the university campus and surrounded by many local parks, they mentioned these green, outdoor public space enables them to do many activities they want. On the contrary, for the second group, which their residence area was mixed with business buildings, little public space is available.

*Safety concerns*

Similar to the results from earlier theme, the two groups disclose very different view of point. The first group identified that their surrounding areas is safe to walk around while the second group mentioned they have concerns of the safety in their environment.

### *Respect of older adults*

In Tainan city, older adults over 65 years old do not have to pay the ticket fare while taking the bus. Although the merit intention of this policy in respecting older adults, in reality, it might be a un-respect experience for them. Several participants mentioned that the bus drivers do not show respect to them while seniors taking the bus as they think they are “free-riders”.

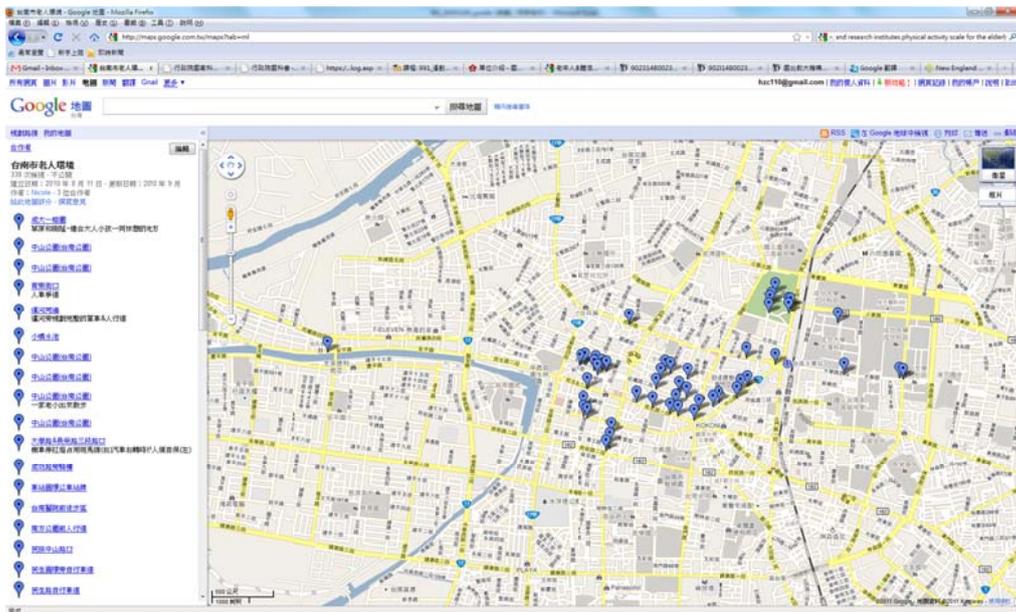


Figure 2 Using Google maps to upload the pictures and identify the built environment

### *Conclusions*

The results of the questionnaire revealed that most of the shops or daily activity destinations are within walking distance from older adults' residence. This is due to the high population density and integrated use of land policy in Taiwan. However, although the services are within walking distance, older adults rely more on scooters in Taiwan. Accessibility to local service within walking distance does not imply increase the possibility of increase PA such as walking or cycling. This is contrary to most of the western studies. However, the studies affirmed that seniors physical activity level is significantly and positively related to older adults' subjective health and perception of built environment.

This study identified four major themes related to older adults' perception on environment and their physical activity from Tainan city, Taiwan. The themes are well-maintained pedestrian infrastructure, clean public space, safety concerns, respect of older adults. From the study, there are many hazardous in the environment influencing seniors' mobility currently. This study suggests the government should pay more attention on both the social and physical environment. As World Health Organization has initiated an action to build the Aging Friendly Cities, the results from the study could serve as a reference for local Taiwan's guideline.

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