

2022 Doctoral Dissertation (Abstract)

Effects of neighborhood environment on physical function  
in community-dwelling older adults

Masataka Ando

Ph.D. in Gerontology  
Graduate School of Gerontology  
J. F. Oberlin University

## **I . Purpose**

The aim of this study was to investigate the individual characteristics of older adults that affect the association between physical function and neighborhood environment and to examine the effects of neighborhood environment on changes in objectively measured physical function.

## **II . Study 1**

### **Individual characteristics of older adults that affect the association between physical function and neighborhood environment**

The aim of this study was to clarify the association between physical function and neighborhood environment and investigate the individual characteristics of older adults that affect the relationship between both.

A total of 624 community-dwelling older adults, aged  $\geq 65$  years and living independently, participated in this cross-sectional study. Physical function was assessed by muscle strength (grip strength and knee extension strength) and physical performance (5m walking time and timed up-and-go test (TUG)). The neighborhood environment was assessed using the International Physical Activity Questionnaire Environmental Module (IPAQ-E). Individual characteristics, including age, sex, medical history, pain, medications, height, weight, body mass index (BMI), habitual exercise, cognitive function, depressive function, social isolation, and functional capacity were also investigated. The association between physical function and neighborhood environment and individual characteristics that affect the association between both, were analyzed using multiple regression analysis and classification and regression tree (CaRT) analysis.

Multiple regression analysis showed that neighborhood environment was significantly associated with physical function in both older men and women. Specifically, for men, significant associations were found between 5m walking time and recreational facilities ( $B = -0.31$ ,  $p = 0.004$ ) and between TUG and residential density ( $B = -0.27$ ,  $p = 0.042$ ). For women, significant associations were found between grip strength, knee extension strength, and recreational facilities ( $B = 0.91$ ,  $p = 0.024$  and  $B = 1.66$ ,  $p = 0.043$ , respectively). The CaRT analyses indicated that older men aged  $\leq 80$  years without low back pain and depressive symptoms, and presence of recreational facilities had the shortest 5m walking time. However, CaRT analyses found no relationship between physical function and the neighborhood environment in older women.

These results suggest that the association between physical function and neighborhood environment

may be altered by sex, age, and physical and mental health conditions.

### **III. Study 2**

#### **Effects of neighborhood environment on one-year change of objectively measured physical function in community-dwelling older adults**

This study aimed to examine the effects of neighborhood environment on longitudinal changes in objectively measured physical function among older adults living in a community.

This study was one-year longitudinal study. Of the 624 community-dwelling older adults who participated in the baseline survey (Study 1), 299 individuals (follow-up rate: 47.9%) who participated in the follow-up survey after 1-year, were analysed. Physical function was assessed using muscle strength (grip strength and knee extension strength) and physical performance (5m walking time and TUG). Changes in physical function were defined based on minimal detectable change (MDC). When each physical function measure declined above the MDC over time, it was considered a physical function decline. Contrarily, changes in the MDC or improvements above the MDC were defined as maintenance or improvement. Neighborhood environment was assessed using the IPAQ-E. Multiple logistic regression analysis adjusted for individual characteristics was used to analyze the effects of the neighborhood environment on changes in each physical function. To examine the possibility of dropout bias, inverse probability weighting (IPW) was also performed.

Multiple logistic regression analysis showed that even after adjusting for individual characteristics, the presence of neighborhood recreational facilities affected the maintenance/improvement of 5m walking time (OR = 2.31, 95% CI: 1.02 - 5.21), and good crime safety affected the maintenance/improvement of TUG (OR = 1.87, 95% CI: 1.06 - 3.33). Similar results were found in the analysis using IPW.

These results suggest that both physical and social environments may affect longitudinal changes in physical function, especially physical performance, among community-dwelling older adults.

### **IV. Conclusion**

Through the results of both study 1 and 2, we concluded that older adults' individual characteristics should be considered when evaluating the effects of neighborhood environment on physical function. In addition, improving or promoting the use of environmental resources in neighborhoods may contribute to the maintenance of physical function and functional capacity.