



# The study of perceived environment and its relation to senior citizen's physical activity behavior intention☆



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## ARTICLE INFO

### Article history:

Received 1 September 2015  
Received in revised form 1 October 2015  
Accepted 1 November 2015  
Available online 30 December 2015

### Keywords:

Perceived environment  
Senior citizen  
Quality of life  
Theory of planned behavior  
PLS  
Fs/QCA

## ABSTRACT

An aging society exerts considerable influence on the health of the elderly. Studies indicate that regular physical activity can reduce the incidence of chronic diseases, promote senior citizens' mental health and cognitive functioning, and enhance quality of life. It shows decrease government expenditures on Medicare and welfare. The purpose of this study is to evaluate the relationship between perceived environment and a senior citizen's physical activity behavior intention. The study applies the theory of planned behavior (TPB) proposed by Ajzen (1991) to investigate senior citizens over the age of 65 in Taiwan. To distribute questionnaires, it uses the quota purposive sampling method. The study distributes 330 questionnaires and collects 326 valid questionnaires. Model verification of the data uses partial least squares (PLS) and fuzzy-set qualitative comparative analysis (Fs/QCA). The results show that the model in this study has highly explanatory and has predictive power specificity. Environmental accessibility has significant influences on the physical activity behavior attitude, subjective norm, and perceived behavior control of senior citizens. The results suggest that in Taiwanese communities there is either increase accessibility to exercise facilities or an increased number of facilities for the improvement of senior citizens' health.

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## 1. Introduction

In 2012, the Council for Economic Planning and Development estimates that from 2016 to 2020, the annual ratio of aging population growth will exceed 5.0%. Additionally, it estimate that in 2018, the ratio would reach 14%, which indicates that Taiwan is becoming an aged society. In 2013, the Directorate General of Budget conducted an analysis and found 75.9% of the elderly aged 65 and over have at least one chronic disease, and among 82.1% of the elderly aged 80 and over, 16.8% have difficulty taking care of themselves.

Related literature shows that regular exercise such as walking, jogging, and biking could improve the health of the elderly. For example, it can improve metabolic syndrome, hypertension, hyperglycemia, and melancholia. (Aoyagi & Shephard, 2013; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; McMurdo et al., 2012).

In recent international studies, researchers focus on the relationship between exercise by seniors and physical environmental factors (Owen et al., 2004; Gómez et al., 2010; Nathan et al., 2012; Rosso, Auchincloss, & Michael, 2011). A good environment includes a convenient walking path, a manageable walking distance, road safety, a safe neighborhood, and environmental esthetics, nearby destinations, such as convenience stores, parks, and green zones. All factors are those that influence seniors' health and willingness to exercise. Consequently, all studies reflect a significant correlation between environment and seniors' physical activity. Some studies reflect the correlation between the environment and the physical activities of the elderly. A literature review finds that few studies explore the relationship between the environment and physical activities of the elderly. Therefore, this study aims to examine the relationship between these two constructs. Moreover, this study presents policy recommendations and references for future research. The goals of this research are (1) to construct a model of the environment and physical activities of the elderly and (2) to understand the relationship between the environment and physical activities of the elderly.

## 2. Literature review and research hypotheses

### 2.1. Environment and physical activities

Previous studies indicate that the environment and physical activities are linked. Bronfenbrenner (1977) applies the ecological model to explore the influence of the environment on residents' health and find

☆ The authors acknowledge and thank the Ministry of Science and Technology, Taiwan, ROC, for grant number 104-2410-H-110-018-MY3. The authors thank Arch Woodside, Boston College, USA, and reviewers at the Journal of Business Research for valuable suggestions on how to construct empirical models and perform analyses for this study. Any remaining errors are the authors' sole responsibility.

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that it is the key factor influencing individual health. Additionally, the study identifies two environmental impact factors: an internal factor (human) and an external factor (environment). The internal environment includes individual attributes, such as faith, attitude, and behavior. For instance, changing one's internal environment can improve one's attitude toward physical activities, which can increase the number of physical behaviors performed. External influence includes environmental components, such as the availability of a safe space. The ecological model provided by Sallis et al. (2006) stresses that influences on health behavior comprise a multi-model; individual health behavior is influenced by the internal factor (physiology and psychology), as well as interpersonal relationships and culture, organization, society, public policies, etc. The intervening effect of the environment and policies has the greatest impact on individual health behavior. Seniors' perspectives on the perceived environment are also a contributing factor. The factors concerning the perceived environment include accessibility, convenience, safety, attractiveness, and comfort when engaging in physical activities.

Past studies show significant correlations between seniors' health behavior and accessibility of community facilities, opportunities for activity, convenience of facilities, esthetic attributes, weather and safety (Owen et al., 2004; De Nisco & Warnaby, 2014; Sigmundová, Ansa, & Sigmund, 2011; Van Cauwenberg et al., 2011; Nathan et al., 2012). Multiple studies of the relationship between the environment and physical activities show that walking is a common exercise for the elderly. The activity is significantly correlated to the accessibility of community facilities, opportunities for activity, esthetic attributes, and safety (Owen et al., 2004; Sigmundová et al., 2011; Van Cauwenberg et al., 2011; Nathan et al., 2012).

Ajzen and Manstead (2007) applies the theory of planned behavior to study behavior change and predict physical activities for individual health behavior (Hagger & Chatzisarantis, 2002; Hardeman, Michie, Kinmonth & Sutton, 2011). In the current literature, the TPB model predicts the relationship between the environment and walking; the nearby environment influences walking behavior, while attitude, subjective norm, and perceived behavior control influences the behavioral intention (Rhodes, Brown, & McIntyre, 2006; Lee & Shepley, 2012). McEachan, Conner, Taylor, and Lawton (2011) apply a meta-analysis to investigate the efficiency and methodology of predicting behavior. By analyzing 206 articles, the study verifies that the theory of planned behavior predicts the relationship between physical activities and a healthy diet. Their explanatory power is 23.9% and 21.2%, respectively.

Ajzen (1991) also suggest another external variable that mediates TPB and behavior. Some recent studies focus on the TPB model to understand how attitude, subjective norm, and predictable behavior control influence intention and behavior (Fishbein, 2000; Morrison et al., 2010; Lee & Shepley, 2012; Wu, Cheng, & Cheng, 2015).

A literature review finds a few studies on the relationship between the environment and physical activities. These studies show that walking is a common exercise for the elderly. Hence, this study proposes that accessibility, esthetics, and safety influence attitude, while subjective norm and perceived behavior control moderate behavior intention.

2.2. Research model and hypotheses

The study combined TPB and perceived environmental characteristics to predict senior citizens' physical activity behavior intention. Based on the ecological model (Rhodes et al., 2006), the perceived environment characteristics of accessibility (AC), esthetics (AS), and safety (SA) influence physical activity behavior intention by influencing attitude (ATT), subjective norm (SN), and perceived behavior control (PBC).

Hence, the study proposes the following hypotheses: (1) the TPB (H1, H2, H3) would mediate environment - behavior intention relations based on the tenets of the TPB, (2) integrating perceived environmental accessibility (H4-1, H4-2, H4-3), esthetics (H5-1, H5-2, H5-3) and safety (H6-1, H6-2, H6-3) into the TPB contribute to predicting physical activity behavior intention (see Fig. 1).

3. Research method and sampling

3.1. Sampling

The study subjects are elderly, aged 65 and over, with normal cognition function, who speak Chinese or Taiwanese, and can conduct physical activities freely. The study selects senior interviewees randomly from a long list of names for a public agency. Their willingness to participate is confirmed by telephone before the investigation began, resulting in a high response rate.

Following the suggestions of Urbach and Ahlemann (2010), the PLS-SEM samples have to be at least 30 ~ 100. In this study, the study conducts purposive sampling with 1200 people, with 326 interview responses recorded and a recovery rate of 28.79%.

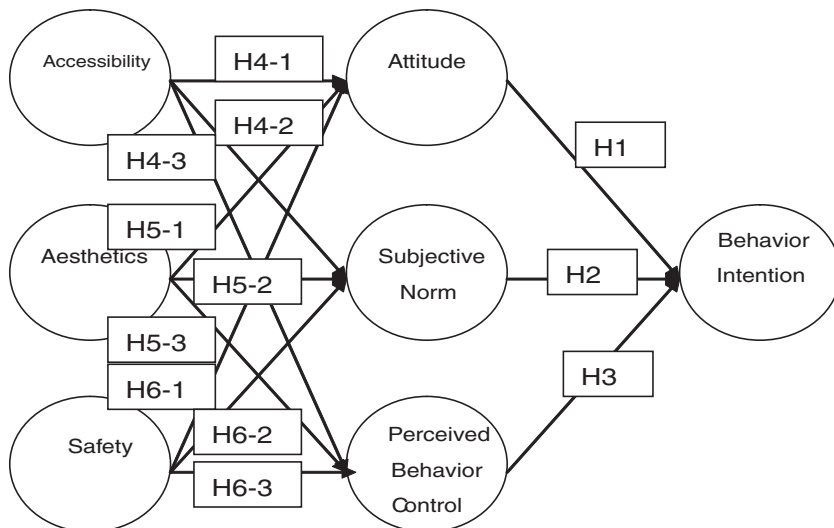


Fig. 1. Correlation model of behavioral intention toward perceived environment and elderly physical activities.

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