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Original Research

Test-retest reliability of Physical Activity Neighborhood Environment Scale among urban men and women in Nanjing, China

L. Zhao [1], Z. Wang [2], Z. Qin [2], E. Leslie [3], J. He [4], Y. Xiong [5,**], F. Xu [2,4,*]

[1] West China School of Public Health, Sichuan University, Chengdu, China
[2] Nanjing Municipal Center for Disease Control and Prevention, Nanjing, China
[3] Faculty of Medicine, Nursing and Health Sciences, Flinders University, Adelaide, Australia
[4] The School of Public Health, Nanjing Medical University, Nanjing, China
[5] Jiangsu Province Geriatric Hospital, Nanjing, China

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ABSTRACT

Objectives: The identification of physical-activity–friendly built environment (BE) constructs is highly useful for physical activity promotion and maintenance. The Physical Activity Neighborhood Environment Scale (PANES) was developed for assessing BE correlates. However, PANES reliability has not been investigated among adults in China.

Study design: A cross-sectional study.

Methods: With multistage sampling approaches, 1568 urban adults (aged 35–74 years) were recruited for the initial survey on all 17 items of PANES Chinese version (PANES-CHN), with the survey repeated 7 days later for each participant. Intraclass correlation coefficient (ICC) was used to assess the test-retest reliability of PANES-CHN for each item.

Results: Totally, 1551 participants completed both surveys (follow-up rate = 98.9%). Among participants (mean age: 54.7 ± 11.1 years), 47.8% were men, 22.1% were elders, and 22.7% had ≥13 years of education. Overall, the PANES-CHN demonstrated at least substantial reliability with ICCs ranging from 0.66 to 0.95 (core items), from 0.75 to 0.95 (recommended items), and from 0.78 to 0.87 (optional items). Similar outcomes were observed when data were analyzed by gender or age groups.

Conclusion: The PANES-CHN has excellent test-retest reliability and thus has valuable utility for assessing urban BE attributes among Chinese adults.

* *Corresponding author*. Nanjing Municipal Center for Disease Control & Prevention, 2, Zizhulin, Nanjing 210003, China. Tel.: +86 25 8353 8305.
** *Corresponding author*. Jiangsu Province Geriatric Hospital, 30 Rd. Luojia, Nanjing 210024, China.
E-mail addresses: xiongyaqingnj@126.com (Y. Xiong), f.xufei@gmail.com (F. Xu).

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Introduction

Sufficient physical activity (PA) has been demonstrated to be of benefit for human health, with subsequent approaches to achieve sufficient PA recommended by specific guidelines.[1,2] Among the numerous influencing factors for PA,[2,5–9] neighborhood built environment (BE) has been shown to be able to exert a long-term influence on residents' PA patterns. PA-friendly BE is of particular importance for people achieving and maintaining sufficient PA at the community level.[2,5] Thus, there is a need to develop easily used and reliable instruments for the assessment of BE within the different cultural, social, and language contexts of specific communities.

Currently, there are several approaches available for identifying those PA-friendly attributes of BE. Such instruments are generally classified into either objective or subjective categories. The typical objective method for assessing BE is via spatial approaches that utilize geographic information system (GIS). However, the high cost involved and complicated technical support limit the use of GIS in wide-ranging population-based studies for public health promotion. On the other hand, self-report questionnaires from community-based epidemiological surveys that collect information on neighborhood BE through residents' perception self-report can be widely used with convenience and relatively low cost. However, these methods need to show evidence of reliability to be of utility.

Fortunately, a brief self-report questionnaire, the Physical Activity Neighborhood Environment Scale (PANES) has been developed for assessing PA-supportive BE (e.g. walking, bicycling in neighborhoods)[10] and demonstrates good test-retest reliability not only in adult sample populations from USA, Sweden, and Nigeria[11–14] but also in an adolescent population from China.[15] Potentially, PANES may be used to measure BE attributes among different age groups and across communities within different cultural contexts.

China, as the largest country with rapid economic development, has been experiencing rapid urbanization with substantial city infrastructure and facilities construction and neighborhood environment modification. In addition, there has been a parallel rise in the burden of disease due to lack of PA among both adolescents and adults.[3,4,16] The broad public health implications for China mean it is vital to identify those population-level PA-friendly BE features, in order that city planners/designers can make good use of those PA-supportive BE attributes that can help residents achieve and maintain sufficient PA in planning city development. Thus, an urgent need is to develop a reliable, brief, and easily used instrument to assess BE attributes for adults in addition to adolescents in China. This study aimed to examine the test-retest reliability of the Chinese version of the PANES (PANES-CHN) among urban adults in regional China.

Methods

Study design and participants selection

This study was a cross-sectional survey implemented between late March and early July of 2017 in Nanjing, one large city in eastern China, which had six urban and five rural/suburban districts and more than eight million regular residents in 2016. China has a specific administrative system, comprising five strata from the top to the bottom as: central government, province/municipality, district/county, administration street/town, and administrative village/residents community. In this study, the survey areas were limited to urban communities and then residents' community was used as the sampling unit.

The eligible participants were urban adults aged 35–74 years old in Nanjing. To maximize our sample's representativeness of general population and warrant, the assessed reliability throughout the entire age range, participants were recruited by eight age groups with the 5-year interval. Furthermore, the number of participants within each age group was required to be the same as possible. It was estimated that approximately 180–200 subjects (men: women = 1:1, approximately) are needed in each age group that enables sufficient statistical power to examine the test-retest reliability of PANES-CHN within each age group. Therefore, the estimated overall participants would be at most 1600.

A multistage sampling approach was applied to choose study participants. First, two from six urban districts were randomly selected. Then, four administrative streets were chosen from each selected urban district. Next, one neighborhood was randomly selected from each participating administrative street, thus resulting in eight neighborhoods. Finally, 180–200 eligible participants were recruited from each participating neighborhood and approximately 22–25 participants were included into each age group.

The information gathered mainly included participant's sociodemographic characteristics, 17 items of PANES-CHN[15] and PA level which was measured using a validated short Chinese version of the International Physical Activity Questionnaire (IPAQ-CHN).[17] There were two rounds of survey conducted to collect information on PANES with a 7-day interval. Only those participants who promised to take part in both surveys were included in the first-round survey. Additionally, body weight and height were objectively measured.

Prior to the first survey, each eligible participant was asked to provide written informed consent for participating in the study. This study was approved by the Academic and Ethical Committee of Nanjing Municipal Center for Disease Control and Prevention.

PANES-CHN

The PANES was originally developed in English and has been professionally translated into Chinese Mandarin (PANES-CHN) in 2015. The PANES-CHN has been examined having acceptable reliability among primary and high school students in China, which has been detailed elsewhere.[15] Briefly, PANES-CHN translation procedure included translation, back-translation, and critical review by an expert panel.

BE measures

There are 17 items included in PANES to describe neighborhood BE features, where a neighborhood specifically refers to a residence area with a 10–15 minute walk distance away