Differences in spatial and temporal characteristics of leisure activity between low-income and non-low-income groups: A case study of Nanjing

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Abstract: Leisure activities play an important role in people’s daily life and are closely related to residents’ physical and mental health. Studies on leisure activities have increased sharply in recent decades. However, comparison studies of leisure activities of residents with different socio-economic attribute have received less attention. Based on an activity diary dataset, this study seeks to examine differences in the temporal and spatial characteristics of low-income and non-low-income groups. The results indicate that the characteristics of leisure activities between the two income groups are significantly different. Compared with non-low-income individuals, low-income individuals have more leisure time available, however, their leisure activities are monotonous in terms of types and geographical distribution. Social policies are suggested to support the equitable distribution of urban leisure resources, especially the low-income communities which are located far from the city center.

1. Introduction
Leisure activity is not only a time arrangement or lifestyle, but also an important indicator to measure the progress of social civilization and the quality of life of residents. After the Second World War, with the development of the civil rights movement and increasing attention to social justice, the differences in leisure activity of residents with various socioeconomic status (such as poor, gender, elderly and disabled) have received more attention. In recent decades, some studies have focused on income differences in leisure behaviour. For instance, Bittman (2002) indicated that low income is one of the main causes of exclusion of leisure participation. Araujo et al. (2013) conducted a survey in a low-income community in the city of Rio de Janeiro, finding low-income young residents have limited resources for leisure activities due to lack of money, time or both.

However, these studies have some limitation. For one thing, the previous studies are mainly selected western cities as case studies. It is known that residents of different countries have various values, cultures and living habits. Therefore, it is necessary to pay attention to residents of other countries other than western countries. For another thing, the dimension of temporal is used as the main research perspective. However, the concept of leisure activity includes not only temporal dimension, but also the dimension of spatial. This study will shed some light on the comparison studies of leisure activities of different income groups. Based on the activity diary dataset, this study adopts an activity-space measure to examine and compare the spatial and temporal characteristics of leisure activities of participants in low-income and non-low-income groups. Furthermore, social policies to enhance social equality will be put forward based on the studies’ findings.
2. Data and method

2.1 Data collection
The study area for this research is Nanjing, which is the political and economic center of Jiangsu Province in East China. The data for this study comes from an activity diary dataset collected through a random sample questionnaire survey in 2017. The survey sample participants from 6 selected neighbourhoods of different geographical locations of Nanjing. Participants whose average personal disposal income equals to or below CN¥2,000 per month are defined as low-income residents, while the other participants whose average personal disposal income above CN¥2,000 per month are defined as non-low-income residents. Ultimately, 774 questionnaires could be used in this study, including 424 from low-income residents and 350 from non-low-income residents. The two-day activity diary recorded a total of 3830 leisure activities, providing detailed spatiotemporal information on individual leisure activities during the two survey days, one weekday (from Monday to Friday) and one weekend day (from Saturday to Sunday).

2.2 Method
Methods of mathematical statistics and spatial statistics are adopted in this comparison studies. On the one hand, ANOVA tests were performed to assess the differences in the temporal characteristics of leisure activity between the two income groups. On the other hand, the kernel density and the standard deviational ellipses (SDE) were used to indicate the geographical spatial distribution of leisure activities of two income groups. For the latter, to be specific, we use ArcGIS to model daily leisure activity space of individuals with different income by an SDE at the 68% confidence interval.

3. Results

3.1 Temporal distribution of leisure activities between the two income groups
The time spent on different types of leisure activities can help us to understand different participants’ accessibility to leisure facilities and the diversity of their leisure activities. Referring to the previous studies, this study classifies leisure activities according to two methods: activity type and activity location. From a type-based perspective, leisure activities can be divided into five types, including physical activities (running, walking, doing radio gymnastics, etc.), cultural entertainment (playing CARDS, watching TV, listening to the radio, reading newspapers or books, etc.), short-distance travel, social activities and surf the Internet. From a location-based perspective, leisure activities can be divided into two categories: in-home leisure activities and out-of-home leisure activities.

Table 1 shows the temporal characteristics of leisure activities of the two income groups. In general, both low-income and non-low-income groups spend more time on leisure activities on weekends than they spend on weekdays. This result is reasonable because of the two-day weekend system. However, there are some differences in how they allocate their leisure time. On weekdays, low-income residents have significantly more leisure time than that of non-low-income residents. This finding differs from the results in western studies, which indicate that low-income residents have allocated less time on leisure activities. It may because in the research samples, there is a much higher percentage of low-income participants are elderly and unemployed. When it comes to the weekends, the situations have some differences. Time spent on leisure activities by low-income and non-low-income participants are 322.8 minutes and 335.6 minutes respectively, indicating that non-low-income have more leisure activities on weekends.

With regard to time-use in different types of leisure activities, low-income residents allocate the most leisure time on culture leisure activities, physical exercise and social activities. However, non-low-income residents spend most time on culture leisure activities, Internet surfing and physical exercise. ANOVA tests indicate that on weekdays, low-income individuals spend significantly more time on cultural leisure activities and social activities than non-low-income residents. When it comes to weekends, compared with non-low-income participants, low-income participants spend more time...
on culture leisure activities but less time on short-distance travel and surf the internet. It worth noting that non-low-income participants spend nearly three times as much time as low-income residents on short-distance travel on weekend. It may because non-low-income residents have more leisure resources, for instance, better economic conditions, higher level of accessibility (because of more car ownership) and more free time on weekends. Therefore, they have ability to travel to distant destinations for some high-end leisure activities, such as soaking in hot springs and visiting the forest park.

Table 1: The time-use in various leisure activities of low-income and non-low-income groups (min)

| Location of leisure activities | Weekday |   | Weekend |   |
|-------------------------------|---------|---|---------|---|
| Type of leisure activities    |         |   |         |   |
| Physical exercise             | 56.32   |   | 61.80   |   |
| Cultural entertainment        | 140.27*** |   | 159.54*** |   |
| Short-distance travel         | 5.98    |   | 10.58*** |   |
| Social activities             | 36.97** |   | 46.24   |   |
| Surf the Internet             | 32.86   |   | 44.67*** |   |
| Out-of-home                   | 113.35  |   | 146.46  |   |
| In-home                       | 159.04*** |   | 176.37  |   |
| Total                         | 272.4*** |   | 322.8   |   |

| Difference from non-low-income group is statistically significant. |
| Difference from low-income group is statistically significant. |
| Significant at the 0.10 level. ** Significant at the 0.05 level.*** Significant at the 0.01 level. |

From the perspective of locations of leisure activity, low-income residents spend significantly more time on in-home leisure activities on weekdays than that of non-low-income residents. The existing studies have proved that the frequency and time-spent of going to outdoor leisure facilities are directly related to residents’ physical and mental health. In this study, low-income residents have more leisure time on weekdays, however, they conduct many leisure activities in their homes, such as watching TV or reading newspapers.

3.2 Spatial distribution of leisure activities between the two income groups

Spatial distribution of leisure activities of low-income and non-low-income participants are shown in Figure 1. Low-income residents’ leisure activities in geographical distribution are different from that of non-low-income residents on both weekdays and weekends. Some low-income residents who live in neighbourhoods close to the city center may have some out-of-neighbourhood leisure activities. However, most of the low-income residents who live in the outer suburb have almost exclusively leisure activities within their neighbourhoods. In general, compared with the non-low-income group, low-income participants’ leisure activities are more likely concentrated in the spaces near their home. The low-income group have a relatively monotonous leisure activity space.

It has been mentioned above that the non-low-income group have less leisure time available than the low-income group on weekdays. However, the non-low-income group have a more diversified leisure activities in spatial distribution, especially on weekends. Non-low-income participants conduct their recreational activities not only in urban centers or sub-centers, such as Xinjiekou CBD, Confucius temple traditional commercial center, and Hexi new town CBD, but also in some parks or scenic spot located in outer suburb.
Space-time agglomeration of leisure activities of the low-income and non-low-income groups is shown in Figure 2. First, the leisure activities of both two income groups are concentrated in the main urban area. In many Chinese cities, most of the urban facilities, such as commercial and recreational facilities, as well as urban parks, are highly concentrated in the main city. In other words, the main city provides a variety of leisure activities and attracts residents in different income groups to participate in leisure activities. Second, the leisure activity space of low-income participants is larger than that of non-low-income participants not only on weekdays, but also on weekends. It may because that there is a large number of low-income residents’ leisure activities concentrated in the suburban communities. Third, the size of SDE of low-income individuals on weekdays and weekends are 161.55km² and 162.28km² respectively, showing the range of spatial distribution of the low-income group on weekdays is similar as that on weekends. However, the size of SDE of non-low-income individuals on weekdays and weekends are 150.99km² and 163.01km² respectively, indicating that non-low-income participants’ leisure activity space on weekends is significantly larger than that on weekdays.
4. Conclusion and discussion

There are some common characteristics in leisure activities among residents with different incomes. For instance, both the two income groups have more leisure time on weekends and spend most leisure time on cultural leisure activities and physical exercise. Their leisure activities are concentrated in the main urban areas. However, there are some differences in both spatial and temporal characteristics of leisure activities between the two income groups. On the one hand, low-income individuals allocate more time to cultural leisure and social activities on weekdays while non-low-income participants allocate more time on short-distance travel and surf the Internet. On the other hand, compared with low-income participants, non-low-income participants conduct leisure activities in a more extended and diversified space, including places around their homes, as well as some places in urban centers, urban parks and suburban scenic spot.

It is widely known that positive and healthy recreational activities play an important role in the daily life of urban residents and maintaining social stability. This study indicates that low-income residents have more daily leisure time available on weekdays. However, due to the low level of accessibility and economic status, low-income residents’ leisure activities are dominated by free activities, such as playing CARDS, chatting and physical exercise in the communities. In other words, low-income residents lack the opportunity to fully enjoy urban leisure resources. Furthermore, the low-income participants may be exclusion in the participation of leisure activities. For instance, compared with non-low-income participants, low-income participants have less opportunities to take part in some “high-level” leisure activities, such as short-distance travel.

Based on the finding in this study, social policies are suggested to improve the diversity and fairness of leisure activities for low-income residents. First, various leisure infrastructure needs to be developed in low-income communities, especially the communities which location are far from the city center. It is because low-income residents are very dependent on the community space to conduct their leisure activities. Second, it is necessary for the local government to improve the public transport facilities around the low-income communities. It is known that low-income residents have a lower capacity to reach distant locations. Convenient public transportation can improve their accessibility to leisure facilities in other parts of the city. Third, community organizations (e.g. juweihui) can carry out some leisure activities, for instance, organizing outdoor activities, opening classes for the elderly, holding a sports meeting, etc., to help low-income residents to make full use of the community facilities and enrich their leisure life.
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