

Article

Association between Park Visitation and Physical Activity among Adults in Bangkok, Thailand

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Abstract: Visiting parks regularly can provide multiple health benefits, including increased physical activity levels. However, empirical evidence connecting park visitation and physical activity in urban settings in Southeast Asia remains scarce. This study explores the association between park visitation and physical activity among adults. A cross-sectional study using a survey questionnaire of 585 respondents in Bangkok, Thailand was conducted. Two binomial logistic regressions (odds ratio = ORs, 95% confidence interval = CI) with park visitation and physical activity level as the dependent variables were employed. We found that park visitation was influenced by individual and neighborhood environment correlates. People with a healthy lifestyle and who lived near parks were more likely to visit parks. We also found that park visitation was a strong predictor of physical activity. People who visited parks were almost four times more likely to meet the 2020 WHO global recommendation for physical activity of 150 min of medium and vigorous physical activity per week. The findings suggested that parks and green spaces are important settings for physical activity. The results of this study can inform policymakers on how to plan and design active environments that are conducive to physical activity and health.

Keywords: public park; physical activity; urban planning; urban landscape; public health



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1. Introduction

Regular physical activity has been acknowledged to have multiple health benefits [1,2]. The recent development of the topic has focused on the importance of the built environment as a setting for physical activity. Land-use patterns, transportation systems, and neighborhood characteristics are essential for encouraging physical activity among different socioeconomic groups [3]. One of the main focuses in the built environment and physical activity studies is how parks can increase the physical activity levels of urban residents. Parks are vital in promoting physical activity in a city, since they can provide equal opportunities for the population to be physically active [4]. In an urban context where public open spaces are scarce, parks offer a unique setting, providing more opportunities for being active, enjoying nature, and social interaction compared to any other type of public infrastructure [5]. Recent discourse on the concept of a 15-min city reiterates the importance of parks and green open spaces in the everyday lives of urban residents [6].

In the literature, visiting parks has been associated with multiple health benefits. In addition to increasing physical activity levels, park visitation also improves mental health and wellbeing [7], reduces crimes and violence [8], increases social interactions, and increases land and property values in the neighborhood [9]. Various determinants influence park visitation. In previous studies, socioeconomic characteristics, such as income and education, race, gender, and physical health, were considered important factors in determining park visitation [10,11]. Adults were more commonly seen in the parks than other age groups,

while higher socioeconomic status and education levels were also positively correlated with a higher frequency of park visitation [12,13].

Studies mostly found positive associations between physical activity and park visitation. People who visited parks were more likely to be physically active and meet the physical activity guideline of 150 min per week, as advised by the World Health Organization (WHO) [14]. Park users were also reported to have a healthier lifestyle than that of the average urban population [15]. The prescription of park visitation interventions was conducted in Singapore and was found to be successful in increasing physical activity [16]. Visiting parks regularly was also found to protect against physical activity decline in older adults [17].

Studies also suggested that neighborhood environmental characteristics are important determinants for park visitation and physical activity. Proximity to parks, population density, neighborhood walkability, street connectivity, crime and safety, and public transportation systems were significantly correlated with park visitation and physical activity [18]. People living in areas with high residential density, walkable street networks, and access to a park within walking distance showed significant associations with park visitation and use of parks for physical activity [19].

Despite the growing interest in the topic, methodological limitations have contributed to contradictory findings in the literature. For example, differences in defining park visitation and how researchers have determined the domain of physical activity or neighborhood environment may lead to different results [20]. Hot and humid climates and seasonality in tropical cities can also reveal different patterns of association between park visitation and physical activity. Studies in Southeast Asian cities found that parks were mainly used during the morning and evening periods due to the hot and humid weather, contrary to park use in European and US cities [21–23]. In addition, most studies examining the association between park visitation and physical activity were conducted in the US, Australia, and Europe, although several investigations linking park use and physical activity in the context of Southeast Asian cities have recently been conducted. For example, a study in Singapore found that park visitation and park use are important determinants of physical activity even in a high-humidity tropical climate [24]. Another study in Indonesia and Thailand found that people living near parks were more likely to visit them and to have a better quality of life [25].

Bangkok has been experiencing a shortage of green open spaces that can provide opportunities for residents to be physically active [26]. Extreme weather events and urban heat islands in the city increase the risk of heat stress and limit the opportunities to be physically active, especially for people living far from green open spaces [27]. A national survey on parks in Thailand found that more than 60% of park users were engaged in moderate to vigorous physical activity (MVPA), and more than 80% of them were adults [28]. This finding indicates that parks and green spaces in Bangkok are essential settings for adults to be physically active.

However, studies on parks and physical activity among adults in Bangkok were primarily conducted using systematic observation, where some crucial variables, such as the sociodemographic characteristics of park visitors and the characteristics of the neighborhood they lived in, were absent in the analysis [29,30]. To address these gaps, the objectives of this study were: (1) to understand the sociodemographic and neighborhood environment correlates of park visitation among adults and (2) to investigate whether park visitation was associated with having a sufficient physical activity level among adults in Bangkok. The results will provide policymakers and relevant stakeholders with a better understanding of the roles of parks in promoting physical activity and a healthy lifestyle in cities.

2. Materials and Methods

We consider this study as cross-sectional research. We used a self-reported survey questionnaire to understand the socioeconomic and neighborhood environment determinants

of park visitation and its associations with the physical activity level of Bangkok residents. A quota sampling design was employed for primary data collection by dividing the city based on the administrative districts. A list of registered households and their addresses was obtained from the Bangkok Metropolitan Administration (BMA) as the sampling frame. We then randomly selected 12 respondents from 50 districts (600 respondents were selected in total). Previous studies employed a similar strategy when obtaining a small number of samples in a high-density urban area to avoid creating a larger bias [31,32]. We recruited a total of ten surveyors to conduct face-to-face interviews with each respondent to ensure a 100% response rate. Respondents were given a token of appreciation for completing the interview. The value of the souvenir was 100 Thai baht (THB) or around 30 US dollars (USD). The questionnaire covered three main sections: the socioeconomic characteristics of the respondents, physical activity and other healthy behaviors, and questions related to the neighborhood environment in which the respondents lived and their park visitation practices. The reliability of the items in the questionnaire was assessed using Cronbach's alpha. Values ranging from 0.78 to 0.93 were found for all items in the questionnaire, which indicated good internal consistency [33]. The survey was conducted from 25 July to 31 August 2019. After data cleaning, 585 responses were included for analysis. The following summarizes the justification of the variables collected for the study.

This study defines parks as public parks managed by the Bangkok Metropolitan Administration (BMA) that can promote physical activity, following the operational definition from previous studies in Bangkok [34,35]. Under this definition, 48 parks were selected for the study and grouped into three types: village parks, community parks, and district parks. Park visitation was defined as whether respondents had ever visited any of the 48 selected parks over the last week. Previous studies used a similar measurement of park visitation to determine its associations with various individual and environmental variables for its simplicity in data collection [36,37].

The neighborhood environment is one of the critical determinants of park use and park visitation [38]. In linking neighborhood environment and park visitation, we collected five proxy variables: park proximity, neighborhood population density, availability of public transport near home, types of parks near home, and perception of neighborhood safety. Park proximity was defined as the time required for respondents to visit the nearest park from their home. We asked the respondents to select one of the three options: "less than 10 min", "10–30 min", and "more than 30 min", following previous studies [39]. Studies found that neighborhood population density was associated with more physical activity [40,41]. To measure this variable, we geocoded the respondents' home addresses and incorporated the district density into their questionnaire responses. Neighborhood safety was considered one of the essential determinants in transportation and leisure physical activity, including park visitation [42]. In this study, neighborhood safety was measured by asking respondents to indicate their agreement with the statement "I feel safe in this neighborhood" and was measured on a 5-point Likert scale (1 = strongly disagree and 5 = strongly agree). For analysis, we dichotomized this variable into "feel safe" and "less feel safe" following previous studies [43,44].

Physical activity level was defined as whether the respondent met the 2020 WHO global recommendation for physical activity of conducting at least 150 min of moderate-intensity physical activity in the last week. The validated Global Physical Activity Questionnaire (GPAQ) was used to assess the days of physical activity in three different domains: at work, transportation, and leisure time in a typical week [45]. We also collected individual correlates acknowledged in the literature to be associated with physical activity, such as health behavior (whether the respondents had non-communicable diseases (NCDs), were regular smokers, and consumed alcohol regularly), as well as individual-level sociodemographic characteristics (income, education, gender, marital status, and body mass index (BMI)) following previous studies [46,47].

We used univariate descriptive statistics to describe the socioeconomic and neighborhood environmental characteristics of the sampled respondents. For the analysis, we

employed two multivariable logistic regression models (odds ratio = ORs, 95% confidence interval = CI). The first model was the park visitation model. The dependent variable for this model was whether respondents visited parks in the last week, and it was dichotomized into “visited parks in the last week” and “did not visit parks in the last week”. This model addressed the first research question on the individual and neighborhood characteristics that influenced park visitation. The second model was the physical activity model, where the dependent variable was the ‘sufficient physical activity level’ measured using the GPAQ. The 2020 WHO global recommendation on physical activity and health stated that adults aged 18–64 years should do at least 150–300 min of moderate-intensity aerobic physical activity [48,49]. Using this definition, we dichotomized the GPAQ responses into a binary variable of ‘meeting physical activity recommendation (more than or equal to 150 min per week)’ and ‘not meeting physical activity recommendation (less than 150 min per week)’. The second model helped answer the second question of whether visiting the park could contribute to having sufficient physical activity levels. Both models were adjusted for the influence of all confounding variables. All data in this study were analyzed using IBM SPSS Statistics 24 software.

3. Results

Table 1 summarizes the characteristics of the respondents from the survey. More than 45% of respondents reported having a monthly income of 10,000–30,000 THB. More than half of the respondents were adults (54.0%), and 59.0% of the respondents were female. More than 60% of respondents reported being single and having a normal BMI (77.3%). More than 65% of respondents reported living more than 30 min from the park, and only 10.5% of respondents lived near district parks. Almost half of the respondents (49.2%) reported having sufficient physical activity levels.

Table 1. Characteristics of respondents from the survey.

Category	Variable	Sample Characteristics
Socioeconomic characteristics	Monthly income	
	Less than 5000 THB (less than 160 USD)	30.6%
	5000–10,000 THB (160–300 USD)	8.2%
	10,001–30,000 THB (300–1000 USD)	45.6%
	30,001–50,000 THB (1000–1600 USD)	9.6%
	>50,000 THB (>1600 USD)	6.0%
	Education	
	High school or less	47.3%
	High school to bachelor’s degree	46.7%
	More than bachelor’s degree	6.0%
	Gender	
	Male	44.1%
	Female	55.9%
	Marital Status	
	Single	63.9%
Living with partner	36.1%	
BMI		
25 or less	77.3%	
>25	22.7%	
Health behavior	Regular alcohol consumption	
	Yes	11.3%
	No	88.7%
	Regular smokers	
	Yes	9.9%
	No	90.1%
Having non-communicable diseases (NCDs)		
Yes	9.9%	
No	90.1%	

Table 1. Cont.

Category	Variable	Sample Characteristics
Neighborhood environment	Park proximity	
	less than 10 min	10.8%
	10–30 min	21.0%
	more than 30 min	68.2%
	Neighborhood population density	
	Low	23.8%
	Medium	16.0%
	High	60.2%
	Perception of neighborhood safety	
	Feel safe	13.0%
	Less feel safe	87.0%
	Availability of public transport near home	
	Yes	41.7%
No	58.3%	
Physical activity level	Types of parks near home	
	Village Park	38.6%
	Community Park	50.9%
	District Park	10.5%
Sufficient physical activity level	Meet PA guideline	49.2%
	Did not meet PA guideline	50.8%

Table 2 presents the associations of park visitation with socioeconomic and neighborhood environment variables. After adjusting for potential confounders, the bivariate logistic regression model showed several patterns. Park visitation increased with education (high school to bachelor's degree: OR = 1.885, more than bachelor's degree: OR = 4.359, $p < 0.05$). We found no association between park visitation and monthly income or marital status. Female respondents were less likely to visit parks compared to men (OR = 0.4359, $p < 0.05$). Healthy behaviors of the respondents were generally significantly associated with park visitation. People living in areas with higher neighborhood densities were less likely to visit parks, and people living near larger parks were more likely to visit parks.

Table 2. Association between park visitation and personal and neighborhood characteristics.

Category	Variable	OR	95% CI
Socioeconomic characteristics	Monthly income		
	Less than 5000 baht	ref	
	5000–10,000	1.335	0.596–2.992
	10,001–30,000	1.365	0.817–2.281
	30,001–50,000	1.199	0.519–2.766
	>50,000 baht	0.580	0.193–1.737
	Education		
	High school or less	ref	
	High school to bachelor degree	1.649 *	1.059–2.568
	More than bachelor degree	3.718 *	1.130–12.229
	Gender		
	Male	ref	
	Female	0.485 *	0.302–0.780
Marital Status			
Single	ref		
Living with partner	1.087	0.517–2.298	

Table 2. Cont.

Category	Variable	OR	95% CI
Health behavior	BMI		
	>25	ref	
	25 or less	1.630	0.930–2.020
	Regular alcohol consumption		
	Yes	Ref	
	No	1.401 *	1.179–1.900
	Regular smokers		
	Yes	Ref	
	No	4.966 *	2.258–10.921
Having non-communicable diseases (NCDs)			
Yes	ref		
No	2.211 *	1.929–5.261	
Neighborhood environment	Park proximity		
	less than 10 min	Ref	
	10–30 min	0.387 *	0.136–0.643
	more than 30 min	0.515 *	0.250–0.902
	Neighborhood population density		
	Low	ref	
	Medium	0.540	0.249–1.174
	High	0.594	0.267–1.321
	Perception of neighborhood safety		
	Less feel safe	ref	
	Feel safe	2.104 *	1.874–4.735
	Availability of public transport near home		
No	Ref		
Yes	1.694 *	1.090–2.633	
Types of parks near home			
Village Park	ref		
Community Park	1.533 *	1.015–1.933	
District Park	1.658 *	1.289–2.524	

Note: 2loglikelihood = 616.802, chi-square = 144.505, * = $p < 0.05$.

Table 3 summarizes the associations between park visitation and physical activity. The respondents who visited the parks in Bangkok were almost four times more likely to meet the WHO physical activity recommendations (OR = 3.917, $p < 0.005$). Physical activity level was not associated with income or marital status. Healthy behaviors of the respondents were found to be significantly associated with physical activity (did not consume alcohol regularly: OR = 1.947, $p < 0.05$; not a regular smoker: OR = 1.623, $p < 0.005$; did not have NCDs: OR = 1.936, $p < 0.005$; BMI 25 or less: OR = 2.311, $p < 0.05$). Physical activity level was also significantly associated with neighborhood environment correlates (perception of neighborhood safety: OR = 2.705, $p < 0.005$; availability of public transport near home: OR = 1.387, $p < 0.05$; community park near home: OR = 1.291, $p < 0.05$; district park near home: OR = 1.591, $p < 0.05$).

Table 3. Association between park visitation and physical activity level.

Category	Variable	OR	95% CI
Socioeconomic characteristics	Monthly income		
	Less than 5000 baht	ref	
	5000–10,000	0.778	0.484–2.409
	10,001–30,000	0.630	0.351–1.130
	30,001–50,000	0.803	0.322–2.003

Table 3. Cont.

Category	Variable	OR	95% CI
	>50,000 baht	0.571	0.188–1.730
	Education		
	High school or less	ref	
	High school to bachelor degree	1.516	0.916–2.510
	More than bachelor degree	0.551	0.199–1.529
	Gender		
	Male	ref	
	Female	0.667	0.287–0.752
	Marital Status		
	Single	ref	
	Living with partner	1.217	0.719–2.060
Health behavior	BMI		
	>25	ref	
	25 or less	2.311 *	1.035–5.160
	Regular alcohol consumption		
	Yes	Ref	
	No	1.947 *	1.687–3.260
	Regular smokers		
	Yes	Ref	
	No	1.623 *	1.271–2.432
	Having non-communicable diseases (NCDs)		
	Yes	ref	
	No	1.936 *	1.417–2.100
Neighborhood environment	Park proximity		
	less than 10 min	Ref	
	10–30 min	0.688 *	0.134–0.905
	more than 30 min	0.750 *	0.369–0.523
	Neighborhood population density		
	Low	ref	
	Medium	0.654	0.280–1.527
	High	1.184	0.501–2.799
	Perception of neighborhood safety		
	Less feel safe	ref	
	Feel safe	2.705 *	1.754–4.170
	Availability of public transport near home		
	No	Ref	
	Yes	1.387 *	1.193–2.271
	Types of parks near home		
	Village Park	ref	
	Community Park	1.291 *	1.129–2.649
	District Park	1.591 *	1.367–3.318
	Park visitation over the last week		
	No	ref	
	Yes	3.917 *	2.441–6.288

Note: 2loglikelihood = 543.191, chi-square = 239.852, * = $p < 0.05$.

4. Discussion

This study examined the sociodemographic and neighborhood environment correlates of park visitation among adults and whether they contributed to the physical activity levels of Bangkok residents. We found two major findings from this study. First, park visitations in Bangkok were generally associated with sociodemographic and neighborhood environment correlates. Gender was a significant correlate of park visitation. In our study, female respondents were 46% less likely to visit parks for physical activity. In previous studies, safety was cited as one of the main reasons for why female users were less likely

to visit parks and green open spaces in urban areas [50,51]. The healthy behaviors of respondents were also significant in explaining park visitation [52,53]. Respondents who reported not consuming alcohol and cigarettes regularly were 1.4 and 4.9 times more likely to visit parks, respectively. A similar finding was found with respondents with normal BMI and with no NCDs.

Most neighborhood environment correlates were found to have significant associations with a park visit. The variables of the types of parks near home were found to be significant, indicating that park size is somewhat important in determining park visits. In other words, the bigger the park, the more people can visit and engage in physical activity. Proximity to the park had a significant positive association with park visits. However, in many cities, including Bangkok, not everyone can have the privilege of park proximity due to the increased land values and conversion of green space for commercial and residential uses. A study in Bangkok found that perceived accessibility is more important than proximity in determining park-based physical activity [54]. The significant association of the availability of public transport near home supports this argument that improving access to parks and green spaces will be a better option for developing green spaces for physical activity in Bangkok. The neighborhood density variable was not significant in determining park visits. This was probably because Bangkok already has a low number of green space areas per person, and existing parks serve not only people in the district, but also the whole city. Another plausible explanation was that we used district population density as a proxy to measure the neighborhood density, and each district in Bangkok had a relatively similar value.

Secondly, after adjusting for individual and neighborhood environment correlates, we found that park visitation was a strong predictor of physical activity. Respondents who visited parks were almost four times more likely to have sufficient physical activity levels. This reiterates the argument that parks and green open spaces are among the most important places for urban residents to engage in physical activity [15,55]. Previous studies in Bangkok showed that more than 60% of park visitors were engaged in light or moderate to vigorous physical activity [26,35]. It also supported the argument that a park with a larger area, better features, and better accessibility would have more visitors and more people engaged in physical activity [56]. In Bangkok, where there is not enough green open space per capita, parks have to serve more users than their designated capacities. This finding implies that there is a need for Bangkok to increase the number of parks and green spaces and improve the qualities of the existing ones to better support physical activity promotion. Neighborhood safety, park proximity, and availability of public transport near home were significantly associated with physical activity levels. One of the plausible explanations is that these variables are commonly used to measure neighborhood walkability, which promotes walking and physical activity in general [46]. It underlines the importance of the neighborhood environment in providing opportunities for physical activity. Further investigation is required to understand the relationship between neighborhood walkability and physical activity in Bangkok.

This study tried to expand the understanding of how parks and green open spaces can contribute to physical activity. The strength of the study includes the use of individual and neighborhood environment correlates in establishing the associations between park visitation and physical activity levels, which, to our understanding, has never been done in Bangkok or other Southeast Asian cities. However, some limitations exist in this study. First, this is a cross-sectional study with a small sample size representing the adult population in Bangkok. Studies with a larger sample size covering not only adults, but also children, the elderly, and those with physical impairments are needed to determine the robustness of the results. Secondly, we cannot be sure that park visitation directly causes the improvement of individual physical activity levels. Interpreting causality requires a more rigorous research method. Future research should also be directed toward quantifying the contributions of parks to different domains of physical activity, such as transportation, work, and recreation. Using longitudinal data for different seasons with larger sample sizes

and a better probabilistic sampling method may provide a clearer picture of how parks can contribute to physical activity and human health in general.

5. Conclusions

This study examines the association between park visitation and physical activity levels among adults in Bangkok, Thailand. In general, the findings were consistent with the previous studies conducted in other countries. We found that park visitation was associated with individual and neighborhood correlates. We also found that park visitation was a strong predictor for adults in meeting the global physical activity recommendation of 150 min of medium and vigorous physical activity per week. Our study contributes to a growing literature on how parks and green open spaces can contribute to physical activity and health. We empirically demonstrated that visiting parks could be beneficial for urban residents to be physically active. This study adds to the emerging literature on the active environment in Southeast Asian cities. The results of the study can inform national and local policymakers on how to plan and design active environments that are conducive to physical activity and health. At the national level, this study can benefit the Ministry of Public Health of Thailand as fundamental information for establishing national recreational-physical-activity-related policies and campaigns to promote a healthy lifestyle. At the local level, the study can provide supporting evidence for the Bangkok Metropolitan Administration (BMA) in expanding green-space-related policies and plans to create a healthier and more livable Bangkok.

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