ELDERLY PERSPECTIVES OF EXERCISE WITH OUTDOOR FITNESS EQUIPMENT

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Abstract

This study examined Thai elderly's perspectives regarding exercise with outdoor fitness equipment (OFE) and assessed their fitness. Participants were 20 Thai seniors, aged over 60 years. This was a mixed method in which the qualitative data were collected via observation, semi-structured interview and stimulated recall, then were inductively analyzed using content analysis and triangulated across the three data collecting methods. Results indicated that the participants chose the public parks close to their residence together with convenient transportation to avoid traffic congestion in the city. They expected to have good health, to socialize and to have fun. They engaged with 4-5 exercise machines per visit. The favorite outdoor fitness machines for males were (1) lat pull down, (2) ski walker, (3) air walker, and (4) chest and reverse fly, whereas the females preferred to exercise with (1) air walker, (2) elliptical cross trainer, (3) surfboard and (4) shoulder wheel. They were displeased with their fitness scores since quantitative data showed that some fitness parameters were in low categories compared to Thai elderly norms. The male body mass index (BMI) was in the overweight type whereas the female was normal. Further, the dynamic balance, leg strength, and cardiovascular endurance mean scores of both genders were in low categories. In conclusion, participants enjoyed working out with OFE and perceived that they were quite healthy because they had no information about the norms. The fitness scores, however, helped them to realize that their fitness levels were lower than the norms. Thus, findings were useful for them to begin working on the at risk items so that they could improve their health and live independently as long as possible.

Keywords: older adults, outdoor fitness equipment, fitness, mixed method

Introduction

The global senior population has rapidly increased since birth rate has decreased and people are living longer. Older adults (aged over 60) in Thailand reached 19 % of the entire population in the country in 2021 (Foundation of Thai Gerontology Research and Development Institute or TGRI, 2022). Physical activity engagement decreases while people increase in age which results in health problems, such as chronic diseases, osteoporosis, cardiorespiratory disease, diabetes, and cognitive impairment (Thai Health Literacy Promotion Association or THLA, 2019; Thygerson and Larson, 2006). Promoting older adults to participate regularly in physical activity helps improve their functional fitness and allows them to live independently without care givers.

Functional fitness is important for seniors in order for them to perform daily activity independently, such as bathing, walking, stair climbing, eating, and cooking, (THLA, 2019). Functional fitness includes several items, such as balance, strength, cardiorespiratory endurance, flexibility as well as body composition, and the simple methods to assess these parameters are recommended (Jone & Rikli, 2002). The measurement scores allow individuals to be more aware of their fitness levels and may lead them to develop an activity program to enhance the low scores or at risk parameters. Without fitness assessment data, older adults whom exercise regularly may assume that they are healthy.

Public parks are places where people come to exercise and socialize with friends. Installation of outdoor fitness equipment (OFE) is one strategy to elevate physical activity levels because people in all age groups visit parks, including older adults (Cohen et al., 2010; Cohen et al., 2012; Sami et al., 2020). Researchers found that OFE installation helped increase numbers of people visiting parks compared to those without OFE, and during peak-hours, in the morning and late afternoon, older adults and females used outdoor exercise equipment more than people in other age groups (Chow et al., 2017; Cohen et al., 2012). Further, there was the need of public open space for strength, cardiorespiratory endurance and balance training since the number of older adults has increased (Kershaw et al., 2017). On the contrary, Copeland et al. (2017) found that installation of OFE in a low population density city, might not have as great an impact on increasing physical activity as it does in the high density city. How the installation of OFE in public parks in Bangkok, a dense population city with 5,501,651 residents (2,576,618 males and 2,925,033 females), impacts senior users is unknown because there is lack of investigation (Environment Department, Strategy and Evaluation Department, 2022; The Bureau of Registration Administration, 2022).

Different groups of people visited parks, such as children, adults as well as seniors and they used different types of OFE (Chow, 2013; Cohen et al., 2010). Somnil (2021) indicated that a two-way waist twisting and a bicycle machine were the most preferred equipment among users at Udorn Thani Parks, Thailand. However, Chow et al. (2017) reported that the air walker and triple arm stretch machines were popular stations at Xihu Park, Taiwan. Further, Cohen et al. (2012) found that the most often used machines were dual pendulum and the ski machines whereas the least used machines were the leg curl and horizontal bars. Since users prefer some equipment over the others, more of those OFE receiving the highest rates of use should be installed.

Since there are many types of outdoor fitness machines, each station helps enhance different fitness parameters. Thus, users have to purposely select them (Levinger et al., 2021). For instance, the air walker, leg press, waist twister and shoulder wheel stations can increase cardiorespiratory endurance, strength, balance and flexibility, respectively (Chow et al., 2021). However, due to the lack of understanding about program setting and

exercise principles, such as frequency, intensity, time, and type of activity or FITT knowledge, users may not gain enough health benefits (ACSM, 2018; Rikli & Jones, 2013).

Studies related to health benefits of park fitness equipment focused in several aspects but not many researchers addressed issues relevant to senior perspectives and their physical fitness levels, particularly in big city parks. Thus, this study was conducted to address this gap, using both qualitative and quantitative approaches. The purpose was to examine elderly users' perceptions related to OFE at two inner city parks in metropolitan Bangkok, Thailand, and to assess their functional fitness. Findings will be useful for policy makers and park administrators in organizing the space and installing OFE to have greater impact on the health benefits for users, including older adults.

Objectives

The purpose was to examine elderly users' perceptions related to OFE at two inner city parks in metropolitan Bangkok, Thailand and to assess their functional fitness.

Methods

Ethic committees

This research was approved by the Human ethics committee from the Strategic Wisdom and Research Institute of Srinakharinwirot University. The certificate code was SWUEC-G-419/2563E.

Population and Sample

Based on observation data collected in the morning (6:00-8:00 am) and evening (4:00-6:00 pm), we found that the majority of seniors using OFE at Lumpini Park were females, and Buengsikan Park were males. Therefore, we recruited 20 senior participants, 10 males from Buengsikan Park, (ME 1-10) and 10 females (FE 11-20) from Lumpini Park for this case study research. Twenty elders would be an appropriate number in order for researchers to gain understanding about their perceptions and to keep qualitative data manageable. The inclusion criteria included individuals whom (1) were aged over 60 years (2) exercised at least 3 days a week with 3 years experience of using OFE or a combination of OFE with other physical activities, (3) reported no history of knee injury for the past 6 months, and (4) completed the Physical Activity Readiness Questionnaire+ (PAR-Q+, Thai version) (THLA, 2019) to identify if they were healthy enough to perform a functional fitness test. They all signed consent forms and volunteered to participate in this case study. The exclusion criteria were elders who received medical conditions during data collection (August-October, 2021) or experienced difficulties in performing any of the functional fitness test items. The ME abbreviation represents male elderly, (ME 1-10) and FE stands for female elders (FE 11-20). Socio - characteristics of participants in each group are presented in Table 1.

Table 1 Participants Characteristics (N = 20)

Items	Beungsrikan Park (x =63.90 yrs.) Male (Mean ± SD)	Lumpini Park (x =61.70 yrs.) Female (Mean ± SD)
1. Age (yrs.)	63.90 ± 2.13	61.70 ± 1.34
2. Weight (kg.)	79.90 ± 19.85	56.20 ± 8.08
3. Height (cm.)	168.50 ± 8.68	153.80 ± 3.36
4. Years of exercise at the park (yrs.)	5.70 ± 2.41	4.30 ± 1.83
5. Exercise frequency (days/week)	4.90 ± 1.60	3.70 ± 0.82
6. Park exercise duration (mins.)	63.50 ± 14.92	54.00 ± 8.43
7. OFE exercise duration (mins.)	26.50 ± 10.29	23.50 ± 7.47
8. Types of exercises OFE + 1*, 2*, 3*	OFE+1*, 2*, 3*	OFE+1*, 2*, 3*

Note: 1*, 2*, 3* (1. walking, 2. jogging, 3. other physical activity)

Case study of two public parks in Bangkok, Lumpini and Buengsikan

Lumpini, developed in 1925, is a 97-year old public park in Bangkok, Thailand, that covers 576,000 square meters of land that is open 7 days a week, from 4:30 am in the morning to 10:00 pm at night. Daily park users number about 11,800 during weekdays and 13,500 on weekends (Environment Department, Strategy and Evaluation Department, 2022). Walking and jogging pavement are provided in the park as well as space for individual and group activities, such as tai chi, aerobic dance, yoga and so on. A swimming pool, indoor gymnasium, fitness center as well as tennis and badminton courts are accessible. Water activities, such as water cycle, water bike, pedal boat, kayak and stand up paddle board are also provided. There are a few fitness zones with different numbers of OFE, ranging from 10-50 machines. This park is located in a dense population area, easy to access with several kinds of transportation, such as subway, sky train, buses, cars and motorcycles. Parking lots are available but they may not be sufficient because of the many users each day, particularly in the morning and evening.

Buengsikan, developed in 2008, is a 15-year old community park covering 81,600 square meters of land, located close to Don Mueang International Airport. Buengsikan public park is open 7 days a week, 24 hours a day. There are about 560 daily park users (Laksi District Office, 2020). There are approximately 30 OFE located in the park. Parking spaces are provided for users. Most users ride motorcycles to the park. Most physical activities in both parks are free of charge, with only a few activities that users have to pay for, such as swimming and water activities. Due to the larger size of Lumpini Park, there are more individual and group physical activities offered than at Buengsikan Park.

Instruments

Qualitative data were collected through observation, semi-structured interview and a stimulated recall with photos technique. Quantitative data were collected using 8-foot-up-and-go test, 30 second chair stand, 2 minute step up and down, chair sit and reach test and body mass index. (The Bureau of Sports Science, 2019).

The 8-foot-up-and-go test begins with a person getting up from a sitting position, walking 8 feet (2.44 m), turning and walking back to a seated position. A 30 second chair stand requires full stands in 30 seconds with arms across the chest. The 2 minute step test starts when an individual raises each knee to midway between the

patella and the top of hip bone in 2 minutes. Score is the number of times that the right knee reaches the precise height. A chair sit and reach test is measured from sitting position on the chair, with a leg extended and hands reaching toward the toes. The number of centimeters (- or +) between the fingers and tip of the toes is recorded. Body mass index is a person's weight divided by the height^2, (kg/m^2).

Data collection and analysis

Qualitative data collection and analysis

Data were collected through observation, semi-structured interview and a stimulated recall with photos technique. Each participant was observed at least 2-3 times while working with OFE, focusing on types of equipment selected and the length of workout time with each OFE. Interview questions dealt with reasons to visit the park, health benefits and factors involved with using OFE, as some examples shown in the interview guide below. For the stimulated recall with photos used in this study, the participants were asked to bring 8 photos of OFE, 4 that they gained more benefits from and 4 that they experienced difficulties in using. The authors watched the photos with one participant at a time and asked him or her a few questions related to each photo (Carter et al., 1988; Supaporn, 2007). Examples of questions included the following: explain the fitness equipment in the photos; describe how you operate each fitness machine from the beginning to the end of your workout, such as how many repetitions and for how long?; and what benefits do you gain from that equipment?

All data collection methods were pilot tested and revised before using to collect data. The observation field notes, interview transcriptions and stimulated recall transcriptions were inductively analyzed and searched for relevant themes and categories, regarding participants' views of using the public park and OFE. Trustworthiness was established through the triangulation (Lincoln and Guba, 1985; Supaporn, 2007).

An interview guide (Example of interview questions)

1. Please tell me 2-3 reasons why you choose to visit this park.
2. What are your goals of working out at this park?
3. Please describe the routine of your exercise session at the park from the beginning to the end.
4. If you have a program plan for your exercise, what principles do you take into consideration for program planning?
5. Explain the advantages of exercise with OFE.
6. Choose 4-5 favorite outdoor fitness machines that you like to use for your workout. Why do you choose those?
7. List 2-3 barrier factors of using OFE and describe in more detail.
8. What are the physical fitness items that you usually measure?
9. Which norms do you choose in order to compare each fitness parameter?
10. Are you satisfied with your fitness test results? Why or why not?
11. If you can make changes to help you gain more benefits as a park user, what would that be?

Quantitative data collection and analysis

Five functional fitness parameters were assessed, including (1) dynamic balance, (the 8-foot-up-and-go test), (2) strength (a 30 second chair stand), (3) cardiorespiratory endurance, (the 2 minute step up and down), (4) flexibility, (a chair sit and reach test), and (5) body mass index (BMI) (Jones & Rikli, 2002). Mean scores and standard deviation were calculated and compared with Thai male or female norms in accordance to their mean

ages, 63.90 years for male, and 61.70 for female (see Table 1).

Results

Qualitative results

Findings from qualitative data indicated seven themes and some categories which related to public parks and OFE users' perceptions as well as functional fitness assessment. Examples of themes and quotations are listed next.

Themes and supportive quotations (Male elders are labeled ME 1 through 10 and female elders are labeled FE 11 through 20.)

1. Reasons to select the park: nearby to house location, convenient transportation.

FE 18 "Traffic congestion is a big problem in Bangkok. Lumpini park is close to my house and easy to travel to. I walk to the park. I don't have to worry too much about the traffic jam, particulary in early morning and evening."

2. Goals of exercise at the park: to improve health, to socialize with friends, to have fun.

ME 1 "I want to develop my physical and mental health, to meet my friends sometimes, and to enjoy myself. The day that I exercise with friends, we walk and talk. Then, we choose OFE nearby to each other if possible, so that we can talk and workout at the same time. It's more enjoyable than the day that I exercise alone."

FE 19 "Millions of people live in Bangkok, it's kind of crowded everywhere. When I come to the park and walk in the green environment, I feel so relaxed and gain good health as well."

3. Exercise routines: walk and exercise with OFE, 10-40 reps. for strength, flexibility and balance machines, 3-25 min. for aerobic stations, same intensity.

FE 16 "I usually walk a few minutes then exercise with 4-5 outdoor fitness stations."

ME 8 "Normally, I use each machine once, then move to another equipment. For strength machines, I do 20 times. For aerobic machines, I stay on 4-5 minutes or longer if no one is waiting to use it".

4. Supportive factors of using OFE: Choices of OFE to improve different fitness parameters.

ME 6 "If I walk, I use my legs, doing the same thing over and over. It's kind of boring. OFE have many stations that challenge me to work on the entire body, like shoulders, arms, and legs. I can entertain myself better than doing one exercise for a long period of time."

FE 14 "I like the shoulder wheel station because I can relieve my shoulder stiffness and get better flexibility."

ME 7 "Working with the leg press machine, my leg gets stronger than last year."

5. Barrier factors related to exercise with OFE

5.1 Safety concern of broken machines

FE 12 "Some of the OFE do not work properly, like one peddle of the bicycle is broken and the seat is torn off. Some machines are dusty and noisy when I use them so I decide to change to another station".

5.2 Lack of good cleansing and maintenance

ME 3 "Many people use elliptical cross trainer machines so some of them do not work properly. These machines will last longer with good cleaning and preservation."

FE 16 "Each day from dawn to dusk, many people use OFE at Lumpini park, so now some stations are broken. Good maintenance is called for."

5.3 Imprecise instruction of how to operate each machine

ME 5 "I need good instructions on how to use each machine, with bigger letters and photos. Sometimes I forget my eye glasses and I can't read the small letters."

5.4 Bad weather

FE 20 "Some days, like a rainy day, it's not safe for me to use the wet fitness machines".

5.5 Long waiting time for aerobic endurance equipment

ME 4 "I always see many people line up and wait very long to use aerobic machines like an air walker because people use them so long, like 15-20 minutes. It's kind of boring that everyone has to wait. Some days, I don't feel like waiting, I go walking instead."

FE 15 "The park officers should have information about which are the popular machines and buy more of those. Thus, people will have a chance to work with their favorite ones."

5.6 Lack of knowledge about designing exercise program and assessing functional fitness

FE 14 "I don't know how to plan the program for myself, to gain better strength, endurance or even to control my weight. I really want to learn. The video workshop is good because anyone can watch the video several times."

ME 9 "This is the first time that I have measured my fitness and compared it to the norm. The fitness norms should be posted somewhere so everyone can see them"

FE 17 "I don't know how to prepare my physical activity program and to do fitness tests. There should be instructors going around the park so that I can ask them."

6. Favorite OFE

The four favorite OFE for males were (1^{st}) lat pull down, (2^{nd}) ski walker, (3^{rd}) air walker, and (4^{th}) chest and reverse fly, whereas the females preferred to work with (1^{st}) air walker, (2^{nd}) elliptical cross trainer, (3^{rd}) surfboard and (4^{th}) shoulder wheel. As shown in Figure 1.

ME 3 "A ski walker is similar to the air walker on which I can move both arms and legs to boost my endurance so that I don't get tired easily during the day."

7. Displeased with functional fitness scores

FE 19 "I think that I am pretty healthy and I never measure fitness. I am disappointed to know that my physical fitness scores are low. That's a surprise!"

ME 5 "I am kind of upset with the test scores. I have no idea why all of my scores are below the norms because I have continued my workout for years. There should be trainers or instructors to bike around the park so that I can ask them."


(A)


(B)


(C)


(D)

lat pull down | ski walker | air walker | chest and reverse fly




(E) air walker | (F) elliptical cross trainer | (G) surfboard | (H) shoulder wheel

Fig. 1 Favorite OFE for males (A-D) and females (E-H)

Quantitative results

Five parameters of functional fitness of males and females are shown in Table 2 and Table 3 and norms for Thai older adults aged 60-64 are also presented for comparison with the mean scores of physical fitness items (The Bureau of Sports Science, 2019).

Table 2 Male functional fitness scores (x = 63.90 years)

functional fitness parameters	Mean ± SD	Norms (60-64 years)		
		Low	Normal	Good
1. 8-foot-up-and-go test (sec.)	6.92 ± 1.49 (low)	> 5.6	3.8-5.6	< 3.8
2. 30 sec. chair stand (times)	15.20 ± 2.90 (low)	18 - 22	23 - 27	28 - 32
3. 2 minute step up and down (times)	72.90 ± 11.60 (low)	72 - 91	92 - 111	112 - 131
4. Chair sit & reach test (cm.)	-0.90 ± 4.95 (low)	-1	0	1
5. BMI (weight/height^2, kg/m^2)	27.81 ± 4.65 (over wt.)	25.72-30.21***	21.20-25.71**	15.64-21.19*

Body Mass Index (BMI) * = thin, ** = normal, *** = over weight

Table 3 Female functional fitness scores (x = 61.70 years)

functional fitness parameters	Mean ± SD	Norms (60-64 years)		
		Low	Normal	Good
1. 8-foot-up-and-go test (sec.)	6.20 ± 0.77 (low)	> 6.0	6.0 – 4.4	< 4.4
2. 30 sec. chair stand (times)	17.20 ± 6.49 (low)	16 - 20	21 - 25	26 - 28
3. 2 minute step up and down (times)	61.80 ± 16.73 (low)	65 - 86	87 - 107	108 - 129
4. Chair sit & reach test (cm.)	2.50 ± 3.03 (good)	-1	0	1
5. BMI (weight/height^2, kg/m^2)	23.70 ± 4.14 (normal)	25.91-30.57***	21.11-25.90**	15.82-21.10*

Body Mass Index (BMI) * = thin, ** = normal, *** = over weight

Discussion

The main reasons for choosing to exercise at public parks in Bangkok were the location nearby their residences and the convenient transportation to avoid the traffic congestion, which is similar to findings reported earlier (Ibiapina et al., 2017; Somnil, 2021). Senior users enjoyed their workout and the opportunity to socialize as well as to obtain health benefits (Chow, 2013).

Users' physical activity routines began with walking/jogging on the pavement 25-35 minutes, followed by spending 20-30 minutes on 4-5 OFE stations. They performed 10-40 repetitions (2-4 minutes) on the strength, flexibility and balance machines and spent 4-20 minutes on the endurance machines, exercising with constant intensity. This is similar to an earlier report that found users spent less than 5 minutes operating each OFE station and less than 9 minutes for all machines (Chow et al., 2017). Further, users observed others' OFE operation and developed their exercise methods for themselves. Thus, the guidelines of exercise testing and prescription can be applied for OFE users, such as, a few sets of 8-12 repetitions for strength training with 30 seconds rest in between, or 30-60 minutes of moderated intensity for aerobic endurance exercise (ACSM, 2018; The Bureau of Sports Science, 2019).

The main supportive factor of OFE exercise was the choices of physical activity offered in which users can maintain/gain different parameters of fitness. The six categories of barrier factors to using OFE included (1) safety concern of broken machines, (2) lack of cleansing and maintenance system (3) imprecise instruction of how to operate each machine, (4) bad weather, (5) long waiting time for aerobic endurance equipment and (6) lack of knowledge on designing their exercise programs as well as assessing the functional fitness.

The first-four barriers were found in other studies and the guidelines to overcome barriers on using OFE were also recommended (Levinger et al., 2021; Veitch et al., 2021). The last two categories, however, were different. Researchers suggested strategies to encourage park visitors to use more OFE, such as advertising, introducing exercise programs at equipment setting by trainers and improving equipment quality and maintenance (Copeland et al., 2017; Hunter et al., 2015). In contrast, this study found that there were too many participants waiting in the rows to use outdoor exercise machines, particularly the cardiorespiratory stations. The solutions may be to install more aerobic machines since they are easy to operate and users stay on these stations quite long.

The last barrier factor, lack of knowledge on designing their exercise programs as well as assessing the functional fitness, may be accomplished by creating videos focused on the topics of designing a physical activity program, assessing functional fitness and comparison with norms. A recent study found that users learned to operate OFE better with a video rather than by the image and written board instructions. (Gutierrez-Santiago, 2022).

The four preferred OFE for males were (1st) lat pull down, (2nd) ski walker (3rd) air walker and (4th) chest and reverse fly, whereas the females preferred to work with (1st) air walker, (2nd) elliptical cross trainer, (3rd) surfboard and (4th) shoulder wheel. Similar to previous studies, users had their own favorite fitness machines, such as a two-way waist twister, a bicycle machine, air walker, triple arms stretch, ski walker and dual pendulum (Chow et al., 2017; Cohen et al., 2012; Somnil, 2021).

Participants were not satisfied with the functional fitness parameters since quantitative results indicated that the body mass index mean score of male seniors was classified as over weight type but the female was normal (The Bureau of Sports Science, 2019). Further, the female flexibility was in good level but the male was in low category which is similar to other studies that found females had better flexibility than males (Mason et al., 2016; TGRI, 2022). Although participants engaged in a combined program of OFE and other physical activity at the parks at least 3 days a week over 3 years or longer, the balance, leg strength and cardiovascular endurance mean scores of both genders were in low categories. These users may need a well planned program to achieve the lower fitness parameters since Aksay (2021) found that well designed online programs helped improve balance, strength, cardiorespiratory endurance and flexibility of both male and female seniors. Further, the

younger seniors (60-64) fitness performance progressed better than the older groups (Choudhary, 2020). Thus, how to design an individual exercise program is important in order to help older adults set goals and try to improve the low score items. Similarly, Chow et al. (2021) found that using park endurance machines with moderate intensity could help seniors achieve cardiovascular endurance, but the improvement of strength, balance and flexibility parameters were not consistent. Further, the inadequate exercise intensity and duration may be due to the lack of knowledge and the crowd in OFE zones (Chow et al., 2017). Knowledge of how to design an exercise program, how to assess fitness and identifying the type that is normal or in the at risk group is therfore necessary.

Conclusions

Participants perceived that exercise with OFE improved their fitness levels and they assumed that they were quite healthy. Unfortunately, after assessing their functional fitness, they realized that some items needed more improvement. The functional scores did not seem to match with their assumptions. Thus, they called for personal trainers or instructors at the park to help them design proper exercise programs and gain more health benefits.

Suggestions

1. Park administrators should install more OFE machines that are frequently used by park visitors.
2. Park officers or instructors should offer knowledge about assessing physical fitness, comparing to norms, and designing exercise programs for park users, including older persons.
3. Conducting a workshop related to how to improve physical fitness parameters of users, particularly older adults, is crucially needed.

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