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Development of physical activity model of the elderly

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Abstract

The purpose of this research was to develop a physical activity model. The research instruments included a questionnaire and a focus group. Content analysis was conducted to analyze a physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province. Analytical statistics used was Pearson's product-moment correlation coefficient at a significant level of .05 and descriptive statistics used included frequency, percentage, mean, and standard deviation of factors relating to physical activities of the elderly. The socio-demographic data factors were analyzed for correlation with physical activities and sedentary behavior of the elderly. The findings revealed that:

1. Sex and age were negatively correlated with sedentary behavior, while income was positively correlated with sedentary behavior.
2. Status and health condition were positively correlated with recreational activities, while health condition was positively correlated with highly intense work activities.
3. Enabling factors (free time, equipment, and facilities) were negatively correlated with recreational activities and had a negative correlation with highly intense work activities.

The results that were divided into two aspects: 1) propriety standard with community characteristics, and 2) feasibility standard for implementation. It was found that the model is most suitable with the average of 88.80 and standard deviation of 0.95. It indicates that the physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, using a participatory process, is appropriate and can be practically applied to the elderly.

Keywords: model development, physical activity, elderly, sedentary behavior

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1. Introduction

The world's elderly population is currently increasing, as announced by a United Nations report [1] which predicts that the world's population will increase to 9.7 billion by 2050, or within the next 30 years, and may increase by nearly 11 billion by the year 2100. The world's population is on its way to becoming an elderly society as a result of a longer life span, medical technology advancements, and lower birth rates in many countries. According to the data, the birth rate has decreased from 3.2 births per woman in 1990 to 2.5 births per woman today and could reach as low as 2.2 births per woman by 2050. Accordingly, it demonstrates that many countries are entering a completely elderly society.

According to the census data of the National Statistical Office and the population estimates of the Office of the National Economics and

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Social Development Council from 1960-2030, Thailand has been transitioning into an elderly society since 2005 because of the population over 60 years old, which accounts for 10.4 percent of the total population. Furthermore, Thailand is expected to enter the "Aged Society" between 2024 and 2025, increasing the proportion of the elderly population while the proportion of those of working age tends to decrease. Research by the [2] showed that an aging society may affect economic growth either through a decrease in the quality and quantity of labor, a slowdown in household consumption in the future, or the deterioration of the financial stability of Thai households.

The changes when entering the elderly are numerous which could be the functioning of the cardiovascular system, nervous system, musculoskeletal system, or joints. These changes are all caused by the deterioration of various systems resulting in the occurrence of chronic diseases that necessitate ongoing care for the elderly as well as having an impact on the elderly's quality of life. As a result, it is important to address the issue of the elderly. One way to solve the problem with minimal budget and maximum benefit is to improve one's health through regular physical activities.

Physical Activity (PA) is one of those activities that is critical to the health and well-being of the elderly. By doing this, the muscles move back and forth causing the use of more energy while resting. When performed daily, various movements help reduce the risk of disease and promote better health. It is significant for the prevention of serious chronic diseases that affect the elderly, such as coronary artery disease and ischemic stroke [3]. Physical activities that move the body on a regular and continuous basis, at a moderate level, have the potential to slow the progression of chronic diseases and reduce the incidence of heart disease by 20-25% [4]. According to the 2015 population physical activity survey, Thailand had a total of 10,330,314 elderly people and 10,281,014 with insufficient physical activities or sedentary behavior, representing 99.52 % of the population and tending to have increased sedentary behavior. Insufficient physical activities not only affect one's health but also affect the economy, society, and quality of life.

There are six communities in Lat Ya Subdistrict Municipality, Kanchanaburi Province, and Wat Thung Lat Ya Elderly School was established in 2018. According to the report dated September 23, 2019, there are 1,112 male and female senior citizens between the ages of 59 and 120 in the school.

Lat Ya Municipality is located in Mueang Kanchanaburi District. It is also a tourist route that leads to various tourist attractions. Therefore, it is a diverse community. There are villagers, government officials, and a large number of tourists in the area. There is growth in various areas of the community and a greater need for various factors among the people. However, the study discovered that there was no data used to promote health through physical activities among the elderly in that area.

Consequently, the research team is interested in developing a physical activity model among the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province. Green and Kreuter's PRECEDE model [5] was used as a conceptual framework for the study aiming to improve the well-being of the elderly leading to a good quality of life and a good role model for other communities.

2. Literature Review

Thailand has been an aging society since 2005 and it is predicted that in the next 20 years, Thai society will become a completely aging society. By definition, the elderly means people aged 60 years and over [6]. It is the age that people are retired from work. The physical condition has changed to deterioration physically, mentally and socially, and there are reduced social roles and occupational activities [7].

The World Health Organization [8] defines physical activity as physical activity caused by the work of muscles requiring the use and metabolism of energy. The Department of Health, Ministry of Public Health, stated that physical activity can be divided into four categories: occupation, housework, travel, and leisure activities that occur in daily life. The level of physical activity can be divided into four levels [9] as follows. Sedentary behavior is an activity that does not physically move. This includes sitting and lying down (sleeping is not counted). Low physical activity is the movement that is less exerting focusing on activities that leave one feeling less tired, and it is a movement that occurs in everyday life. Moderate intensity is an activity that causes moderate fatigue while doing activities. One

can still speak in sentences, sweat, or if the heart rate is measured, there will be a pulse level between 120-150 beats per minute. Vigorous Intensity makes one feel very tired when moving the body. It continuously repeats the activity with the use of the major muscles, and while doing activities, one cannot speak in sentences and feels short of breath. If the heart rate is measured, there will be a pulse level of 150 beats per minute or more. Good health-promoting behaviors must be practiced continuously. The factors related to the behavior are divided into three groups: predisposing factor which is the basis causing motivation, enabling factor, which is a system or favorable resource, and reinforcing factor which is the stimulus contributor [10].

Making the community see the importance of personal development from the process of participation of ideas will drive various actions. It is necessary to have a conclusion of the ideas from [11,12,13,14,15]. It was synthesized into five steps: participation in conceptual adjustment, participation in surveys, participation in physical activity promotion planning, participation in action, and participation in monitoring and evaluation.

3. Objectives

Main objective

To develop a physical activity model for the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province.

Sub-objective

To study factors relating to elderly physical activities in Lat Ya Subdistrict Municipality, Kanchanaburi Province.

4. Conceptual Framework

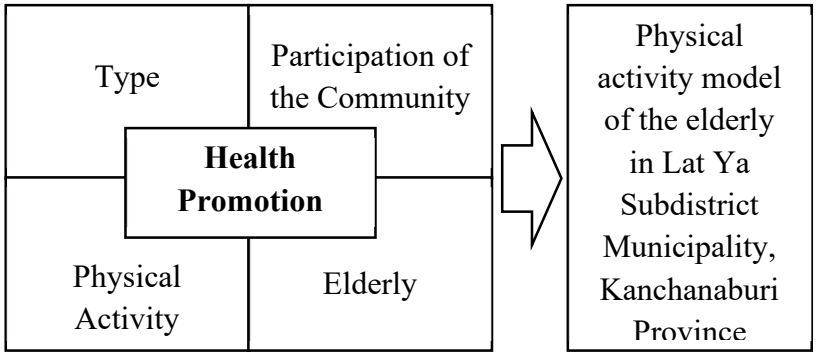

Figure 1 Conceptual framework development of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province.

5. Research Instruments

1. The World Health Organization's Global Physical Activity Questionnaire (GPAQ) [16].

2. A questionnaire on factors relating to physical activities of the elderly in Lat Ya subdistrict municipality, Kanchanaburi province with the alpha coefficient of the entire questionnaire at 0.71.

3. Focus group with the Item-Objective Congruence (IOC) of 0.93

6.Methods

This research is a study of "The Development of Physical Activity Model of the Elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province." It is a quantitative and qualitative research model or a mixed method aiming to examine factors relating to physical activities and develop a physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province with a participatory process. In this study, the research team presented the findings in three phases as follows:

Phase 1: Preparing work before researching physical activities and factors relating to physical activities of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province.

For data collection, the team coordinated with related people the area, scheduled a meeting to clarify details, objectives, sequences, and methods of conducting

research, including agreements during the research, interviewed research participants, and evaluated health condition.

Phase 2: Developing the draft of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, with a participatory process. For data collection, the team coordinated with related people in the area, scheduled a meeting to clarify details, objectives, sequences, and methods of conducting research, including agreements during the research. The focus group included 5 academic experts, 1 director of the social welfare division, 1 school principal, 3 leaders of the elderly club, and 3 elderly people. The draft of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province was developed.

Phase 3: Examining the physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province.

For data collection, the team consulted with experts, clarified research objectives and procedures, and answered any additional questions. In addition, we explained the evaluation criteria to experts, and after receiving assistance, an appreciation letter was sent.

7. Data Analysis

Complete, accurate, and accomplished questionnaire data were processed by using package software and analyzed by using the following methods.

1. Analysis of the correlation between socio-demographic data, i.e., sex, age, education level, status, income, health condition, and the elderly's physical activities by using analytical statistics and Pearson's product-moment correlation coefficient at a significant level of .05.

2. Analysis of the correlation between predisposing factors, enabling factors, reinforcing factors, and the elderly's physical activities by using analytical statistics and Pearson's product-moment correlation coefficient at a significant level of .05.

8. Research Instruments

1. Global Physical Activity Questionnaire: GPAQ [17].

2. A questionnaire on factors relating physical activities of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, with the alpha coefficient of the entire questionnaire at 0.71.

3. Focus group with the Item-Objective Congruence (IOC) of 0.93

This research has been approved by Kanchanaburi Rajabhat University Research Ethics Committee, Institute of Research and Development COA No.018/2564.

9. Results

Phase 1

Complete, accurate, and accomplished questionnaire data were processed by using package software and analyzed by using the following methods.

1. Analysis of the correlation between socio-demographic data, i.e., sex, age, education level, status, income, health condition, and the elderly's physical activities by using analytical statistics and Pearson's product-moment correlation coefficient at a significant level of .05.

2. Analysis of the correlation between predisposing factors, enabling factors, reinforcing factors, and the elderly's physical activities by using analytical statistics and Pearson's product-moment correlation coefficient at a significant level of .05.

Table 1 Correlation coefficient between socio-demographic data, i.e., sex, age, education level, status, income, health condition, and the elderly's physical activities and sedentary behavior.

Factor	Physical Activity				Sedentary behavior
	Work activity		Round trip	Recreational activity	
	Highly intense	Moderately intense			
Sex	r = 0.02	r = 0.03	r = -0.06	r = 0.09	r = 0.50**
	Sig. = 0.94	Sig. = 0.85	Sig. = 0.76	Sig. = 0.62	Sig. = .004
Age	r = 0.16	r = 0.14	r = 0.21	r = -0.00	r = -0.39*
	Sig. = 0.40	Sig. = 0.45	Sig. = 0.25	Sig. = 0.99	Sig. = 0.032
Education	r = -0.19	r = -0.22	r = -0.04	r = -0.14	r = 0.17
	Sig. = 0.30	Sig. = 0.23	Sig. = 0.81	Sig. = 0.47	Sig. = 0.35
Status	r = -0.24	r = 0.09	r = -0.27	r = .63**	r = -0.32
	Sig. = 0.20	Sig. = 0.61	Sig. = 0.15	Sig. = 0.000	Sig. = 0.87
Income	r = -0.01	r = -0.03	r = 0.096	r = -0.127	r = 0.48**
	Sig. = 0.95	Sig. = 0.89	Sig. = 0.606	Sig. = 0.50	Sig. = 0.006
Health condition	r = 0.45*	r = 0.15	r = -0.107	r = 0.596**	r = -0.05
	Sig. = 0.010	Sig. = 0.43	Sig. = 0.568	Sig. = 0.000	Sig. = 0.775

** $p < .01$. * $p < .05$

From Table 1, the analytical results of the correlation coefficient between socio-demographic data, i.e., sex, age, education level, status, income, health condition, and the elderly's physical activities and sedentary behavior showed that:

Sex was negatively correlated with sedentary behavior at a significant level of .01 (r = 0.004). Age was negatively correlated with sedentary behavior at a significant level of .05 (r = 0.032). Income was positively correlated with sedentary behavior at a significant level of .01 (r = 0.006).

Status was positively correlated with recreational activities at a significant level of 0.1 (r = 0.000). Health status was highly and positively correlated with physical activities at a significant level of 0.5 (r = 0.010), and positively correlated with recreational activities at a significant level of 0.1 (r = 0.000).

From Table 2, the analytical results of Pearson's product-moment correlation coefficient between factors affecting physical activities revealed that:

Attitude enabling factor was negatively correlated with highly intense work activity at a significant level of .01 (r = -0.53) and it was negatively correlated with recreational activities at a significant level of .05 (r = -0.43).

Table 2 Correlation coefficient between predisposing factors, enabling factors, and reinforcing factors with the elderly's physical activities and sedentary behavior.

Factor	Physical Activity				Sedentary behavior
	Work activity		Round trip	Recreational activity	
	Highly intense	Moderately intense			
Knowledge predisposing factor	r = -0.03 Sig. = 0.88	r = -0.14 Sig. = 0.45	r = 0.06 Sig. = 0.76	r = 0.15 Sig. = 0.41	r = 0.00 Sig. = 1.00
Attitude enabling factor	r = -0.53** Sig. = 0.002	r = -0.17 Sig. = 0.38	r = 0.05 Sig. = 0.81	r = -0.43* Sig. = 0.02	r = -0.16 Sig. = 0.94
Information reception reinforcing factor	r = -0.23 Sig. = 0.21	r = -0.19 Sig. = 0.30	r = -0.04 Sig. = 0.84	r = -0.14 Sig. = 0.44	r = -0.22 Sig. = 0.24

** $p < .01$. * $p < .05$

Phase 2

The draft of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, was developed using a participatory process from the literature review and focus group.

1. Literature review

The analytical results from the concept of [18,19,20,21,22] were synthesized into five steps as follows:

1. Conceptualization participation is good publicity for the community to see the importance of personnel development and to have the concept and vision in the same direction.

2. Survey participation is a study of community contexts, lifestyles, environmental resources, local wisdom, and learning resources in the community.

3. Promoting physical activity participation is to invite people in communities, local administrative organizations, community leaders, and related agencies or networks to attend meetings to plan physical activity promotion.

4. Action participation is to implement the work plan by using the local wisdom to create the curriculum, and inviting people in the community as lecturers to educate the elderly.

5. Participation in evaluation and benefit is the establishment of a monitoring committee comprised of many parties, i.e., individual, family, and community, or surveying feedback from the public. This evaluation is important because it will have an impact on benefit allocation decisions, termination, or retention, including policy or project improvements.

2. Focus group

The analytical results from the focus group indicated that the physical activity model is as follows:

Step 1: Conceptualization participation

The community recognizes the importance of personnel development to have the same concept and vision by organizing meetings to clarify objectives and inviting a lecturer to educate along with organizing practical activities.

Step 2: Survey participation

Community contexts, lifestyles, resources, environment, local wisdom, and learning resources are explored in the community.

Step 3: Physical activity promotion participation is to invite people in communities, local administrative organizations, community leaders, and related agencies or networks to attend meetings to plan physical activity promotion.

Step 4: Action participation is to implement the work plan by using local wisdom to create the curriculum and inviting people in the community as lecturers to educate the elderly.

Step 5: Participation in evaluation is the establishment of a monitoring committee comprised of many parties, i.e., individual, family, and community, or surveying for feedback from the public. This evaluation is

important because it will have an impact on benefit allocation decisions, termination, or retention, including policy or project improvement.

Factors affecting participation and success are as follows:

1. The leaders' enthusiastic and strong community commitment

2. Having kinship which is long-lasting social capital

3. The community environment, which is conducive to living together in the community

4. Shared local wisdom within the community

5. The community has a mechanism that facilitates activities or learning together

6. Having a shared belief in the community that health is everyone's responsibility to help one another

7. Government and private sector promotion and support

8. Having appropriate health promotion innovation for the elderly in the community

9. Having stable status and good health condition affecting physical activities

Obstacle factors are as follows:

1. Sex, age, status, income, and health condition affect the intense level of physical and recreational activities, as well as sedentary behavior.

2. Attitude enabling factors affect the intense level of physical and recreational activities.

3. Event participation time due to the pandemic situation and the economic downturn of households, especially during the year 2021, reduces travel and refrains people from social activities, affecting sedentary behavior.

4. Mental states, such as feeling tired, wanting to rest, and boredom, affect physical activities and sedentary behavior.

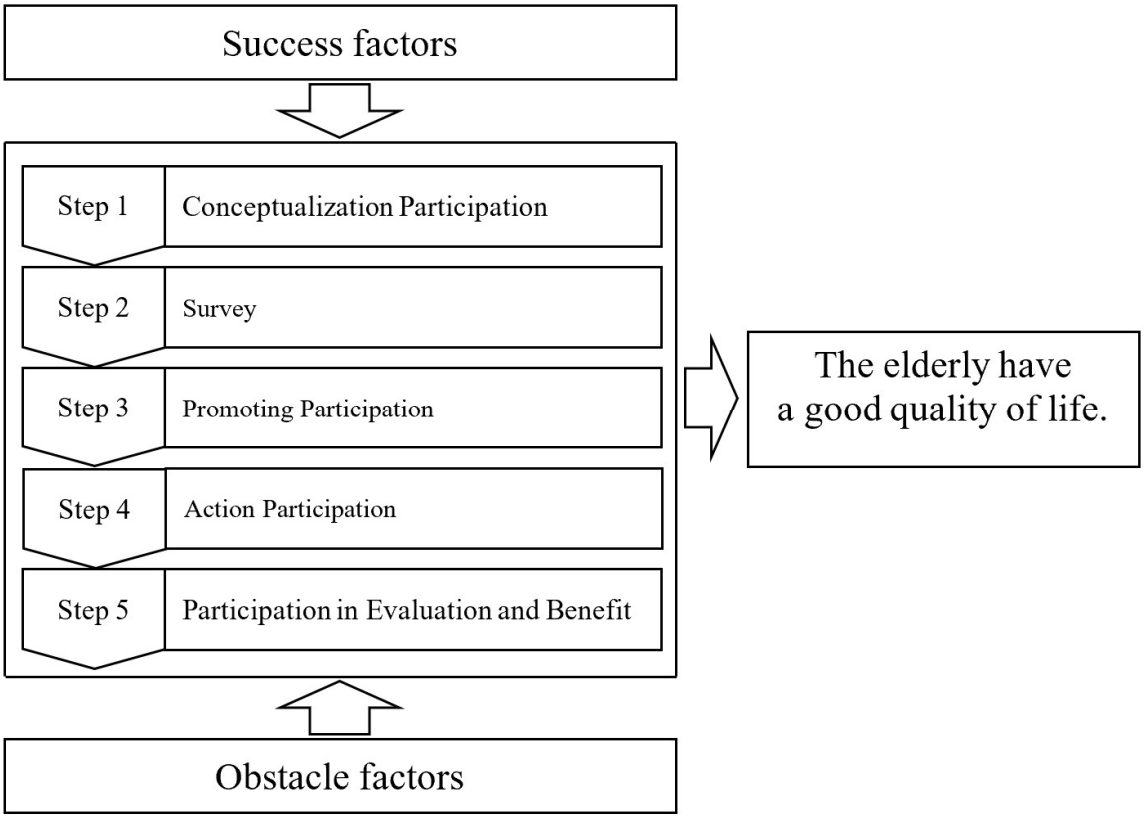

Figure 2 The draft of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, using a participatory process

Research results in phase 3 examined a draft of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, using a participatory process.

The researcher evaluated the model by using data from a qualitative assessment of a physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, with a participatory process. The study was divided into two aspects: 1) propriety standard corresponding to the nature of the community, and 2) practical feasibility. It was found that the quality of participation model in physical activities of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, was at the highest level. The mean was 88.80, and the standard deviation was 0.95. This showed that the model of participation in physical activities of the elderly was appropriate and could be applied to the elderly. The details are as follows:

In terms of the propriety corresponding to the community, experts agree that the physical activity model of the elderly is appropriate to meet the needs of people in the community. It provides opportunities for people in the community to participate in activities, create a sense of responsibility, and build unity in the community. In addition, selected physical activities also help to promote the preservation of Thai arts and culture in the community.

In terms of practical implementation, experts agree that the physical activity model of the elderly is a model that is easy and convenient to use. Physical activities can be used for exercise to promote one's health. People can have time to exercise, and the equipment used is appropriate and easy to find. Most importantly, there is a clear user manual that can be used in practice.

10. Discussion

Point 1: Factors relating to physical activities of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, showed that:

Most of the samples were female, elderly, married, having an elementary education, and engaged in physical activities at a low level (high level of sedentary behavior). This was because most of them were at home and had a moderate level of daily activities and low level of other activities. This probably resulted from the natural decline in performance, which was an obstacle to physical activities causing most of the elderly to sit around and watch TV. The findings are consistent with the study of [23], showing that fewer physical activities were mostly found in females, the elderly, those who did not study or attend primary school, and those who did not work. It could be explained based on the conceptual framework of the transition theory [24], stating that sex and age were factors of personal conditions and a predictor of the transition or whether it is going to pass easily or not. Physical activity is an important factor in slowing the deterioration of organs. Therefore, physical activities for the elderly must be promoted.

Income positively correlated with sedentary behavior can explain why elderly people with good incomes will have more knowledge and understanding of healthcare and better practices to reduce sedentary behavior. This is consistent with the study of [25], which found that those with different incomes had different healthcare behaviors. High-income groups tend to have better healthcare behaviors than low-income groups.

Status was positively correlated with sedentary behavior and recreational activities. It can be explained that the elderly who live with their spouses have consultations to promote healthcare and encourage each other to do recreational activities regularly. This is consistent with the study of [26], showing that the elderly with different marital statuses had different health behaviors.

Health condition was positively correlated with recreational activities and highly intense work activities. This may be because most of the samples' body mass index was not highly excessive, and they had normal pulse rate, normal blood pressure, an annual health check-up, no illness requiring hospitalization in the past year, and a good level of information reception. This indicated that the samples had a good health condition. This may be because the elderly stay with their children. When they are ill, they are cared for with love and concern. Their children also encourage them to seek knowledge about health and do recreational activities. This is consistent with a study by [27], which found that most caregiver relatives had a positive quality of relationship between caregivers and care receivers, including a feeling of intimacy and satisfaction among each

other in situations where both parties interact under supervision.

Enabling factors were negatively correlated to recreational activities and highly intense work activities. This is consistent with the study of the elderly by [28], which found that resources that support exercise for health (location, equipment, and time) of the elderly in Ban Suan Municipality, Chonburi Province, were not correlated to exercise behavior. This may be caused by the fact that the elderly had insufficient knowledge about physical activities or did not understand how to use those materials. The equipment may be inadequate, not convenient, or require a lot of force which is not suitable for the elderly. The organization of environment that is conducive to physical activities would help the elderly to have more physical activities [29].

Point 2 : The development of physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, using a participatory process found that:

Physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province with a participatory process included five key processes and two factors affecting participation. Every step and factor is important and is a continuous process. It makes the community truly and sustainably participate. This is in accordance with the concept of [30], stating that the heart of sustainable development lies in the members of the community gathering as a community of learning, having knowledge, and making it beneficial. This knowledge is in line with a study by [31] and [32] that applied a participatory process to acquire a model and guideline from the actual needs of the elderly.

Point 3: Examining the draft model of physical activity of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, using a participatory process found that:

In terms of propriety corresponding to the community, experts agree that the physical activities of elderly people in Lat Ya Subdistrict Municipality, Kanchanaburi Province, with a participatory process, are appropriate and meet the needs of people in the community and allow them to participate in activities. This creates a sense of responsibility and unity in the community. In addition, selected physical activities also help to promote the preservation of Thai arts and culture in the community. This is consistent with [33], who studied community participation in health promotion for the elderly. It was found that community participation will make the elderly very cooperative and enthusiastic, create a fun group atmosphere, and achieve objectives. Participation in decision-making, planning, and joint health promotion increases self-esteem in the community, and follow-up is conducted within the community so that the activities can become sustainable.

In terms of the feasibility of implementation, experts agree that a physical activity model of the elderly in Lat Ya Subdistrict Municipality, Kanchanaburi Province, makes participation processes simple and easy to implement. Physical activities can be used to promote one's health, while exercise time and equipment used are appropriate and easy to find. Most importantly, there is a clear and practical manual. This is consistent with the ACSM [34] that physical activities for the elderly should be in line with daily activities or lifestyles. It should also be easy to do by oneself, challenge, promote agility, prevent falls, and be suitable for the physical condition of the elderly.

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