



The development of activity program for enhancing physical fitness and quality of life of the elderly

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Abstract

This study aimed to develop and evaluate the effectiveness of an activity program in enhancing the physical fitness and quality of life for the elderly. The methods included: 1) The program development is based on Pender's Health Enhancing Theory and Protection Motivation Theory. The program's quality is assessed by examining the IOC. 2) The program's effectiveness was assessed by using 60 purposively selected elderly who volunteered and passed the Inclusion criterion. The data were collected three times: before the experiment, after the experiment 4 weeks and 8 weeks, and were analyzed by means, standard deviation, ANOVA with repeated measures, post hoc multiple comparisons Scheffe and t-test at the statistical significance level of 0.05. The research findings were as follows: 1) The development of the activity program consisted of 8 different activities: self-assessment, knowledge of the elderly, recreation for health, aerobic exercise, exercise using elastic, yoga, relaxation, and group counseling. The eight activities had an aggregate IOC of 0.96. 2) The effectiveness of the activity program development found that the average scores of physical fitness and quality of life of the experimental group and control group were significantly different at .05 levels after the 4th week and 8th week. The research findings reveal the effectiveness of the activity program for enhancing physical fitness and quality of life of elderly progressive conditions.

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Introduction

At present, various sources have indicated that Thailand is experiencing a rapid transition into an aging society, with the number and proportion of the elderly population increasing at a rapid rate. (National Statistical Office, 2022)

Thailand's current statistics indicate a growing elderly population. According to the 2021 survey conducted by Foundation of Thai Gerontology Research and Development Institute [TGRI] (2021), there were 13,358,751 elderly people (60 years and over), or 19.6 percent of the total population, divided into 5,974,022 males,

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(44.7%) and 7,384,729 females (55.3%). This represents an increase compared to previous surveys conducted in 1994, 2014, and 2017, which reported proportions of elderly people of 6.8, 14.9, and 16.7 percent of the total population, respectively. The data show a consistent rise in the percentage of elderly people, leading Thailand to transition into the period known as “The Aged Society”.

The increasing rate of elderly people has a profound impact on social and family structure, self-care practices, and quality of life. According to the survey conducted by the Ministry of Public Health in 2019, it was found that only 3.3 percent of elderly people reported having excellent physical health, while 12.4 percent evaluated their health as poor (Ministry of Public Health, 2019).

The major problems of elderly people are physical fitness and quality of life, caused by many physical changes that affect the functioning of various organs, such as muscle strength, muscle endurance, flexibility, endurance of the cardiovascular system, and body composition.

According to the 2020 Thai Elderly Health Survey (Department of Health, Ministry of Public Health, 2020), it was revealed that only 37.80 percent of elderly people indicate positive health behaviors, such as daily exercise, abstinence from smoking and alcohol consumption, while 95 percent of the elderly people, or 9.2 million people, suffer from a range of illnesses. The study also revealed that 50 percent of elderly people suffer from overweight or obesity, which exacerbates their difficulty in walking. Therefore, it is necessary to create an appropriate health care and quality of life system, wherein the Ministry of Public Health endeavors to foster healthy behaviors among elderly people that are within the control. This will greatly help to reduce illnesses in order to have a quality population.

There are concepts for developing activity programs to promote physical fitness and quality of life for elderly people. The theoretical concepts that form the basis for developing activity programs are a crucial consideration. From studies, it has been found that the health promotion theory of Pender’s theory (Pender, 2006) is appropriate for changing lifestyles to promote one’s own health, emphasizing the use of knowledge to design activities or plans for people to change behavior and be able to act accordingly. Pender’s Health Promotion Model is one of the most widely used models to change unhealthy behaviors and promote health. Predicting factors and explanatory constructs of health behavior in Pender’s model include perceived benefits, barriers, and self-efficacy; behavioral emotions; and interpersonal

and situational influencers. The various constructs have been introduced as the strongest predictors of self-care behaviors in recent studies (Hsuan & Pei, 2021). The reason for emphasizing the use of Pender’s Health Promotion Model is because this model explores, from a theoretical perspective, the factors and relationships that contribute to participation in health promotion activities to enhanced health and quality of life among older adults. In addition, the theory of motivation to prevent disease (Roger, 1975) is a theory that will encourage elderly people to change their behavior by emphasizing the perception of dangers, the effects of having undesirable health behaviors, and the acceptance of the effectiveness of promoting the avoidance of risky behaviors.

From the situation in Thailand, there are an increasing number of elderly people and physical fitness problems, as well as the lack of promotion of the quality of life of the elderly. As a result, the researcher is interested in applying Pender’s theories of health promotion and motivation to prevent disease. Including related research results, they were analyzed and synthesized to develop activity programs to promote physical fitness and the standard of living for elderly people in order to effectively promote self-care behavior related to physical fitness and quality of life among the elderly.

Methodology

Participants

This study is conducted as experimental research, and the detailed methodology employed is described as follows. The activity program was conducted with elderly people aged 60–70 years in the Na Phu Subdistrict Elderly School, Udon Thani Province, Thailand, who were chosen by purposive sampling and were selected based on the following criteria: (1) aged between 60–70 years; (2) male or female; (3) living in Udon Thani Province; and (4) having the potential and the ability to join activities, including sufficient body movement and ability to perform daily routines. The group of elderly people were subjected to physical fitness tests and quality of life tests, and only 60 participants were included in this experiment. Then, the elderly were randomly divided into two groups: the experimental group ($n = 30$) and the control group ($N = 30$). From this stage, no significant differences were observed in the pretest scores for physical fitness or quality between the experimental group and the control group ($p > .05$). Only the experimental group attended the activity program.

Tests

The initial test, which was a specific physical fitness test designed for elderly people, was derived from the Department of Physical Education (2013) and included the following: (1) The 30 Second Chair Stand Test to assess the strength and endurance of the leg muscles; (2) The Sit and Reach Test to measure the flexibility of the lower back and back of the thighs; (3) The 2 Minute Step Up and Down Test to assess the endurance of the heart and circulatory system; (4) The Agility Course Test to assess agility and ability to balance while moving; (5) The Skinfold measurement is a measurement of body fat percentage with the thickness of the fat layer combined with the skin. The test demonstrated strong content validity, concurrent validity, and reliability, developed based on related research and literature, and the IOC was rated by 5 experts as 1.00. Quality of life tests by the World Health Organization (WHOQOL-BREF-THAI) (Ministry of Public Health Department of Mental Health, 2002) demonstrated high validity and reliability with the IOC evaluated by 5 experts as 0.96.

Ethics

The development of an activity program, informed by Pender's Health Enhancing Theory and Protection Motivation Theory, received an approval from the Ethics Committee of Chulalongkorn University. The written consent forms were gathered from all participants.

Activity Program Based on Pender's Health Enhancing Theory and Protection Motivation Theory

The development of an activity program, informed by Pender's Health Enhancing Theory and Protection Motivation Theory, was divided into five phases. The initial phase involved the theories, frameworks, and studies on physical fitness and quality of life for elderly people to build the activity program. The theories and literature which were collected from the initial phase were analyzed into a concept, an activity, and an evaluation in the second phase. Later, the activity program was assessed for the content validity by five experts. The health promotion program entered its experimental phase once the index of congruence met its standard.

Data Analysis

All the data from the tests were collected in 3 phases: pre-experiment, during the experiment, and post-

experiment and were analyzed using the Statistical Package for Social Science (SPSS). A comprehensive verification process or double checking was carried out to ensure the accuracy of all data. The results of applying the activity program were evaluated both before and after the interventions. Evaluations of physical fitness and quality of life in the experimental group- before, during, and after participating in the activity program were conducted using one-way ANOVA with repeated measures. Comparisons of physical fitness and quality of life scores between the control group and the experimental group were performed using an independent samples t-test. All the statistics were considered to have a p value $< .05$, indicating statistical significance.

Results

The development of activity program based on Pender's Health Enhancing Theory and Protection Motivation Theory

The activity program is based on Pender's Health Enhancing Theory and Protection Motivation Theory for enhancing the physical fitness and quality of life of the elderly people. The program includes eight activities: 1) self-assessment, 2) knowledge of the elderly, 3) recreation for health, 4) aerobic exercise, 5) exercise using elastic, 6) yoga, 7) relaxation and 8) group counseling. This activity program conforms to the quality control criteria established by the experts, as evaluation by its index of congruence (IOC) of 0.96. The activity program lasted for a period of eight weeks. [Table 1](#) presents the objectives of eight activities.

The Results of Applying the Developed Activity Program Based on Pender's Health Enhancing Theory and Protection Motivation Theory for Enhancing Physical Fitness and Quality of Life of the Elderly

The basic statistics of physical fitness and quality of life of the elderly between the experimental group and control group are shown in [Table 2](#).

To determine whether the variances in mean physical fitness and quality of life scores in the experimental group and the control group were different at the time before the experiment, 4 weeks after the experiment, and 8 weeks after the experiment, the researcher performed a One-Way ANOVA with repeated measures analysis of variance as shown in [Table 3](#).

Table 1 The Objectives of Eight Activities in The Activity Program Based on Pender's Health Enhancing Theory and Protection Motivation Theory

Activity	Objective of activity
1. self-assessment	To allow the elderly to evaluate themselves, analyze the causes of their health, find solutions based on the causes and know how to record information correctly and appropriately.
2. knowledge of elderly	To provide the elderly with correct knowledge and understanding about health care behavior and reduce risky behavior in the elderly, create motivation to take care of themselves and be able to practice self-care.
3. recreation for health	To provide the elderly with knowledge and understanding of the benefits of health promotion using recreational activities for health on the elderly, create motivation to take care of themselves and be able to practice self-care.
4. aerobic exercise	To provide the elderly with knowledge and understanding of the benefits of promoting health using aerobic exercise activities and be able to perform aerobic exercise activities correctly and appropriately on a regular basis.
5. exercise using elastic	To provide the elderly with knowledge and understanding of how to promote health using resistance exercise activities using elastic bands, so that they can perform resistance exercise activities using elastic bands correctly and appropriately on a regular basis.
6. yoga	To provide the elderly with knowledge and understanding of the benefits of health promotion using yoga exercise activities. Elderly people can perform yoga exercise activities correctly and appropriately on a regular basis.
7. relaxation	To provide the elderly with correct knowledge and understanding about relieving emotions and stress, practice skills in relieving emotions and stress, be able to control emotions and reduce anxiety.
8. group counseling	To provide advice and assistance to the elderly regarding health information, health problems, and practice to promote their own health to enhance their efficiency in avoiding health-risk behaviors.

Table 2 The Basic Statistics of Physical Fitness and Quality of Life of the Elderly between the Experimental Group and Control Group

Experimental Group	N= 30					
	Pre-test		Post-test After 4 weeks		Post-test After 8 weeks	
	M	SD	M	SD	M	SD
1. Muscle Strength	1.40	0.54	2.63	0.58	3.63	0.95
2. Flexibility	2.63	0.58	4.18	0.84	4.58	0.54
3. Cardiovascular system	1.75	0.54	2.68	0.61	3.63	0.97
4. Agility	2.17	0.95	3.03	0.73	3.70	0.88
5. Quality of Life	76.47	8.91	88.58	8.01	106.3	7.95
Control Group	Pre-test		Post-test After 4 weeks		Post-test After 8 weeks	
	M	SD	M	SD	M	SD
1. Muscle Strength	1.43	0.54	1.53	0.55	1.50	0.55
2. Flexibility	2.58	0.71	2.63	0.62	2.73	0.59
3. Cardiovascular system	1.80	0.60	1.85	0.66	2.03	0.66
4. Agility	2.05	0.93	2.10	0.92	2.23	0.62
5. Quality of Life	79.40	7.31	75.80	8.91	77.88	6.46

Table 3 Results of a One-Way ANOVA with Repeated Measures Analysis of Variance on the Mean Physical Fitness and Quality of Life Scores within the Experimental Group and the Control Group at the Time before the Experiment, 4 Weeks after the Experiment, and 8 Weeks after the Experiment

Experimental Group	source of variation	SS	df	MS	F	N= 30
						p
1. Muscle Strength	Between	99.35	2	49.67	109.71	0.00*
	Within	35.31	58	0.45		
	Total	134.66	60	50.12		
2. Flexibility	Between	84.86	2	42.43	125.05	0.00*
	Within	26.46	58	0.33		
	Total	111.32	60	42.76		
3. Cardiovascular system	Between	70.31	2	35.15	119.14	0.00*
	Within	23.01	58	0.29		
	Total	93.32	60	35.44		

Table 3 Continued

						N= 30
Experimental Group	source of variation	SS	df	MS	F	p
4. Agility	Between	46.71	2	23.35	68.45	0.00*
	Within	26.61	58	0.34		
	Total	73.32	60	23.69		
5. Quality of Life	Between	180.26	2	901.63	116.54	0.00*
	Within	603.73	58	77.36		
	Total	783.99	60	978.99		
Control Group	source of variation	SS	df	MS	F	p
1. Muscle Strength	Between	0.21	2	0.10	0.49	0.61
	Within	17.11	58	0.21		
	Total	17.32	60	0.31		
2. Flexibility	Between	0.46	2	0.23	0.69	0.50
	Within	26.20	58	0.33		
	Total	26.66	60	0.56		
3. Cardiovascular system	Between	1.11	2	0.55	1.96	0.14
	Within	22.21	58	0.28		
	Total	23.32	60	0.83		
4. Agility	Between	0.65	2	0.32	1.11	0.33
	Within	22.68	58	0.29		
	Total	23.33	60	0.61		
5. Quality of Life	Between	261.21	2	130.60	2.18	0.12
	Within	466.11	58	59.84		
	Total	727.32	60	109.44		

Note: * $p < .05$

In order to know which stages of the experimental groups are different, the researcher tested the differences in pairs using the Scheffe method as shown in Table 4.

A comparison at the time before the experiment, 4 weeks after the experiment, and 8 weeks after the experiment average scores on physical fitness and quality of life between the experimental group and the control group is shown in Table 5.

Table 4 Results of Pairwise Comparisons of the Mean Scores of Physical Fitness and Quality of Life of the Experimental Group Over Time

Variable	Time	Mean	Comparison	p
1. Muscle Strength (A)	Pre-test A _E 1	1.40	A _E 1- A _E 2	0.00*
	After 4 weeks A _E 2	2.63	A _E 2- A _E 3	0.00*
	After 8 weeks A _E 3	3.63	A _E 3- A _E 1	0.00*
2. Flexibility (B)	Pre-test B _E 1	2.63	B _E 1- B _E 2	0.00*
	After 4 weeks B _E 2	4.18	B _E 2- B _E 3	0.00*
	After 8 weeks B _E 3	4.58	B _E 3- B _E 1	0.00*
3. Cardiovascular system (C)	Pre-test C _E 1	1.75	C _E 1- C _E 2	0.00*
	After 4 weeks C _E 2	2.68	C _E 2- C _E 3	0.00*
	After 8 weeks C _E 3	3.63	C _E 3- C _E 1	0.00*
4. Agility (D)	Pre-test D _E 1	2.17	D _E 1- D _E 2	0.00*
	After 4 weeks D _E 2	3.03	D _E 2- D _E 3	0.00*
	After 8 weeks D _E 3	3.70	D _E 3- D _E 1	0.00*
5. Quality of Life (E)	Pre-test E _E 1	76.48	E _E 1- E _E 2	0.00*
	After 4 weeks E _E 2	88.58	E _E 2- E _E 3	0.00*
	After 8 weeks E _E 3	106.30	E _E 3- E _E 1	0.00*

Note: * $p < .05$

Table 5 The Comparison of Average Scores on Physical Fitness and Quality of Life between the Experimental Group and the Control Group

	Experimental Group		Control Group		t	p
	M	SD	M	SD		
Pre-test						
1. Muscle Strength	1.40	0.54	1.43	0.54	-0.20	0.83
2. Flexibility	2.63	0.58	2.58	0.71	0.34	0.73
3. Cardiovascular system	1.75	0.54	1.80	0.60	-0.38	0.69
4. Agility	2.17	0.95	2.05	0.93	0.59	0.55
5. Quality of Life	76.47	8.91	79.40	7.31	-1.60	0.11
After 4 weeks						
1. Muscle Strength	2.63	0.58	1.53	0.55	8.62	0.00*
2. Flexibility	4.18	0.84	2.63	0.62	9.32	0.00*
3. Cardiovascular system	2.68	0.61	1.55	0.66	5.77	0.00*
4. Agility	3.03	0.73	2.10	0.92	4.94	0.00*
5. Quality of Life	88.58	8.01	75.80	8.91	6.73	0.00*
After 8 weeks						
1. Muscle Strength	3.63	0.95	1.50	0.55	12.19	0.00*
2. Flexibility	4.58	0.54	2.73	0.59	14.39	0.00*
3. Cardiovascular system	3.63	0.97	2.03	0.66	8.57	0.00*
4. Agility	3.70	0.88	2.23	0.62	8.64	0.00*
5. Quality of Life	106.3	7.99	77.88	6.46	17.55	0.00*

Note: * $p < .05$

Discussion

The Development of an Activity Program Based on Pender's Health Enhancing Theory and Protection Motivation Theory

The researcher analyzed and synthesized the concepts of Pender's Health Enhancing Theory (Pender, 2006). It is an appropriate theory for changing lifestyles to promote one's own health, emphasizing the use of knowledge to design activities or plans for people to change their behavior and be able to act according to their choices. Protection Motivation Theory (Roger, 1975) is a theory to encourage elderly people to change their behavior by emphasizing their perception of dangers and consequences of having undesirable health behaviors and their perception of the effectiveness of promoting them to avoid risky behavior. This theory includes various resources and research which can be used to develop activities and enhance the physical fitness and quality of life of elderly people. These activities include the eight activities as follows: 1) self-assessment and 2) knowledge of elderly people. 3) recreation for health; 4) aerobic exercise; 5) exercise using elastic 6) yoga; 7) relaxation; and 8) group counseling. This activity program conforms to the quality control criteria established by the experts, as its index of congruence (IOC) is 0.96. Therefore,

the eight activities positively affected the elderly's physical fitness and quality of life. The group of elderly positively changed their knowledge and attitudes and reduced their risky behaviors. Pender's Health Promotion Model has been widely adopted to explore different health promotion behaviors and has achieved concrete results. Previous studies have reported that participating in health promotion activities enhanced their overall mind-body fitness and physical conditions. In addition, social support when participating in health promotion activities not only positively affects the physical and mental health of older adults but also plays an important role in reinforcing their continuous involvement in such activities. In Pender's Health Promotion Model, the concept of perceived self-efficacy is included as part of behavior-specific cognitive and emotional factors. This is supported by multiple studies, which reported that self-efficacy is an important factor that promotes an individual's participation in health promotion behaviors and lifestyle (Hsuan & Pei, 2021). The result is aligned with the study, which was conducted by Su et al. (2014), on the impact of involvement in recreational sports on the physical and mental health and quality of life of elderly people. The findings reveal that the scores of elderly participants physical health, mental health, and quality of life were significantly higher. Furthermore, Vestergrad & Puggard (2006) studied the use of exercise training to maintain the health of men and women aged

65 years and over. The research aimed to study the effects of an exercise program on 1) standard mechanical fitness tests and 2) physical measurements 3) measuring work ability and 4) changes in the use of health services. The sample group received aerobic, strength, balance, and game training exercises. Additionally, there are physical performance tests and physical fitness tests. The results found that there are significant differences in various tests.

Evaluation of the Effectiveness of an Activity Program for Enhancing the Physical Fitness and Quality of Life of Elderly People

Activities that promote physical fitness and improve the quality of life of elderly people include self-assessment and knowledge of the elderly, which are activities that allow the elderly to know how to evaluate themselves and obtain accurate knowledge and understanding about the elderly (Haywood et al., 2005). Elderly people are aware of health care behaviors and reduce risky behaviors that lead to self-harm. They create motivation to take care of themselves and are able to take care of themselves through the process of using images, videos, information sheets, and information on the internet (Health Education Division, Department of Health Service, 2015). Elderly age is when the body gradually deteriorates. Various systems work less or less efficiently, causing health to deteriorate as well. Even though we cannot fix the factors of physical deterioration in elderly people, we can take care of ourselves for good health, which is consistent with Protection Motivation Theory (Roger, 1975). It states that an evaluation of the perceived severity of an impact on health and quality of life will influence a person's response to the threat, which will cause people to avoid health risk behaviors. Pender's Health Enhancing Theory (Pender, 2006), states that making people aware of the benefits of practicing behavior will make them develop or change behavior in a better way. This is consistent with Ghasemtalebi et al. (2015), who studied the promotion of exercise behavior in elderly people and found that after the experiment, the elderly people had an average score of knowledge about exercise, perception of benefits of exercise, perceived barriers to exercise, self-efficacy for exercise, and correct exercise behavior significantly higher than before the experiment. Therefore, it can be concluded that self-assessment and knowledge of elderly people are activities that allow elderly people to know how to evaluate themselves and to obtain accurate knowledge and understanding about elderly people, stimulating the

elderly to be alert about health care behaviors and reduce risky behaviors that lead to illness, create motivation to take care of oneself and be able to take care of oneself, exchange opinions, discussions, knowledge, suggestions, and recommendations, and exchange experiences.

Activities that develop the practices include recreation for health, aerobic exercise, exercise using elastic, yoga, and relaxation, which are organized to create beliefs that one has the ability to do new behaviors. Becoming aware of the benefits of exercise brings positive results for yourself. The result is in accordance with the study which was conducted by Predovan et al. (2012). It presented the effect of three months of aerobic training on performance in older adults to promote aerobic exercise. The results showed that after the experiment, there were changes in exercise and performance that were significantly better compared to the pre-experiment. Furthermore, according to Ghasemtalebi et al. (2015), who studied the effect of aerobic exercises on quality of life in elderly women, consisting of providing knowledge, demonstrations, and practice exercises, it was found that elderly women after the experiment had behaviors promoting exercise in terms of knowledge, perceived benefits, self-efficacy, and behavior in exercising that increased significantly from before the experiment, and quality of life improved. It also corresponds to Hariprasad et al. (2013) and Koohboomi et al. (2015), who studied the application of yoga exercise in elderly people and found that after the experiment, the elderly people had knowledge about exercising with yoga. The elderly individuals significantly increased their perception of the benefits of yoga exercise, their ability to exercise and their practices of correct yoga poses compared to pre- the experiment. Furthermore, Su et al. (2014), who studied the effects of involvement in recreational sports on physical and mental health and the quality of life of elderly people, found that after receiving recreational activities, elderly people had better physical and mental health, including a higher quality of life than before participating in the activity. Furthermore, the research revealed that implementing an exercise program enhanced the elderly's confidence in exercising and served as a practical guideline to mitigate the risk of harm during and after exercises.

Counseling activities are those that provide assistance and positive reinforcement, whether material or psychological. Motivation and commitment to take care of one's health, exercising, and discussing the benefits of the activity program are encouraged to develop a sense of self-care by expressing genuine affection and benevolent intentions; giving advice, engaging in discussion and giving opinions, giving suggestions,

and giving encouragement in practical matters. The result is in accordance with the study conducted by Kaur & Venkateshan (2015) that stated that individuals possessed self-awareness and the capacity to evaluate their own competence as well as have the ability to take control over their own behavior by health personnel. This interpersonal influence plays a crucial role in promoting health behaviors by providing support in terms of knowledge, resources, information, and emotional assistance, which have a direct influence on health-promoting behavior, leading to intentions to plan for implementing health-promoting behavior.

However, in various activities, the activity operator should prepare media, such as video, that demonstrate the correct principles and methods to increase the interest of the activity participants and create the most efficiency. Study the results of organizing the activity according to the activity program to promote physical fitness and improve the quality of life of the elderly, separated by males and females, so that differences between the genders will be visible. The effectiveness of the activity program to promote physical fitness and improve the quality of life of the elderly should be studied using various forms of activity. After the experiment, it is important to provide promotion and support to arrange the various activities that the elderly can engage in. This will help to enhance their physical fitness and ensure a lasting improvement in their quality of life. Additionally, conducting monthly follow-up studies will contribute to this goal in order to assess the long-term sustainability of practices that promote physical fitness and enhance the quality of life in the elderly.

Conflict of Interest

The authors declare that there is no conflict of interest.

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