

**FACTORS INFLUENCING PHYSICAL ACTIVITY
AMONG WOMEN WITH OSTEOARTHRITIS OF THE KNEE**

The background of this section features a large, faint, circular seal of Mahidol University. The seal contains a central emblem with Thai script and is surrounded by the university's name in Thai and English.

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OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
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Thesis
entitled

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FACTORS INFLUENCING PHYSICAL ACTIVITY AMONG WOMEN WITH OSTEOARTHRITIS OF THE KNEE

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ABSTRACT

This study was a descriptive research aimed to examine the factors influencing physical activity among women with knee osteoarthritis (OA). The interaction model of client health behaviors was used as a theoretical framework to guide the study. The samples consisted of two hundred and forty-two female patients with knee OA attending the outpatient department of Siriraj Hospital. Data were collected using 1) Personal data questionnaire, 2) Western Ontario and McMaster Universities Osteoarthritis Index, 3) Catastrophizing subscale of the Coping Strategies Questionnaire-Revised, 4) Fear-Avoidance Belief Questionnaire, 5) Revised Multidimensional Scale of Perceived Social Support, and 6) Short Form of International Physical Activity Questionnaire. The data were analyzed and presented by using descriptive statistics and logistic regression.

The findings revealed that the mean age of the samples was 65.1 years (range = 50-83). There were 60.3 percent of them who had low physical activity. Body mass index (OR = 0.53, 95%CI = 0.31-0.90, $p < 0.01$), functional limitation (OR = 0.99, 95%CI = 0.98-0.99, $p < 0.05$), and pain-related fear (OR = 0.94, 95%CI = 0.90-0.98, $p < 0.01$) significantly influenced physical activity. However, age, knee pain, pain catastrophizing, and social support did not significantly influence physical activity.

Based on the findings, the researcher suggested that body mass index, functional limitation, and pain-related fear should be measured to identify barriers to performing physical activity in women with knee OA. Nurses should also enhance their knowledge and understanding of the benefits of weight reduction and knee exercise, while seeking strategies to reduce pain-related fear so as to increase their physical activity level.

KEY WORDS : INFLUECING FACTORS / WOMEN / OSTEOARTHRITIS OF
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193 pages

ปัจจัยที่มีอิทธิพลต่อกิจกรรมทางกายในหญิงข้อเข่าเสื่อม

FACTORS INFLUENCING PHYSICAL ACTIVITY AMONG WOMEN WITH OSTEOARTHRITIS OF THE KNEE

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บทคัดย่อ

งานวิจัยครั้งนี้เป็นการศึกษาเชิงพรรณนา มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อกิจกรรมทางกายในหญิงข้อเข่าเสื่อม โดยใช้โมเดลปฏิสัมพันธ์ของพฤติกรรมสุขภาพผู้รับบริการมาเป็นกรอบแนวคิดในการศึกษา กลุ่มตัวอย่างประกอบด้วยหญิงข้อเข่าเสื่อมที่มารับบริการที่แผนกผู้ป่วยนอก โรงพยาบาลศิริราช จำนวน 242 ราย เก็บรวบรวมข้อมูลโดยใช้แบบสอบถาม ได้แก่ 1) แบบสอบถามข้อมูลส่วนบุคคล 2) แบบสอบถามอาการข้อเข่าเสื่อม 3) แบบสอบถามยุทธวิธีในการแก้ปัญหาฉบับย่อ ในส่วนการประเมินความคิดเมื่อเผชิญกับอาการปวด 4) แบบสอบถามความเชื่อเกี่ยวกับความกลัวและการถอยหนีจากอาการปวด 5) แบบสอบถามความรู้สึกหลากหลายมิติเกี่ยวกับความช่วยเหลือทางสังคม ฉบับปรับปรุงภาษาไทย และ 6) แบบสอบถามกิจกรรมทางกายนานาชาติฉบับย่อ วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา และสถิติถดถอยโลจิสติก

ผลการวิจัย พบว่า กลุ่มตัวอย่างมีอายุเฉลี่ย 65.1 ปี (พิสัย 50-83) ร้อยละ 60.3 ของกลุ่มตัวอย่างมีกิจกรรมทางกายในระดับต่ำ ปัจจัยที่มีอิทธิพลต่อกิจกรรมทางกาย ได้แก่ ดัชนีมวลกาย ($OR = 0.53$, $95\%CI = 0.31-0.90$, $p < 0.01$) ข้อจำกัดในการทำหน้าที่ของข้อเข่าและความกลัวอันเนื่องจากอาการปวดเข่า ($OR = 0.99$, $95\%CI = 0.98-0.99$, $p < 0.05$) และ ความกลัวที่เกี่ยวข้องกับอาการปวด ($OR = 0.94$, $95\%CI = 0.90-0.98$, $p < 0.01$) อย่างไรก็ตาม อายุ อาการปวดเข่า ความคิดด้านลบเมื่อเผชิญกับอาการปวด และแหล่งสนับสนุนทางสังคม ไม่มีอิทธิพลต่อการทำกิจกรรมทางกาย

จากผลการวิจัย ผู้วิจัยเสนอแนะว่าหญิงข้อเข่าเสื่อมควรได้รับการประเมินดัชนีมวลกาย ข้อจำกัดในการทำหน้าที่ของข้อเข่า และความกลัวอันเนื่องจากอาการปวด เพื่อค้นหาอุปสรรคที่ขัดขวางการทำกิจกรรมทางกาย นอกจากนี้พยาบาลควรมีการเสริมสร้างความรู้ความเข้าใจของผู้ป่วยเกี่ยวกับประโยชน์ของการควบคุมน้ำหนักและการบริหารเข่า รวมทั้งหาแนวทางในการลดความกลัวที่เกี่ยวข้องกับอาการปวด เพื่อให้ผู้ป่วยมีการทำกิจกรรมทางกายเพิ่มมากขึ้น

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CHAPTER I

INTRODUCTION

1.1 Background and Significance of the Study

Osteoarthritis (OA) of the knee is a slowly progressively deterioration of synovial membrane of articular cartilage, thus leading to biomechanical and biomorphology changes in articular cartilage (Royal College of Orthopaedic Surgeon of Thailand, 2011). Knee OA is a cause of damages of femoral, tibial, and infrapatella nerves and branch in joint capsules (Kasitanon, 2003), thus causing the patients to have knee pain and physical disability (Hawker et al., 2008; Pisters et al., 2012). Osteoarthritis of the knee is mostly found in adults after the age of 50 years (Zhang & Jordan, 2010). In relation to gender, the prevalence rate of osteoarthritis of the knee was higher in women, comparing to men. In the United States, 13 percent of women had symptoms of osteoarthritis of the knee, comparing to 10 percent of men. In Asia, the prevalence rate of knee OA in women was almost to a double of men. For example, 32 percent of female Japanese and 16 percent of male Japanese had osteoarthritis of the knee (Muraki, Oka, Akune, et al., 2009). Specifically, the prevalence rates of osteoarthritis of the knee were 24 percent in Thai women and 14 percent in Thai men (Aekplakorn, 2009).

Knee osteoarthritis impacts on quality of life of people. Pain of the knee is a significant problem in this group of the patients. A study by Jakobsson and Hallberg (2006) reported that seventy-four percent of the patients with knee OA had knee pain. About half (50.5%) of the patients had knee pain triggered by doing daily activities; 23 percent of the patients had constant knee pain (Hawker et al., 2008). Pain is easily induced during using joints to execute activities, especially walking, stepping on stairs, and rising from chair, and thus leading to functional limitation and disability (Alencar et al., 2007; Cecchi et al., 2009; Liikavainio, Lyytinen, Tyrväinen, Sipilä, & Arokoski, 2008). Thirty-seven percent of the patients reported irreversible of physical function over 3 years (Jinks, Jordan, & Croft, 2007). Similarly, a prospective study by

Pister et al. (2012) found significant deterioration of functional limitation over 5 years among the patients with knee OA. Women had more suffering from knee pain and functional limitation, with comparing to men (Elboim-Gabyzon, Rozen, & Laufer, 2012; Glass et al., 2014; O'Corner, 2011; Tonelli, Rakel, Cooper, Angstrom, & Sluka, 2011). Women had less improvement of knee function at 2 years of total knee replacement (MacDonald et al., 2008). It was because of lower pain thresholds and pain tolerance in women (Tonelli, et al., 2011). In addition, women were more likely to elicit negative thought about pain (Keefe et al., 2000) which resulted in avoidance behavior, lower pain tolerance, and physical disability (Vlaeyen & Linton, 2000).

The other impacts of knee OA were falls and depression. The patients with knee OA fall easily because they had knee pain, lower limb muscle weakness, joint laxity, and proprioception inaccuracy (Foley, Lord, Srikanth, Cooley, & Jones, 2006; Muraki et al., 2013; Scott, Blizzard, Fell, & Jones, 2012). Chu, Chi, and Chiu (2005) found that the probability of fall among the patients with knee OA was double of older adults with non-knee OA. Eleven percent of the patients with knee OA had multiple falls. In addition, the proportion of recurrent fall in women (65.3%) was higher than men (48.3%) (Chu et al., 2005). The retrospective study by Fong, Siu, Yeung, Cheung, and Chan (2011) showed the chance of fall in women as 2.5 times comparing to men. Therefore, there were more opportunities of bone fracture and physical disability in OA patients, especially in women. The psychosocial impact of OA is depression. Axford et al. (2010) examined the prevalence of depression in patients with hip, knee, and ankle OA. They found that 28 percent of osteoarthritis patients had depressive symptoms. Women with knee OA were more likely to have depressive symptoms than men (Tsai, 2007). Currently, the issue of OA knee in women is therefore significant because of its high prevalence and great negative consequences to their health and quality of life.

Osteoarthritis management comprises non-pharmacological, pharmacological, and surgical managements. Each method aims to reduce joint pain and stiffness, maintain and improve joint mobility, reduce physical disability and handicap, improve health-related quality of life, limit the progression of joint damage, and educate patients about the nature of the disorder and its management (Zhang & Jordan, 2010). Non-pharmacological managements comprise health education, physical activity, and

weight control, which are the cornerstone of managements because of low cost and effectiveness (Hochberg et al., 2012; Jordan et al., 2003; Pencharz & MacLean, 2004; Richmond et al., 2009). Physical activity is the first choice of non-pharmacological management because it has more effectiveness in reducing pain and functional limitation when comparing to education (Zhang & Jordan, 2010). In addition, physical activity is beneficial to control body weight, and prevent cardiovascular and metabolic diseases (Hughes et al., 2010; Yates et al., 2010). To attain health benefit, the International Physical Activity Questionnaire Group, (2005) has recommended that adults should perform moderate to high physical activity. Moderate to high physical activity is a minimum of 3 or more days of vigorous-intensity activity of at least 20 minutes per day; or 5 or more days of moderate-intensity and/or walking at least 30 minutes per day; or 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities.

Although physically activity gives plentiful advantages, most of arthritis patients have low activity. U.S. national health behavior survey in 2007 reported that only 40 percent of the arthritis patients achieving the recommendation of physical activity (Austin, Qu, & Shewchuk, 2012). Similarly, the meta-analysis studied by Wallis, Webster, Levinger et al. (2013), found that only 41 percent of the patients with knee osteoarthritis achieved the recommendation. In addition, the previous studies found that women likely to do physical activity lower levels than men. For example, Roseman, Kuehlein, Laux, and Szecsenyi (2008) found that men with osteoarthritis of the hip/knee spent more time to do moderate and vigorous activities. Conversely, women osteoarthritis of the hip/knee spent more time to sit (Dunlop, Song, Semanik, Sharma, Chang, et al., 2011; Rosemann et al., 2008). Szanton et al. (2015) found greater proportion of older men selecting active activities, such as gardening, walking, jogging, and playing sport, as favorite activities, comparing to women. In Thailand, levels of physical activity among osteoarthritis patients had not been found, but the fourth health survey by physical examination 2008-2009 found that the prevalence of insufficient physical activity in female Thai people (20.2%) was greater than male people (16.6%) (Aekplakorn, 2009).

The World Health Organization (2013) expects that the prevalence of insufficient physical activity will be reduced at least 10 percent within 2015.

Understanding the factors influencing physical activity is essential, and it is the first step of program development. It makes healthcare providers to know what are clients' need and what are intervention strategies that accommodating to their need (Greene et al., 2006). Therefore, non-adherence to physical activity recommendation among osteoarthritis women is a substantive issue challenging to health professionals including nurses.

According to the literature review, many studies attempted to identify what were factors influencing adherence to physical activity recommendations among patients with osteoarthritis and other arthritis. Recent studies indicated that possible factors influencing physical activity were age and body mass index, and previous health care experience, such as knee pain and functional limitation of the knees (Dunlop, Song, Semanik, Sharma, & Chang, 2011; Dunlop, Song, Semanik, Chang, Sharma, et al., 2011; Lee et al., 2013; Rosemann, Kuehlein, Laux, & Szecsenyi, 2007). However, the clients have responsibility to make the choice about health care behavior by themselves within the limitations of internal and external environment (Cox, 1982). It is therefore important to understand intrapersonal variables and contexts of social support which might influence to clients' decision to adhere the recommendations. Understanding what client think and believe is advantage for health professionals who provide tailor intervention to client's need. To date, there is little known about the levels of physical activity and factors influencing physical activity among women with osteoarthritis of the knee, especially in the context of Thai women. Dating back to 10 years, most Thai studies examined the effectiveness of self-management, exercise, health education, self-efficacy programs, and integrating those programs on pain, functional limitation, self-care and exercise behaviors (Chaipinyo & Karoonsupcharoen, 2009; Chantra, 2007; Chumklang, 2010; Compiranonth, 2006; Phairungsakul, 2007; Pilayon, 2009; Piyakhachornrot, Aree-Ue, Putwatana, & Kawinwoggowit, 2011; Suwansawang, 2008; Tabklam, 2006). To fill the gaps of knowledge, this cross-sectional study was conducted to examine the levels of physical activity and factors influencing to physical activity among women with osteoarthritis of the knee. The Interaction Model of Client Health Behavior (IMCHB) was used as a theoretical framework in this study.

1.2 Research Framework

Cox (1982; 2003) developed the Interaction Model of Client Health Behavior (IMCHB) to explain the factors influencing health outcomes. Interaction Model of Client Health Behavior can reflect to metaparadigm of nursing, including human, environment, health, and nursing. Cox believed that clients had ability to make the choice whether they adhere regimen recommendation. The adherence to the recommendation care regimen is influenced by client singularity and client-professional interaction. The component of client singularity comprises background variables, intrinsic motivation, cognitive appraisal, and affective response. Background variables, intrinsic motivation, cognitive appraisal, and affective response can independently or simultaneously influence client's decision to adhere the recommendation the adherence to physical activity recommendation. Background variables include demographic characteristics, social influence, previous healthcare experience, and environmental resources, and they have reciprocal relationship. What health professionals provide to their clients during interaction influence to intrinsic motivation, cognitive appraisal, and affective response as well, such as affective supports, health information, decision control, and professional and technical competency. To provide tailor intervention to the clients, IMCHB guides nurse to explore client singularity that might influence adherence to physical activity recommendation. The Interaction Model of Client Health Behavior was a guide to review related literature. According to literature review, possible factors influencing physical activity were categorized into demographic characteristics including age and body mass index, previous health care experience, environmental support, and cognitive appraisal, including pain catastrophizing and pain-related fear, as can be described in details as below.

Age and body mass index are demographic characteristics of the patients which might influence physical activity. Age implies to declinations in social and family roles, health, and capacity to perform activity. It was possible that age might negatively influence to physical activity because of health deterioration. The studies by Rosemann et al. (2007) and by Dunlop, Song, Semanik, Chang, Sharma, et al. (2011) found that age was negative association with physical activity among patients with osteoarthritis of the knee. However, advancing age might imply to increasing of

wisdom knowledge (Löckenhoff et al., 2009). Wisdom knowledge helps older adults to decide or select specific behaviors that are benefit to their health. In addition, older adults who retire from the jobs had more free time to do physical activity (Godfrey et al., 2014). Therefore, age might positively influence to physical activity. To date, the influence of age on physical activity is difficult to conclude because of limited in number of the studies. The question still remains whether age influences to physical activity among patients with osteoarthritis of the knee.

Body mass index is a proxy for thinness and fatness (World Health Organization Expert Consultation, 2004). Body mass index might affect to physical activity directly because obese clients feel tiredness easily during performing activity (Sallinen, Leinonen, Hirvensalo, et al., 2009). The previous study by Dunlop, Song, Semanik, Chang, Sharma, et al. (2011), and by Lee et al. (2013) found negative association between BMI and physical activity among the patients with osteoarthritis of the knee. In addition, BMI and knee pain might reciprocal influence physical activity because overweight can trigger pain by giving weight overloading on the knee joints (Rai & Sandell, 2011). In addition, BMI and functional limitation of the knees might reciprocal influence physical activity because knee pain led to functional limitation of the knees (Pisters et al., 2012). Although the previous study did not examine the interaction of BMI, knee pain, and functional limitation on physical activity, the study by Rosemann et al. (2007) also found that, taken together, BMI, knee pain, and physical function could explain 48 percent the variance of physical activity. Therefore, it was possible that BMI was an influencing factor of the adherence to physical activity recommendation.

Previous health care experiences in osteoarthritis patients are knee pain and functional limitation of the knees. Knee pain is a symptom of knee OA. More than half of arthritis patients mentioned pain as barrier to performing physical activity (Brittain, Gyurcsik, McElroy, & Hillard, 2011; Gyurcsik et al., 2009). Functional limitation reflects to difficulties in various activities of daily life. The patients with knee OA were difficult to do activities that used quadriceps muscle and knee joints, such as walking, stepping on stairs, and rising from chair. The studies done by Rosemann et al. (2007) and by Lee et al. (2013) found that both knee pain and functional limitation of the knees were significant predictors of physical activity

among patients with osteoarthritis of the knee. Rosemann et al. (2007) found that 11 percent of physical activity among patients with osteoarthritis of the knee was explained by pain. Eighteen percent of physical activity was explained by functional limitation of the knees (Rosemann et al., 2007). Similarly, Lee et al. (2013) divided pain score into none, moderate, and severe pain. They found that the probability of being insufficiently physically active in the patients with moderate pain was 1.4 times greater than patients who had no pain. This probability increased to 1.7 times for the patients with severe pain. Lee et al. also categorized functional limitation into none, moderate, and severe based on tertile score. They found 1.3 times of the probability of being insufficiently physically active in the patients with had moderate functional limitation when comparing to the patient who had no functional limitation. This probability increased to 1.9 times in the patients with severe functional limitation (Lee et al., 2013).

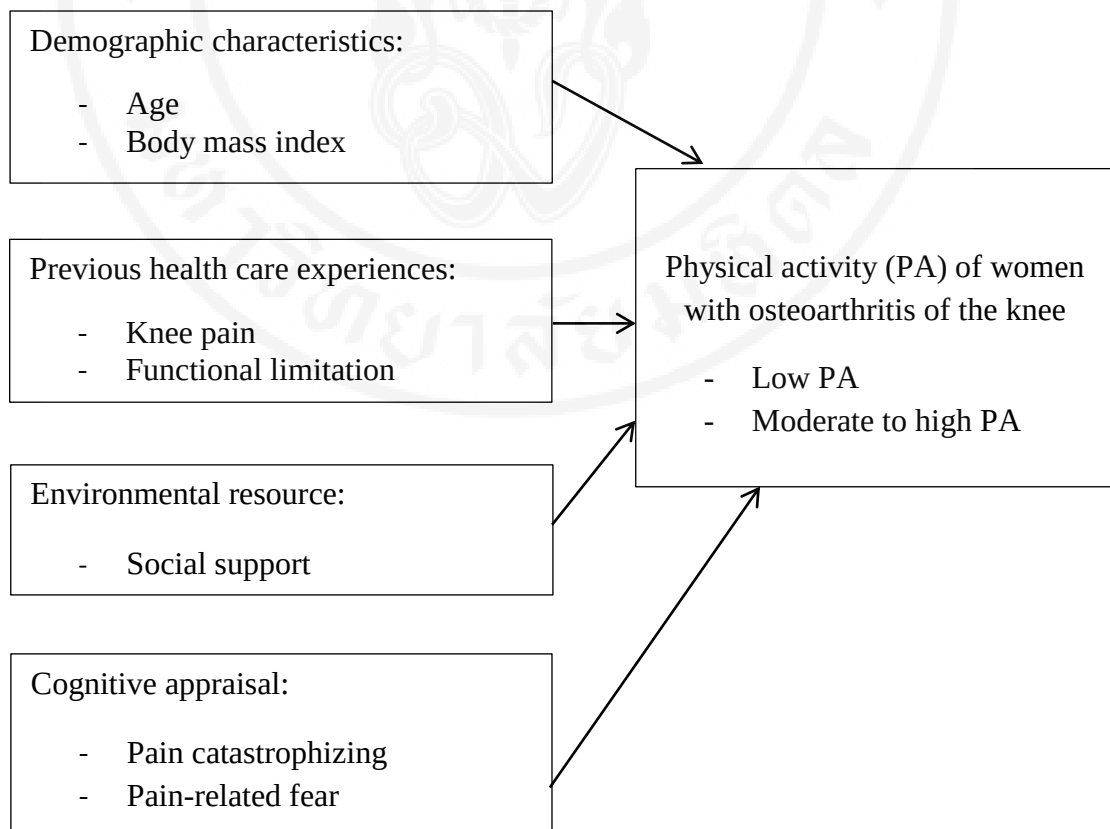
According to the Interaction Model of Client Health Behavior, Cox (1982) guide that intrinsic motivation, cognitive appraisal, and affective responses can mediate between previous health care experience and the adherence to the recommendation. The experience of feeling competent to manage patient's symptoms as an intrinsic factor to motivate them adhering the recommendation. In addition, cognitive belief can arouse emotional response and motivate behavior. The previous studies found that pain-related fear, such as fear of pain, fear of reinjury, and fear of movement, had negative influence on physical activity among the patients with chronic low back pain (Elfving, Andersson, & Grooten, 2007, et al., 2007; Koho et al., 2011). Pain-related fear is personal beliefs that doing physical activity will provoke pain and injury and result to stop or limit activities (Waddell, et al., 1993). Patients believed that their avoidance behaviors were reasonable to prevent dangerous from pain (Rainville et al., 2011). The other cognitive appraisal that might influence physical activity was pain catastrophizing which was a precursor of pain-related fear (Vlaeyen & Crombez, 1999; 2007). Pain catastrophizing reflects to disability to overcome pain and divert attention away from pain (Rosenthal & Keefe, 1983; Philips, 1987; Vlaeyen & Crombez, 1999; 2007). Both pain catastrophizing and pain-related fear results to exaggerate pain and physical disability among the patients with chronic musculoskeletal pain (Denison, Åsenlöf, & Lindberg, 2004; Woby, Watson, Roach, &

Urmston, 2004). Therefore, both pain catastrophizing and pain-related fear might influence physical activity by exaggerating pain and physical disability and provoking avoidance behavior. Although pain catastrophizing and pain-related fear might increase more understanding about doing physical activity among osteoarthritis of the knee, there is little known about role of cognitive factors to physical activity in context of osteoarthritis. In addition, the constructs of pain catastrophizing and pain-related fear are different and they require different interventions. Pain-related fear might derive from other sources, beyond pain-catastrophizing, such as directly pain experience from after-effects of physical activities, interpersonal distress, and anxiety sensitivity (Asmundson, Norton, & Norton, 1999; Crombaz, Vlaeyen, Heuts, & Lysens, 1999). Up to date, there is limited number of studies which examine the influence of pain catastrophizing accompany with pain-related fear on physical activity.

Social support is environmental support that might influence physical activity accompany with previous health care experience. Cox (1982) stated that source, type, amount, and consistency of environmental supports (family, community, and professional supports) was an enable factors that can facilitate patients to attain specific health outcomes. Receiving supports might promote physical activity for OA patients. First of all, social support affects to perceptions of pain and functional limitation because social support has been mentioned as a buffer or mediator of stress (Underwood, 2000). The previous studies found that osteoarthritis patients who perceived higher social support perceived lower pain and functional limitation (Ferreira & Sherman, 2007; Weinberger, Tierney, Booher, Hiner, 1990). Secondly, information support from health care providers and significant others that conveyed something as dangerously wrong with their joints could affect to patient's pain catastrophizing. Information support from health care providers might prevent the patients form pain-related fear and avoidance behaviors (Vlaeyen & Crombez, 1999). Health care providers could help the client to correct their misunderstanding about knee pain because some patients believed that OA was 'wear and tear' in the knee joints due to overused and as normal aging process (Jinks, Jordan, & Croft, 2007; Paskins, Sanders, & Hassell, 2013). The patients would hold this belief and thought that nothing could do to improve OA symptoms (Paskins, Sanders, & Hassell, 2013). This belief might lead to fear of pain, fear of injury, and avoid doing physical activity

to minimize further wear and tear in knee joints. In addition, emotional support from health care providers and significant others might help the client to minimize their fear. Besides that, social support might be beneficial for the patients who perceive barriers to performing physical activity; for example time constraint because of family commitment or lack of motivation. der Ananian, Wilcox, Sauders, Watkin, & Evans (2006) found that the encouragement of family members by allocating the patient's family responsibility motivated osteoarthritis patients to do physical exercise. Brittain et al. (2011) found that a lack of support from friend and family as a barrier of physical activity reported by arthritis patients.

According to the evidence mentioned above, the possible factors influencing to physical activity were drawn in the Interaction Model of Client Health Behavior, as can be seen in Figure 1.1.



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Figure 1.1 Research Framework

1.3 Purposes of Study

1.3.1 To assess the levels of physical activity among women with knee osteoarthritis.

1.3.2 To identify the factors influencing physical activity among women with knee osteoarthritis.

1.4 Research Questions

1.4.1 What were the levels of physical activity among women with knee osteoarthritis?

1.4.2 What were the factors influencing physical activity among women with knee osteoarthritis?

1.5 Hypotheses

The hypotheses of this study were as follows:

1.5.1 Age, body mass index, knee pain, functional limitation, pain catastrophizing, and pain-related fear negatively influenced physical activity.

1.5.2 Social support positively influenced physical activity.

1.6 Definitions of Terms

1.6.1 Osteoarthritis of the knee

Osteoarthritis of the knees is defined as doctor-diagnose osteoarthritis of the knee which is reported in medical record.

1.6.2 Age

Age is defined as year of age that was recorded in medical record on the day interview.

1.6.3 Body mass index

Body Mass Index (BMI) is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). Weight in kilograms was measured by a portable weighting machine without shoes and heavy cloths. Standing height in centimeters was measured by a portable stadiometer without shoes.

1.6.4 Knee pain

Knee pain refers to osteoarthritis women's perception on intensity of knee pain during walking, ascending the stairs, standing, resting, and pain in the night in the previous 7 days. It was measured by Thai version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain scale. The scale was rated ranging from 0 (no pain) to 10 (extremely pain) (Kuptniratsaikul & Rattanachaiyanont, 2007).

1.6.5 Functional limitation

Functional limitation refers to osteoarthritis women's perception on functional ability of joints to execute activities in the previous 7 days, including ascending and descending the stairs, rising from chair and bed, standing, sitting, walking on flat floor, getting in/out a car, going shopping or market, putting on and taking off pants, taking a bath, getting on/off toilet, and engaging light and heavy household activities. It was measured by Thai version of WOMAC-function scale. The scale was rated ranging from 0 (excellent ability) to 10 (mostly difficult) (Kuptniratsaikul & Rattanachaiyanont, 2007).

1.6.6 Social support

Social support refers to osteoarthritis women's opinion toward social support adequacy provided by family, friend, and significant others. It was measured by revised Thai version of Revised Multidimensional Scale of Perceived Social Support (rMSPSS). The scale was rated ranging from 1 (very strongly disagree) to 7 (very strongly agree) (Wongpakaran, N. & Wongpakaran, T., 2012).

1.6.7 Pain catastrophizing

Pain catastrophizing refers to osteoarthritis women's negative thought when they feel knee pain. Pain catastrophizing was measured by Thai version of catastrophizing subscale of the Coping Strategies Questionnaire. The scale was rated ranging from 0 (never thought) to 7 (always thought) (Lukkahatai, 2004; Rosenstiel & Keefe, 1983).

1.6.8 Pain-related fear

Pain-related fear refers to osteoarthritis women's beliefs about the effect of physical activity on knee pain and seriousness of knee pain. Pain-related fear was measured by Thai version of Fear-Avoidance Beliefs Questionnaire about physical activity (Thai FABQ-PA) modified for osteoarthritis of the knees. The scale was rated ranging from 0 (completely disagree) to 7 (completely agree) (Waddell et al., 1993).

1.6.9 Physical activity

Physical activity refers to the levels of physical activity of osteoarthritis women that are categorized into low, and moderate to high physical activity based on the amount of time that women spent to perform vigorous- and moderate-intensity activities and walking in bouts of 10 minutes in the last 7 days, which was measured by Thai version of International Physical Activity Questionnaire (Thai IPAQ) (International Physical Activity Questionnaire Group, 2005).

CHAPTER II

LITERATURE REVIEW

In this chapter, the literature related to women with osteoarthritis was reviewed. A concept of physical activity and factors influencing physical activity were also reviewed to identify gaps of knowledge. The Interaction Model of Client Health Behaviors which was used to guide the study was also described in this chapter. The contents of literature reviewed were presented as below:

2.1 Women with knee osteoarthritis and management

2.1.1 Pathology and diagnosis criteria of knee osteoarthritis

2.1.2 Prevalence of knee osteoarthritis

2.1.3 Impact of knee osteoarthritis

2.1.4 Management of knee osteoarthritis

2.2 Physical Activity

2.2.1 Definition and concept of physical activity

2.2.2 Health benefits of physical activity

2.2.3 Patterns of physical activity

2.2.4 Levels of physical activity

2.2.5 Physical activity measures

2.2.6 Physical activity in women

2.3 Interaction Model of Client Health Behaviors

2.4 Factors influencing physical activity in women with osteoarthritis

2.4.1 Demographic characteristics: age and body mass index

2.4.2 Previous health care experiences: knee pain and functional

limitation

2.4.3 Environmental resource: social support

2.4.4 Cognitive appraisal: pain catastrophizing and pain-related

fear

2.1 Women with Knee Osteoarthritis and Management

Knee osteoarthritis is a musculoskeletal disease which is often found among older adults, and makes them suffer from knee pain and physical disability. This section provides the contents of pathology, diagnosis criteria, prevalence, impact of knee osteoarthritis, as well as management of knee osteoarthritis.

2.1.1 Pathology and diagnosis criteria of knee osteoarthritis

The hallmark of OA pathology is articular cartilage loss. Articular cartilage distribute the force affecting to the knee joints to prevent synovial membrane of articular cartilage from wearing due to high friction between the cartilages of femur and tibia. The Royal College of Orthopaedic Surgeon of Thailand (2011) defines knee osteoarthritis (KOA) as a slowly progressively deterioration of synovial membrane of articular cartilage which is a result of biomechanical and biochemical changes. In biomechanical changes, OA is associated to quadriceps femoris weakness, joint malalignment, and joint injury. They alters load distribution across the knee and leading compressive stress in the knee joints (Johnson & Hunter, 2014). In biochemical changes, OA is a result of an imbalance between anabolism and catabolism mediators which are controlled by chemical mediators, such as somatomedin, insulin-like growth factor (IGF-I), transforming growth factor (TGF- β), tumor necrosis (TNF), alpha interleukin 1 and 6 (IL-1 and IL-6), cytokines, and alpha interleukin 10 (IL-10) (Knoop et al., 2011).

According to the American College of Rheumatology (ACR), the diagnosis of knee osteoarthritis requires specific clinical criteria. The criteria include radiographic, clinical, and laboratory criteria, as follows (Altman et al., 1986).

- **Clinical criteria.** The clinical diagnosis of knee OA includes having knee pain along with at least 3 additional conditions from the lists as follows: 1) age > 50 years, 2) stiffness < 30 minutes, 3) crepitus on motion, 4) bony tenderness, 5) bony enlargement, and 6) no palpable warmth. The sensitivity and specific of this classification were 95% and 69%, respectively.

- **Clinical accompany with laboratory criteria.** The knee OA diagnosis based on both clinical and laboratory criteria includes having knee pain combining with at least 5 of 9 conditions as the follows: 1) age > 50 years, 2) stiffness < 30

minutes, 3) crepitus on motion, 4) bony tenderness, 5) bony enlargement, 6) no palpable warmth, 7) the Westergren erythrocyte sedimentation rate (ESR) < 40 mm/hour, 8) the rheumatoid factor (RF) < 1:40, and 9) a synovial fluid analysis result indicative of OA (SF OA). The sensitivity and specific of this classification were 92% and 75%, respectively.

- **Clinical accompany with radiographic criteria.** The knee OA diagnosis based on both clinical and radiographic includes having knee pain, osteophytes, and at least 1 of 3 conditions as follows: 1) age > 50 years, 2) stiffness < 30 minutes, 3) crepitus on motion. The sensitivity and specific of this classification were 91% and 86%, respectively.

For radiography, Kellgren and Lawrence (1957) proposed the Kellgren and Lawrence (KL) grading system to be criteria of diagnosis of knee OA. The score of KL grading is rated from 0 to 4, which has a benefit to classify the severity of knee OA; grade 0, no narrowing of joint space and forming of osteophytes; grade 1, doubtful narrowing of joint space and possible osteophytic lipping; grade 2, definite osteophytes and possible narrowing of joint space; grade 3, moderate multiple osteophytes, definite narrowing of joints space, some sclerosis and possible deformity of bone contour; grade 4, large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone contour (Kellgren & Lawrence; 1957; Takahashi, Naito, Abe, Sawada, & Nagano, 2004, p. R209). Therefore, radiographic osteoarthritis of the knee means to Kellgren and Lawrence (KL) grade as 2 and over. The symptomatic criteria is the combination of knee pain, presenting osteophytes, and at least 1 of 3 as the following: 1) age 50 years and above, 2) stiffness less than 30 minutes, 3) crepitus on motion (Altman et al., 1986).

In Thailand, the Royal College of Orthopaedic Surgeon of Thailand (2011) recommends to use clinical criteria but radiography will be done when physicians want to assess the severity of knee OA.

2.1.2 Prevalence of knee osteoarthritis

In general, the prevalence of symptomatic OA is lower than radiographic OA because it requires both the presence of knee pain and radiography (Neogi & Zhang, 2013). In United State of America, the well-known population-based studies

were Framingham Osteoarthritis Study, Johnston Country Osteoarthritis Project, and National Health and Nutrition Examination Survey III (NHANES III). In 1987, the Framingham Osteoarthritis Study found that the prevalence of radiographic and symptomatic knee OA among Americans who aged 45 years were 19.2 and 6.7 percent, respectively. In 1988, the Johnston Country Osteoarthritis Project found that the prevalence of radiographic and symptomatic knee OA among Americans who aged 45 years were 27.8 and 16.7 percent, respectively. The National Health and Nutrition Examination Survey III, which were conducted between 1991 and 1994, found that the prevalence of radiographic and symptomatic knee OA among Americans who aged 60 years were 37.4 and 12.1 percent, respectively (Lawrence et al., 2008). In Europe, the prevalence of radiographic and symptomatic knee OA among France who aged 40 years and over was 28.8 and 20.4 percent, respectively (Gullemine et al., 2011). In Asia, the prevalence of radiographic and symptomatic knee OA among Korean who aged 50 years and over was 37.3 and 24.2 percent, respectively (Kim, Kim, Seo, et al., 2010). The prevalence of radiographic and symptomatic knee OA among Japan who aged 60 years and over was 61.9 and 26.1 percent, respectively (Muraki et al., 2009).

Some studies reported the prevalence of knee OA based on self-report knee pain. Self-report on knee pain was low cost and quite validity criteria of OA knee (Scott et al., 2012). Scott et al. (2012) had found that 73 percent of male and 76 percent of female adults who reported knee pain would found radiographic knee OA. Therefore, some epidemiologic studies undergo self-report knee pain. For example, the study by Muraki et al. (2009) found that 32.8 percent of Japanese reported knee pain. The study by Ho-Pham et al. (2014) found that 55.0 percent of Vietnamese reported knee pain. In Thailand, there had no population-based surveys providing prevalence of radiographic and symptomatic knee OA. The fourth health survey (2008-2009) in Thailand surveyed knee OA among older adults using self-report knee pain, and the study found that 24 percent of older women had knee OA. Only 14 percent of older men had knee OA (Aekplakorn, 2009, p. 273).

In terms of epidemiology, the prevalence of knee OA was higher in women than men. In USA, the Framingham Osteoarthritis Study reported that 5.9 percent of men and 7.2 percent of women had symptomatic knee OA. The Johnson

Country OA Project reported that 13.5 percent of men and 18.7 percent of women had symptomatic knee OA (Lawrence, et al., 2008). In China, the prevalence of symptomatic knee OA was a double rate in women, 14 percent for women versus 7 percent for men (Kang et al., 2009). Similarly, the prevalence of symptomatic knee OA in Japan was a double rate in women, 32 percent for women versus 16 percent for men (Muraki et al., 2009). In addition, the prevalence of knee was increasing with age, especially after 50 years of age. Based on symptomatic criteria of knee OA, the prevalence of knee OA in female Frances was a slightly smaller when they had the age in the range 40-49 (1.64% for women, 2.09% for men); however, the prevalence of knee OA in women was a slightly greater when they had the age 50-59 years (5.87% for women, 4.72% for men). The prevalence of knee OA in women increased nearly double when the age in the range 60-69 years, but the prevalence in men slightly increased (10.54% for women, 6.80% for men). The prevalence of knee OA of both genders still increased during 70-75 years; however, more women than men had knee OA (14.96% for women, 10.14% for men) (Guillemin et al., 2011).

In conclusion, knee OA was found in adults who aged 40 years and over, especially in women, and the prevalence of knee OA was increasing with age. This study focused on female patients aged 50 years and over. It was estimated that one-fifth of female Thais had knee OA.

2.1.3 Impact of knee osteoarthritis

The impacts of OA might be categorized into physiological and psychological impact, and the impact on health care cost.

2.1.3.1 Physiological impact

Physiological impact of OA comprises knee pain, functional limitation, and falls.

- **Knee pain.** Osteoarthritis patients feel pain in the morning not excess to 30 minutes. Jakobsson and Hallberg (2006) found that around 74 percent of osteoarthritis patients suffered pain. Some patients only felt stiff in their joints (Altman et al., 1986). Forty percent of osteoarthritis patients suffered joints stiffness (Baird, Schmeiser, & Yehle, 2003). However, nearly half (48.2%) of the patients with OA perceived only little pain or had no pain in the past three months (Jakobsson &

Hallberg, 2006). In general, osteoarthritis pain is triggered by activity especially when overloading on the knee joints especially joints movement and leg squatting (Perrot, Poiraudau, Kabir-Ahmadi, & Rannou, 2009). Overweight and obesity increased pain which was a result of overload on knee joints (Oyeyemi, 2013). Hawker, Stewart, French, et al., (2008) found that about half (50.5%) of the patients with knee OA had knee pain when was triggered by activities. Triggered knee pain could be predicted by observing what activities triggered pain. Only 25.3 percent of the patients had unpredictable knee pain. Most of unpredictable knee pain occurred in short episode, and intense unpredictable knee pain leaved the patients to exhaust and made them to avoid social and recreational activities.

The consequence of knee pain is functional limitation. Wilkie, Peat, Thomas, and Croft (2007) found that intensity of knee pain and stiffness was statistically significantly related to restricted mobility outside the house. Similarly, the prospective study by van Dijk et al. (2010) found that increasing pain at baseline was an independent predictor of functional deterioration at 5 years follow-up. Moreover, Jinks et al. (2007) found that 37 percent of person with knee pain reported their physical functions had no full recovery over 3 years because of knee pain. In addition, those patients had continuing knee pain over 3 years.

- **Functional limitation.** Functional limitation reflects to individual's ability to execute physical tasks that was necessary to usual living, or difficulties in various activities of daily life (Jette, 2009; World Health Organization, 2001). Functional limitation in the patients with knee OA is a consequences of loss of muscle strength, pain, and pain-related avoidance behaviors (Glass et al., 2013; Pisters et al., 2012). Moreover, the patients with knee OA lost proprioception accuracy. It is critical to maintain of joint instability under dynamic conditions (Felson et al., 2000). Functional limitation due to OA made the patients have difficulty to do household chores, do bathing, do dressing, use toilet, climb or descend the stairs, and rise from the chair/bed, transportation and shopping (Baird et al., 2003; Cecchi et al., 2009). Pisters et al. (2012) found that osteoarthritis patients' functional limitation was stable deterioration over 5 years.

- **Falls.** Knee OA was more likely to fall 2.3 times comparing to non-knee OA (Chu et al., 2005). The mechanism of fall in OA patients are

explained by gait and balance impairment due to knee pain, loss of lower extremity muscle strength, joint laxity, and proprioception inaccuracy. Muscle weakness, poor proprioception accompany with knee joint laxity results knee joint loss stability that resulting posture instability (Dekker, van Dijk, & Veenhof, 2009). In addition, obvious deformity of legs, such as genu valgus and varus, deviated from the mechanism axis, and they also made the patient lose gait and balance.

2.1.3.2 Psychological impact

Psychological impact of OA is depression and pain-related fear. Each impact was explained as below.

- **Depression.** Osteoarthritis patients suffered from pain, physical disability, family and social role limitations that resulted to the patients had higher rate of depression with comparing to healthy people (Ferreira et al., 2015). Forty-one percent of OA patients had anxiety and depressive symptoms (Axford et al., 2010). Around one-fifth (19%) of osteoarthritis patients had diagnosis of depression disorder (Rosemann et al., 2007).

- **Pain-related fear.** Pain-related fear referred to an excessive and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to pain (Somers et al., 2009). The patients might define pain as a threat, and pain induced them to fear, including fear of pain, fear of injury, and fear of movement, which results avoidance behaviors. Fearful patients produced catastrophic thought (an extreme negative thought about pain). Catastrophic thinking magnifies pain as a sign of injury. Suffers spent more attention to scan pain stimuli (hypervigilance) and avoided or escaped from those stimuli. Suffers avoided pain-induced activities as soon as they anticipated the negative consequences of pain. Avoidance behavior is a safety-seeking behavior. Avoidance behavior could protect suffers from pain; in the long-term, conversely, it can exacerbate pain, physical disability, and depression (De Peuter, de Jong, Crombez, & Vlaeyen, 2009; Dekker, Boot, Woude, & Bijlsma, 1992; Vlaeyen & Linton, 2012).

2.1.3.3 Impact of osteoarthritis on healthcare cost

Osteoarthritis requires pharmacy, non-pharmacy, and surgical treatments, and it spend a great of hospital expenditure. OA spent 35 percent of total healthcare cost (Le, Montejano, Cao, Zhao, & Ang, 2012). American with OA had

average annual physician visits 15.83 visits per person-year that was greater than 9.8 visits per person-year of American with non-OA (Wright et al., 2010). Eighty-seven percent of the patients used pain-relieved drugs, and pain-related prescription spent 6 percent of the total cost (Le et al., 2012). Moreover, alternative treatments (e.g. acupuncture, physical therapy, assistive devices, chiropractic care, etc.) were most common used in OA, and it was accounted for 3 percent of the total cost (Gore, Tai, Sadosky, Leslie, & Stacey, 2012).

2.1.4 Management of Knee osteoarthritis

The purposes of OA management are to reduce joint pain and stiffness, maintaining and improving joint mobility, reducing physical disability and handicap, improving health-related quality of life, and limiting the progression of joint damage, and educating patients about the nature of the disorder and its management (Zhang et al., 2008). Osteoarthritis managements can be classified into non-pharmacological, pharmacological, and surgical managements.

2.1.4.1 Non-pharmacological management. Non-pharmacological management including education, weight control, and physical activity are cornerstone of non-pharmacological management because of low cost and effectiveness. Physical activity, including low-impacted aerobic and quadriceps strengthening, is most effective to reduce pain and functional limitation. Comparing to quadriceps strengthening, low-impacted aerobic is more effectiveness (Zhang, Nuki, Moskowitz, et al., 2010).

2.1.4.2 Pharmacological management. Pharmacological management comprises non-opioid analgesics and opioid therapy. Non-opioid analgesics are most common used including paracetamol and nonsteroid anti-inflammatory drug (NSAID) or selective NSAID (such as COX-2). Paracetamol not exceed 4 gram per day is the first line drug. Opioid therapy might be used when the patients have intensive pain and have caution of non-opioid analgesics (Zhang et al., 2008).

2.1.4.3 Surgical management. Surgery procedures of knee osteoarthritis comprise arthroscopic debridement, ligamentous reconstruction, realignment osteotomy, and unicompartment knee replacement (Rotchanasthean,

2003, p. 183). Each procedure has different objectives. Doctor would offer arthroplasty or knee replacement to their patients when severe osteoarthritis is not able to treat by any methods or have surgical criteria. Partial or complete knee replacement is alternative choice when the patients fail to treatment (Zhang et al., 2008).

In conclusion, osteoarthritis results from degeneration of articular cartilage. The prevalence of knee OA is increasing with age and being female. Knee OA results in knee pain and functional limitation, and it causes the patients to fall easily. Moreover, knee OA has psychological impact, such as depression and pain-related fear. Non-pharmacology, pharmacology, and surgery aim to reduce pain and functional limitation.

2.2 Physical Activity

Physical activity is benefit to relieve osteoarthritis pain, improve knee function, and prevent cardiovascular and metabolic diseases. This topic aims to clarify definition and concept of physical activity, as well as patterns, levels, and measurements of physical activity. This topic also presents health benefits of physical activity and physical activity in women based on the previous studies.

2.2.1 Definition and concept of physical activity

Physical activity was mentioned dates back to at least 3000 to 1000 B.C. In Chinese, Yellow Emperor's Book of Internal Medicine identified physical activity as a principle of human harmony with world. In the classical-era Olympic Games, the Greeks performed physical activity to attain athletic prowess. Around 400 B.C., Hippocrates promoted exercise to evacuate the excrements and promote body fitness. In 19th century, the term 'physical education' was used to promote children in schools to do physical activity. Gymnastic and callisthenic exercise was promoted nationwide, as well as physical fitness testing. Until mid-1970s, the need to health promotion was rather than health performance. Between 1980 and 1990, there had numerous disciplines about exercise training that enhanced physical performance (U.S. Department of Health and Human Services, 1996).

In 1985, the concept of physical activity was firstly analyzed by Caspersen et al. They claim that the concepts of exercise and physical fitness are an umbrella concept of physical activity, and they give definitions of each concept as the following. *Physical activity* refers to any bodily movement produced by skeletal muscles that results in energy expenditure. Generally, physical activity is categorized into occupational, sports, exercise conditioning, household, or other activities. *Exercise* refers to physical activity that is planned, structured, and repetitive aiming to attain physical fitness. *Physical fitness* is a set of attributes that are either health- or skill-related fitness. Health-related fitness comprises cardiovascular endurance, muscular endurance, muscle strength, body composition, and flexibility. Skill-related fitness aims to attain athletic outcomes including agility, balance, coordination, speed, power, and reaction time (Caspersen et al., 1985).

Although there had numerous disciplines about physical activity and health, but more than 60 percent of American adults did not perform regular physical activity. Between 1978 and 1990, physical activity recommendation was made to promote people to perform regular physical activity to achieve only cardiorespiratory fitness and body composition. In 1990, the American College and Sport of Medicine updated by adding musculoskeletal strength and endurance as a major outcome.

In 2002, the joint World Health Organization (WHO) and Food and Agricultural Organization (FAO) expert consultation on diet, nutrition, and the prevention of chronic disease met in Geneva to develop diet, nutrition, and prevention of chronic disease recommendation for international agencies and governments. World Health Organization recommended adults perform 10 minutes bouts of 30 minutes of moderate-intensity physical activity in bouts on most days of the week (WHO, 2003).

In 2008, U.S. Department of Health and Human Services (USDHHS) published '2008 Physical Activity Guideline for Americans'. U.S. Department of Health and Human Services (2008, p. 2) defines *physical activity* as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above basal line. U.S. Department of Health and Human Services also defines *exercise* as a form of physical activity that is planned, structured, repetitive, and the performed with the goal of improving health of fitness (USDHHS, 2008, p. 7).

Physical activity is categorized into baseline activity and health-enhancing physical activity. *Baseline activity* refers to the light-intensity activities of daily living, such as standing, walking slowly, and lifting lightweight objects. *Health-enhancing physical activity* refers to activity that, when added to baseline activity, produces health benefits. It is doing moderate- or vigorous- intensity activity, such as brisk walking, jumping rope, dancing, lifting weights, climbing on playground equipment at recess, and doing yoga (USDHHS, 2008).

In 2010, World Health Organization published 'Global Recommendations on Physical Activity for Health'. World Health Organization (2010, p. 53) defines *physical activity* as any bodily movement produced by skeletal muscles that requires energy expenditures. *Exercise* is defined as a form of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. World Health Organization wants to promote people to be physically active, and sedative physical activity is a sitting-based activity that should be reduced. Therefore, World Health Organization (2010) recommends adults perform physical activity following the recommendation of U.S. Department of Health and Human Services.

In 2011, Center for Disease Control and Prevention (CDC, 2011a) recommends adults performed moderate- intensity physical activity for at least 30 minutes per day, 5 or more days per week; or vigorous- intensity physical activity for at least 20 minutes per day, 3 or more days per week.

In 2013, World Health Organization expects to reduce prevalence of insufficient physical activity people all age at least 10 percent within the year of 2020. World Health Organization published 'Global Action Plan for the Prevention and Control of Non-communicable Diseases 2013-2020' to be policy option (WHO, 2013).

In conclusion, evolution of physical activity has a long period. In the beginning period, doing physical activity aims to achieve religious experience and attain physical power to do daily tasks. Then, physical activity aims to achieve athletic outcomes; therefore, sport and performance-skill training are promoted throughout America. In the 19th century, concepts of physical activity, exercise, and physical fitness were clarified. *Physical activity* refers to body movements, beyond

baseline activity, which requires energy expenditure and give benefit to health. Physical activity is an umbrella term of exercise, and physical fitness is an outcome of seriously performing exercise. Both national and international organizations, such as USDHHS, CDC, and WHO, provide physical activity guidelines for health professionals. Propose of physical activity changes form only physical performance to overall health. The recommendations of physical activity changed from, in 2002, bouts of 30 minutes of moderate physical activity on most days of the week, in 2008, an accumulate 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity in bouts of 10 minute throughout the week (USDHHS, 2008). U.S. Department of Health and Human Services (2008, p. 5) states that the health benefit due to performing physical activity 30 minutes per day on 5 days a week do not differ from performing physical activity 150 minutes a week.

2.2.2 Health benefits of physical activity

In general, regular physical activity effectively prevents substantial causes of death, such as cardiovascular and metabolic diseases (such as cardiovascular disease, hypertension, stroke, and diabetes). Cardiovascular diseases (CVD) had multiple risk factors as same as diabetes (DM). Metabolic syndrome is the term to represent risk factors of CVD and DM. The criteria of metabolic syndrome are at least three criteria of 1) elevated waist circumference, 2) elevated triglyceride, 3) reduced high-density cholesterol, 4) elevated blood pressure, and 5) elevated fasting glucose (Alberti et al., 2009). Yates et al. (2010) found that self-report moderate to high intensity physical activity could significantly lower waist circumstance, triglyceride, blood pressure, and fasting glucose, but not reduced high-density cholesterol. Based on 5 years of prospective study, increase of physical activity from habitual activity significantly to increase high-density cholesterol (Aadahl et al., 2009). Although increase of physical activity from habitual activity could not to lower triglyceride, but it could lower total cholesterol and low-density cholesterol that were risk factors of cardiovascular diseases (Aadahl et al., 2009).

If osteoarthritis patients increase physical activity, they attain not only health benefit above but also good osteoarthritis outcomes. Talbot, Gaines, Huynh, and Metter (2003) promoted osteoarthritis patients to add 30 percent of walking steps

over usual steps within 12 weeks. They found that they could improve quadriceps muscle strength significantly. Increasing step could reduce pain and improve functional performance also though non-significant statistic. Hughes et al. (2010) found that increasing physical activity could reduce pain though non-significant statistic. However, it could reduce joint stiffness and functional limitation significantly. To attain most benefits, several national organizations promoted OA patients to do regular physical activity.

Beyond benefit to prevent metabolic syndrome and improve OA outcomes, physical activity can lower mortality rate. Wanner et al. (2014) found that moderate intensity leisure-time physical activity, beyond exercise, could significantly lower the probability of all-cause mortality, adjusted hazard ratio (aHR) 0.84 (95%CI: 0.78, 0.90, both genders), when comparing to low intensity. In addition, physical activity could lower risk of mortality due to cardiovascular disease (aHR = 0.84, 95%CI: 0.75-0.95, both genders) and cancer. (aHR = 0.86, 95%CI: 0.77-0.97, both genders). If leisure-time physical activity included exercise twice a week, it could lower the probability of all-cause mortality (aHR = 0.85, 95%CI: 0.78-0.92, both genders), cardiovascular disease (aHR = 0.79, 95%CI: 0.66-0.95, only men), and cancer mortality (aHR = 0.76, 95%CI: 0.66-0.88, both genders), when comparing to never or once a week of exercise. Hu, Jousilahti, Antikainen, and Tuomilehto (2007) found that moderate intensity leisure-time physical activity, including exercise, could significantly lower cardiovascular mortality (aHR = 0.84, 95%CI: 0.77-0.91 for men; aHR = 0.78, 95%CI: 0.70-0.87 for women). Similarly, Wen et al. (2011) found that person who do light exercises at least 92 minutes per week, had 14 percent reduced of all-causes mortality. Conversely, inactive person had 17 percent of risk of mortality. Not only leisure-time physical activity but other activities could lower mortality. Hu et al. (2007) found that moderate intensity occupation activity could significantly lower cardiovascular mortality also. Occupation activity was accounted by aHR 0.82 (95%CI: 0.72-0.93) for men and 0.79 (95%CI: 0.69-0.90) for women, when comparing to low intensity. Persons had transportation activity (walking or cycling to and from working place) had lower cardiovascular mortality by aHR 0.90 (95%CI: 0.81-0.99) for men and 0.78 (95%CI: 0.68-0.89) for women, when comparing to none (Hu et al., 2007).

In conclusion, physical activity give benefits to cardiorespiratory and metabolic systems, such as controlling blood pressure, blood sugar, and weight. Physical activity also gives positive outcomes to patients with knee osteoarthritis. OA patients should perform sufficient physical activity.

2.2.3 Patterns of Physical Activity

Physical activity performed by the subject is complexity of patterns of physical activity which include type, duration, frequency, and intensity. Patterns of physical activity can represent energy expenditure which is a benefit to determine levels of physical activity.

2.2.3.1 Types of physical activity

Types of physical activity are referred to modes of participation in physical activity which could take many forms, including aerobic (endurance), strength, flexibility, and balance activity (WHO, 2008). Each type is described as below.

- **Aerobic or endurance activity.** Aerobic or endurance activity means to physical activities in which people move their large muscles in a rhythmic manner for a sustained period. Examples of aerobic activity include running, brisk walking, bicycling, dancing, swimming, bicycle riding, tennis, basketball, golf, and gardening. Regular aerobic physical activity is benefit to cardiovascular system (USDHHS, 2008).

- **Muscle-strengthening activity.** Muscle-strengthening activity is an additional benefit to performing physical activity. The benefit of muscle-strengthening activity is increasing of skeletal muscle strength, power, endurance, and mass. Examples of muscle-strengthening activity include lifting weights, working with resistance bands, doing calisthenics using body weight for resistance (such as push-ups, pull-ups, and sit-ups), climbing stairs, carrying heavy loads, and heavy gardening. People should strengthen major muscle groups two or time sets with 8 to 12 repetitions per set, at least 2 days per week. Major muscle groups includes legs, hips, back, abdomen, chest, shoulders, and arms.

- **Flexibility activity.** Flexibility aims to restore range of motion and improve flexibility. Flexibility is the ability to move a joint or a series of joints through a range-of-motion (ROM) (Brody, 2011). Generally, flexibility exercise is used in warm-up period. Person stretched their muscles and holding 10 to 30 seconds at terminal stretch position, repeating 4 to 10 repetitions. To prevent harm from limited tissue extensibility, it is suggested to stretch muscles in a stationary position at greatest possible length (American Geriatrics Society Panel and Exercise and Osteoarthritis, 2001).

- **Balance activity.** Balance activity aims to regain postural stability depending on the complex systems of vision, vestibular, and somatosensation. Merom et al. (2012) categorized balance exercise into 3 groups, including balance training, probable balance challenge, and possible balance challenge. Probable balance challenge activities are balance training, tai chi, dancing, tennis, team sports (for examples, touch football, table tennis, and sailing. Possible balance challenges activities are probable balance challenge activities, balance training, bowls, golf, selected team sports (for examples, darts, and croquet). To prevent falls, people with risk of falls should perform balance activity minimum 2 times a week of 40 minute of each (Sherrington, Lord, & Close, 2008).

2.2.3.2 Amount of physical activity

The amount of physical activity is an interaction of duration, frequency and bout intensity. World Health Organization (2008, pp. 52-53) defines duration, frequency, and intensity of physical activity. *Duration* is the length of time in which an activity or exercise is performed. In general, duration is expressed in minutes. *Frequency* is the number of time an exercise or activity is performed. In general, frequency is expressed in sessions, episodes, or bouts per week. *Intensity* of physical activity is the rate at which work is being performed or the magnitude of the effort required to perform an activity or exercise. Intensity can express both absolute intensity and relative intensity. Details about each type of intensity were delineated as follows, although relative intensity is more practical.

- Absolute intensity is determined by the rate of work being performed and does not take into account the physiological capacity of the individual. For aerobic activity, absolute intensity is assessed using rate of energy expenditure

during doing activity that is expressed by 'Metabolic Equivalent of Task' (MET). Moreover, absolute intensity for aerobic activity is assessed using physiological responses, such as heart rate. For resistance activity, absolute intensity is expressed as the amount of weight. For walking, absolute intensity is simply assessed by the speed of walking. A MET is the ratio of the work metabolic rate to the resting metabolic rate; it was a unit of energy expenditure measured by indirect calorimeter using a ventilated hood system. MET varies in intensity of doing physical activity. One MET is defined as 1 kcal/kg/hour and is roughly equivalent to the energy cost of sitting quietly. A MET also is defined as oxygen uptake in milliliter per kilogram of body weight per minute with one MET equal to the oxygen cost of sitting quietly, equivalent to 3.5 milliliters per kilogram of body weight per minute (WHO, 2008). The work metabolic rate varies in many forms of movement from low level of sedentary activities to high level of vigorous activities. U.S. Department of Health and Human Services (2008) categorizes intensity of physical activity into light- (1.1-2.9 METs), moderate- (3.0-5.9 METs), and vigorous- (≥ 6.0 METs) intensities.

- Relative intensity takes into account or adjusted to an individual's exercise capacity. For aerobic activity, relative intensity is estimated using the percentage of maximal heart rate, index of exertion, index of effort, and talk test. *The percentage of maximal heart rate* (% HR) is responses to energy expenditure and oxygen consumption. Maximal heart rate is estimated simply as 220 minus year of age. Intensity is categorized into sedative ($< 40\%$ HR), light (40-50% HR), moderate (55-69% HR), vigorous (70-89% HR), and high ($\geq 90\%$ HR) (Norton, Norton, & Sadgrove, 2010, p. 497). *Index of exertion* is measured simply using 10-point Borg Category Ratio (Borg CR-10) which ranges from 0 (not at all exertion) to 10 (almost maximum exertion). Scores of 2, 3, 5 meant to light-, moderate-, and heavy- intensities, respectively (Borg, 1982, see Appendix A). *Index of effort* is used to assess how hard an individual feels during he or she perform physical activity. It is an absolute scale 0 to 10, rating from sitting (0), low- (1 to 4), moderate- (5 or 6), vigorous- (7 or 8), and high- (9 or 10) intensity physical activity (CDC, 2011b). *Talk test*: Simple intensity self-assessment is Talk Test. If person can talk without pausing for a breath, but not sing, during the activity, moderate-intensity activity is achieved. If person cannot say more than a few words without pausing for a breath, vigorous-

intensity activity is achieved (CDC, 2011b). Three levels of intensity of physical activity proposed by USDHHS in 2008, including light, moderate, and vigorous might be estimated using % HR, Borg CR-10, Index of effort, and talk test, as can be seen in Table 2.1.

Table 2.1 Intensity Category of Physical Activity

Intensity category	Objective measures	Subjective measures
Light	1.1 - 2.9 METs 40% - 54% HRmax	Borg CR-10 = 2 Index of Effort = 1-4
Moderate	3.0 - 5.9 METs 55% - 69% HRmax	Borg CR-10 = 3 Index of Effort = 5-6 Talk test: Ability to talk without pausing for a breath during the activity
Vigorous	≥ 6 METs $\geq 70\%$ HRmax	Borg CR-10 ≥ 5 Index of Effort ≥ 7 Talk test: Cannot say more than a few words without pausing for a breath during the activity

In conclusion, physical activities might be categorized into aerobic, muscle-strengthening, flexibility, and balance activities which give advantages differently. However, the recommendations of physical activity proposed by USDHHS, WHO, and CDC as stated earlier underwent aerobic activity. Intensity of physical activity is categorized into light, moderate, and vigorous. The intensity of physical activity can be estimated by Calorimeter to measure energy expenditure in the unit of Metabolic Equivalent of Task (MET), which is known as an absolute intensity. The other measurement of intensity of physical activity is a relative intensity which estimates the energy expenditure indirectly using percentage of maximal heart rate (% HR), index of exertion, index of effort, and talk test.

2.2.4 Levels of physical activity

The levels of physical activity are categorized in two ways including MET-minute per week and amount of physical activity performed by the subject or participants to achieve health benefit. Different organizations have classified of the levels of physical activity as below.

2.2.4.1 International Physical Activity Questionnaire Group (IPAQ Group, 2005) categorizes the levels of physical activity into 3 groups, including low, moderate, and high physical activities.

- Low physical activity: Low physical activity is neither high nor moderate physical activities.

- Moderate physical activity: Moderate physical activity is 3 or more days of vigorous-intensity activity of at least 20 minutes per day; or 5 or more days of moderate-intensity and/or walking at least 30 minutes per day; or 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET-minutes per week.

- High physical activity: High physical activity is vigorous-intensity activity on at least 3 days achieving a minimum total physical activity of at least 1,500 MET-minutes per week; or 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total physical activity of at least 3,000 MET-minutes per week.

2.2.4.2 U.S. Department of Health and Human Services (2008) categorizes the level of physical activity into 4 groups, including inactive, low, medium, and high.

- Inactive: Inactive is no activity beyond baseline activity. Although, inactive people do short moderate- or vigorous- intensity activity, such as climbing a few flights of stairs, but these episodes aren't long enough to achieve health. Another activity is personal care activities, such as bathing, dressing, using the toilet, getting in and out of bed or chair, and eating. People with inactive physically activity do not receive health benefit.

- Low activity: Low activity is activity beyond baseline but fewer than 150 minutes of moderate- intensity physical activity a week, or 75 minutes

of vigorous- intensity physical activity a week. People with low physically activity receive some health benefit.

- Medium activity: Medium activity is 150 to 300 minutes of moderate-intensity activity a week, or 75 to 150 minutes of vigorous-intensity activity a week. In scientific terms, this range is approximately equivalent to 500 to 1,000 MET minutes a week. People with medium physically activity receive substantial health benefit.

- High activity: High activity is more than 300 minutes of moderate-intensity activity a week, or more than 150 minutes of vigorous-intensity activity a week. People with high physically activity receive additional health benefit.

2.2.4.3 World Health Organization (WHO cited in Bull, Maslin, & Armstrong, 2009, p. 793) categorizes the level of physical activity into 2 groups, as below:

- Inactive or insufficiently active means unachieved the recommendation which World Health Organization proposed.

- Active or sufficiently active means achieved WHO's physical activity recommendation which is defined as 150 minutes of moderate-intensity physical activity; or 75 minutes of vigorous- intensity physical activity; or an equivalent combination of moderate- and vigorous- intensity physical activity achieving at least 600 MET-minutes.

In this study, the levels of physical activity were categorized into two levels, low and moderate to high physical activity, basing on criteria of IPAQ Group. Moderate to high physical activity can represent to sufficiently active which was called by World Health Organization.

2.2.5 Physical activity measures

2.2.5.1 Types of physical activity measures

According to definition of physical activity, energy expenditure was an index of physical activity measurement. Energy expenditure can be determined using objective, subjective, and criteria measures.

- Objective measures: Objective measures comprise calorimeter, motion sensors, and heart rate monitors. Calorimeter can measure energy expenditure

directly by assessing heat production and heat loss. In addition calorimeter can measure to assess energy expenditure indirectly by assessing oxygen consumption and carbon dioxide production in a ventilated hood. The weakness of Calorimeter is expensive and impractical for large population (Laporte, Montoye, & Caspersen, 1985). Motion sensors comprised pedometers and accelerometers. They are portable devices that are able to measure physical activity indirectly. Pedometer measures movements in the vertical direction; and it can count number of step in a minute while running and walking. However, pedometer is unable to assess cycling, swimming, movement of upper body, carrying a load, or moving on soft or graded terrain. In addition, pedometer is not sensitive to slowly walking. Accelerometer is more accuracy because it assesses body movement one to three dimensions, including vertical, mediolateral, and anterior-posterior dimensions (Vanhees et al., 2005). However, accelerometers is unable to capture energy expenditure in all activities, such as walking while carrying a load, walking uphill, biking, climbing stairs, weight lifting, and water activities (Farr et al., 2008; Murphy, 2009). Therefore, physical activity might be underestimated when was assessed by pedometers and accelerometers. Other limitations of them are participants' compliance and financial cost (Murphy, 2009). Heart rate is cardio-respiratory responses that related to intensity of activity. It is indirect measure. Heart rate monitor might not enough reliable under mental stress, caffeine drinking, and smoking.

- Subjective measures: Subjective measures comprise self-report questionnaires, interviewer-assisted questionnaires, proxy-report questionnaires, and diaries. Each method has different strength and weakness. Self-report questionnaires and diary record comprise necessary information about type, frequency, duration, and intensity of doing physical activity that are benefit to transform into unit of energy expenditure. Comparing to motion sensors, questionnaires are less validity. The correlation between self-report on questionnaires and mentor sensors are weak (Tucker, Welk, & Beyler, 2011). Questionnaires might under-report because of depending on memory recall (Troiano et al., 2008). In paradox, questionnaires might be over-report because of social desirability. Additionally, the responders might ambiguous the terms in questionnaire, such as "physical activity", "leisure-time", and

“moderate-intensity” (Tucker et al., 2011). However, questionnaires are inexpensive and appropriate to study physical activity in large population.

- Criteria measures: Physical activity can be measured by the criterion observation. Observers will record type, frequency, and duration of activities. What are recorded will be coded using standardized criteria, and analyzed. Therefore, validity depended on observer’s experience. This method was appropriate to study physical activity in children (Vanhees et al., 2005).

2.2.5.2 Physical activity questionnaires

In this study, self-report on questionnaires would be used to measure levels of physical activity because it was acceptability among the participants and easily to administration. There are many questionnaire to inquiry physical activity, such as International Physical Activity Questionnaire (IPAQ), Global Physical Activity Questionnaire (GPAQ), Physical Activity of the Elderly (PASE), and Self-Report Physical Activity Questionnaire (SPAQ). International Physical Activity Questionnaire was developed during 1998-1999 to be measurements for large population groups across cultures, and the latest version was modified in 2005 (Craig et al., 2003; IPAQ Group, 2005). Global Physical Activity Questionnaire was developed by WHO in 2002, based on IPAQ both short and long forms, to assess physical activity across countries which was one of 8 key risk factors of non-communicable diseases (Bull et al., 2009). Although IPAQ and GAPQ measure concept of physical activity but they are different structurally questionnaire. Short form International Physical Activity Questionnaire does not give the detail of type of physical activity, but GAPQ provides domains of work-, transport-, and leisure- time physical activities (Armstrong & Bull, 2006; Hallal et al., 2010). However, GAPQ takes more time to administer than short form IPAQ. Short form International Physical Activity Questionnaire and GPAQ had moderate correlation between them ($r = 0.54$) (Armstrong & Bull, 2006). Therefore, there is no one better than the other between IPAQ and GAPQ. Physical Activity of the Elderly and SPAQ were developed in 1993 and 2003, respectively, to be specific questionnaires for older adults, but SPAQ is specific to Thai culture (Visuthipanich et al., 2009; Washburn, Smith, Jette, & Janney, 1993). Both PASE and SPAQ have limitations to apply to young adults in this study. Although SPAQ was specific to Thai culture, it is still at an

initial stage of development. In addition, SPAQ contains 42 items which might took more time to administer. Therefore, IPAQ was selected for use in this study because it has been used to measure PA worldwide including in Thailand and takes short time to administer. In addition, IPAQ is an acceptable instrument for use to compare PA of people among countries.

2.2.6 Physical activity in women

Hallal et al. (2012) examined the prevalence of physical inactivity in adolescent and adults from 122 countries people who aged 15 years and above in 76 countries which were members of World Health Organization. Both IPAQ and GAPQ were used in this study. Hallal et al. (2012) found that the prevalence of physical inactivity worldwide was 31.1 percent of adults. Women (33.9%) were more inactive than men (27.9%). For Southeast Asia including India, Indonesia, Lao, Myanmar, Nepal, Philippine, Sri Lanka, Vietnam, and Thailand, the prevalence of physical inactivity in men ranged from 14.6 percent in Vietnam to 31.5 percent in Indonesia. The prevalence of physical inactivity in men ranged from 15.9 percent in Vietnam to 28.1 percent in Indonesia (Hallal et al., 2012). In Thailand, the fourth health survey by physical examination 2008 to 2009 examined levels of physical activity in Thai people who aged 15 years and above. This study found that insufficient active was increasing with age as well. For men, the prevalence of insufficient active ranged from 15.1 in the age group of 15 to 29 years to 50.3 in the age group of 80 years and above. For women, the prevalence of insufficient active ranged from 25.7 in the age group of 15 to 29 years to 67.7 in the age group of 80 years and above. This prevalence of insufficient active was dramatically increasing after the age of 70 years both genders (Aekplakorn, 2009). Therefore, physical inactivity in women is a significant problem worldwide.

Gender roles might influence in difference of physical activity. In traditional gender roles, men are a head of family and responsible to protect family honor and provide welfare to their family. In contrast, women are responsible to provide daily care to their family, such as cooking, cleaning, and caring, which demanded a great time. (Cantu & Fleuriet, 2008). Therefore, women spent more time to do household activities, comparing with leisure-time and occupational activities

(Espinel, Josephine, Chau, van der Ploeg, & Merom, 2015; Tsunoda et al., 2013). Espinel et al. (2015) found that older women spent more time to do household activity (472 minutes/day), comparing with leisure-time activities (392 minutes/day). Similarly, Greene et al. (2006) found that women with osteoarthritis spent more time (66 minutes/day) for doing household activity. They spent time to do leisure-time activity 22 minutes per day. Household activities take only light to moderate intensity which might not enough to achieve moderate- to high- physical activity. The study by Plonczynski, Wilbur, Larson, and Thiede (2008) found that only 35 percent of women achieved moderate-intensity physical activity by performing household activity. If women require to achieve moderate- to high- physical activity they might divide the time to do active leisure-time physical activity, such as exercise and sport

The previous studied found that women mentioned dutiful family caregiver, work commitment as barriers to perform physical exercise (Bjornsdottir, Arnadottir, & Halldorsdottir, 2012; Cantu, 2011; Cantu & Fleuriot, 2008; Kirchhoff, Elliott, Schlichting, & Chin, 2008; Kowal & Fortier, 2007). However, the burden of doing family tasks tends to decrease with advancing age. Kowal and Fortier (2007) found that percentage of women who perceived family tasks as barrier of doing physical activity decreased from 46.2 percent in the age group of 50-54 years, to 36.7 percent in the age group 55-59 years, and to 23.8 percent in the age group 60 years and above. Women also mentioned that family responsibility made them felt too tired to do other activities (Cantu, 2011). Brittain et al. (2011) found that more than a half (56%) of women with arthritis felt too tired to do exercise because of long time period of work. Forty-one percent of them had no time to do exercise because of work commitment.

Although family commitment will be a barrier to achieve moderate- to high- physical activity, time spent for household activity tends to decrease after retirement which increased free time to do active leisure-time physical activity. However, some women might select to do light-intensity activity which is not enough to attain health benefit. The study by Slingerland et al. (2007) found that the percentage of female retirees doing 2 hours a week of sports and non-sports leisure-time activities increased from 21 percent before retirement to 35 percent after retirement. The percentage of female retirees doing 2 hours a week of non-sports

leisure-time activity increased from 46 percent before retirement to 85 percent after retirement. Similarly, Touvier et al. (2010) found that female retirees spent the time to do moderate- to vigorous-intensity leisure-time activity increasing around 2 hours per week and to walk increasing around 1 hours per week. However, Plonczynski et al. (2008) found that only 9 percent of women achieved moderate-intensity physical activity by performing leisure-time physical activity.

For situation of physical activity among Thai women, the fourth health survey by physical examination 2008-2009 found more prevalence of insufficient active in women, as stated earlier. In addition types of physical activity was surveyed and found that 66.1 percent of physical activity in Thai women was taken by worked-related activity (combination of household and occupational activities). This percentage was more than men (60.5%). Only 13 percent of physical activity in Thai women was taken by leisure-time physical activity, which were less than men (18.3%) (Aekplakorn, 2009). However, the proportion of leisure-time physical activity in women increased from 11.1 percent in the age group of 30-44 years to 14.4 percent in the age group of 70-79 years. This proportion declined to 12.7 percent at the age of 80 years and above (Aekplakorn, 2009). For exercise, Chunharus et al. (2009) found that the proportion of doing exercise among Thai older women (28.3%) was less than men (31.2%) in the age group 60-69 years. The proportion of exercise in Thai elderly women (33.8%) was similar to that (31.8%) of men in the age group 70-79 years. Thai elderly women tended to do exercise more than men after 80 years of age (37.9% for women, 20.8% for men). However, only 40 percent of Thai older adults did physical exercise after 80 years of age. Most (63%) of them did only stretching exercise that was only light-intensity physical exercise. (Chunharus et al., 2009, pp. 63-64). Thai women were more inactive than men because of overloading of family tasks. Although, women tend to do more active leisure-time physical activity, such as exercise. They do only light-intensity physical exercise. Beyond family tasks, possible factors influencing physical activity among women would be discussed in the topic 2.4.

2.3 Interaction Model of Client Health Behaviors

Cox developed Interaction Model of Client Health Behavior (IMCHB) in 1982 because the existing models, such as Rosenstock's health belief model (Rosenstock, 2005), Suchman's stages of illness experience model (Suchman, 1966), Andersen's and Newman's behavioral model (Anderson & Newman, 2005), limits to explain how personality variables and cognitive processes affect to client's decision and how healthcare professional influenced client's behaviors. Health belief model believes that client's seeking help from health professional when they perceive being vulnerability to disease, which is defined as a disease-focused model. Two latter models focus on the influence of family, friend, economic and community resources in clients' behavior, and they overlook the influence of personality variables. Therefore, the previous models cannot to capture phenomena in nursing because nurses recognize the clients as individuality and uniqueness. The Interaction Model of Client Health Behavior embodies three major assumptions. Firstly, clients have the competence to make choice for their health. Secondly, the clients should be allowed to decision and action as much as they can or interest. Finally, a client's and a professional's perceptions of reality might or might not be congruent (Carter & Kulbok, 1995).

In details, Cox (1982; 2003) developed IMCHB to explain complexity of background variables and client-professional interaction on health outcomes. The Interaction Model of Client Health Behavior comprises three elements, including client singularity, client-professional interaction, and health outcome, as follows (see Figure 2.1).

2.3.1 Element of client singularity: The client singularity elements are proposed as the holism and uniqueness of individual in interaction within his or her own social and physical environment. They comprise background variables, internal motivation, cognitive appraisal, and affective response.

Background variables are antecedent or precursor of motivation, cognitive appraisal, and affective responses. Moreover, the background variables are cumulative interaction simultaneously and often interdependently with each other to produce a specific health behavior (Cox, 1982). Background variables comprise demographic

characteristics, social influence, previous healthcare experience, and environmental resources. The meanings of each variable are provided as below (Cox, 2003).

- Demographic characteristics refer to general client characteristics such as age, education, race or ethnicity, and family income.

- Social influence is defined as social factors that affected health behaviors, such as variation in amount and consistency of religiosity, family, peer, and cultural influences.

- Previous healthcare experience refers to health history (objective and subjective), current physiologic health status, and developmental status, such as diagnosis and treatment history or experience, and response to treatment.

- Environmental resources are defined as availability of informational, people, financial, and geographic resources to facilitate health behavior.

The meanings of internal motivation, cognitive appraisal, and affective response are as below.

- Internal motivation is a composite of the individual's self-determined health judgments, self-determined health behavior, perceived competency in health matters, and internal-external cue responsiveness. Contrasted with external motivation, internal motivation is characterized by active independent decision making, effective management of motives, responsiveness to internal cues, feeling of self-determination, and a high degree of self-confidence (Cox et al., 1987 cited in Bear, Brunell, & Covelli, 1997, p. 230).

- Cognitive appraisal is described as cognitive process representing one's self-concept, belief system, values, as well as knowledge acquisition and risk appraisal (Abel & Chambers, 2004; Cox, 1982).

- Affective responses are the client's emotional reaction to the health state or condition (Bear et al., 1997).

The interrelationships of cognitions, emotional arousal, and motivation are complex. Clients appraise whether the recommendation is benefit to them and consensuses to their beliefs. Clients appraise whether they are vulnerable to health problems and whether health problems are serious. In addition, clients' perception on their abilities motive them adhere to the recommendations. The clients will adhere to the recommendations when they have no negative emotions, such as worry, angry,

sadness, guilt, or fear (Cox, 1982). This appraisal can affect emotional response to health condition as well as person's motivation to engage in certain health behaviors (Bear et al., 1997). In turn, affective responses can generate a cognitive appraisal that does not motivate a specific behavior, but it might serve as the cue for the development of a motive that would specifically direct a behavior (Cox, 1982). Nurses should assess and make understand about the element of client singularity to provide tailor interventions, such as affective support, health information, decision control, and technical competencies. Each of elements of client singularly can influence to client's behavior independently, simultaneously, or cumulatively.

2.3.2 Element of client-professional interaction: The client-professional interactions are beyond health education (Cox, 1986). Types of interactions between client and health professional are classified into four types based on prior researches, including affective support, health information, decisional control, and professional and technical competencies. The information is a part of knowledge that can be used to formulate goals for action, reduce negative arousal, and provide feedback about one's sense of competency and self-determinism. It is a cornerstone for client's decision making and goal setting (Cox, 1982). Health information might vary in nature (specific versus abstract), content, method (such as written, audio, video, or one-on-one interaction), and type and function that depended on the nature of clients and health problems. Some types of information might relieve anxiety, and some might generate self-efficacy. However, information alone might be insufficient to change behavior if without positive affective support (Cox, 2003).

- The affective support refers to attending to the client's level of emotional arousal. The provider must consider the level of client's affect. Sometime, the provider might focus at client's affect before other complements if it dominated over the cognition (Cox, 1982). The affective support might be professional reassurance, expressing the understanding regarding a client's expressed feelings, making an encouraging or supportive statement, expression of concern, and attending to the client's emotional state (Bear et al., 1997).

- The decisional control refers to the individual's expectations of having the power to participate in making decisions to obtain desirable consequences. The

provider should establish the trust atmosphere to motivate their clients offer the maximum decisional control (Cox, 1982).

- The professional-technical competencies are the technical skills and abilities used by the health professional to meet the health needs of the client. The greater clients needed for technical skills form the provider such as vital-sign monitoring (Cox, 1982). Healthcare providers might interact to their clients by giving emotional and information supports, training skill, and promoting self-decision. Both factors help the clients concern their health and motivated clients to adhere to the recommendation influencing to clients' cognitive appraisal and affective responses.

2.3.3 Element of health outcomes: Health outcomes include utilization of health care problem, clinical health-status indicators, adherence to the recommended-care regimen, and satisfaction with care. The outcomes might not limit to behavior, however, behavior can be measured directly or indirectly as a function of any of the outcomes. Moreover, in contrast to the other parts, the outcome measures might or might not be interrelated (Cox, 2003). The concepts of health outcome are extremely board, but the researchers can flexible to choose only one or two outcomes that were sensitive to nursing (Cox, 1986).

The original IMCHB had no direct linkage between background variable and health outcome. In 2003, Cox revised the model by adding the arrow from background variables to health outcomes which imply to direct effect of background variables on health outcomes. In addition, Cox added a feedback loop from health outcome to client singularity. It implies that health outcomes could affect to background variables, intrinsic motivation, cognitive appraisal, and affective response. A feedback loop guides health professionals do re-assessment and modify the interaction plan. However, the revised model still keep the influence of background variables on intrinsic motivation, cognitive appraisal, and affective responses. The reciprocal arrow among background variables were kept also. The revised IMCHB was shown in Figure 2.2. This study used the Interaction Model of Client Health Behavior developed in 2003. However, this study limit to examine the feedback loop.

The Interaction Model of Client Health Behavior differs from other social cognition theories models, such as Pender's Health Promotion Model and Social

Cognitive Theories. Both Health Promotion Model and Social Cognitive Theories are competence approaches which do not believe that fear as determinants of health behavior. In addition, the Interaction Model of Client Health Behavior differs from other prevention model, such as Health Belief Model which focuses on person's belief in disease susceptibility and severity and overlooks the effect of environmental factor on behavior. Therefore, the Interaction Model of Client Health Behavior is compatible with this study because it can explain the effect of human experience on human behavior. In addition, it is developed within nursing context which deals with person, environment, health, and nursing processes or goals. The Interaction Model of Client Health Behavior can explain the complexity of influence of client singularity on the adherence to physical activity recommendation. Generally, knee pain is an experience of osteoarthritis patient. Osteoarthritis patients response their pain basing on their thought and feeling. Positive response results the patient to meet recommendation and to have good health indicator. If osteoarthritis patients think that pain is a threat, they tend to use passive coping strategies, such as rest, activity limitation, or avoidance. Some people produce negative thought about pain which cause the patients have more fear of pain and injury. Avoidance behavior is negative consequence of fear, and long-term avoidance results muscle atrophy and disability. Health professionals expect that OA patients to meet physical activity recommendation, but pain experience and pain-related fear might influence performing physical activity. Moreover, functional limitation because of fear-avoidance behavior and osteoarthritis progression might influence performing physical activity. To sum, the Interaction Model of Client Health Behavior was fit to the objective of this study.

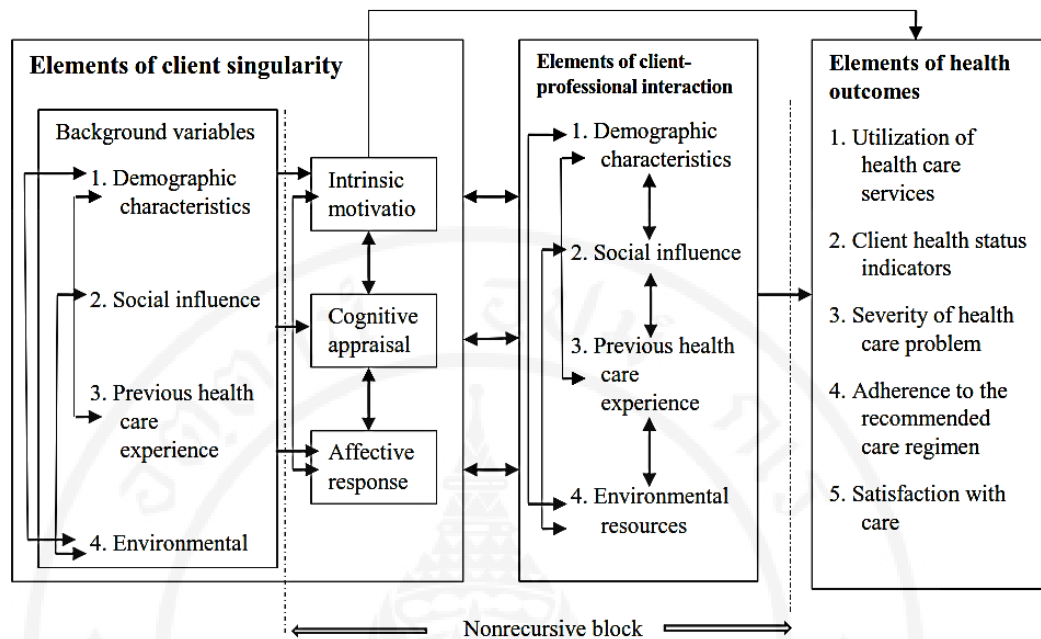


Figure 2.1 Interaction Model of Client Health Behavior

(Modified from Cox, 1982, p. 47)

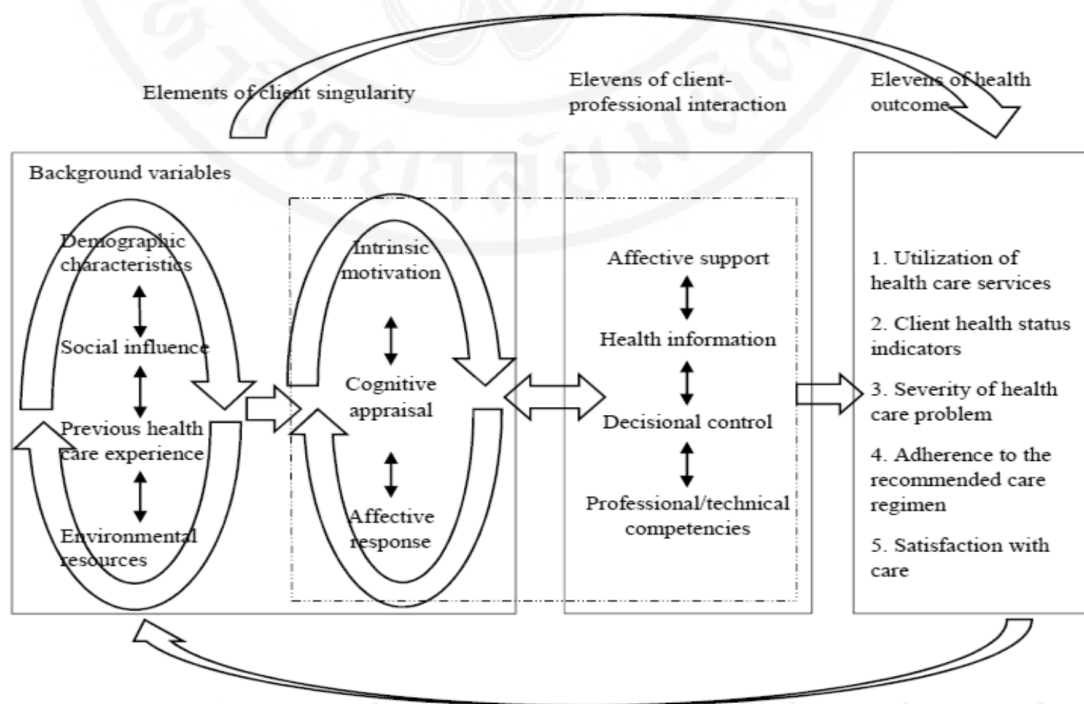


Figure 2.2 Revised Interaction Model of Client Health Behavior

(Modified from Cox, 2003, p. E93)

2.4 Factors Influencing Physical Activity in Women with Osteoarthritis

Referring to the Interaction Model of Client Health Behavior (Cox, 1982), the factors influencing physical activity can be categorized into demographic characteristics, previous health care experience, environmental resources, and cognitive appraisal.

2.4.1 Demographic characteristics

Age, body mass index, levels of education, marital status, occupation status, and income are demographic characteristics that might associate with physical activity. Age and BMI were mostly often studied. However, little studies to clarify the association between demographic characteristics and physical activity in contexts of arthritis (Brittain et al. 2011; Dunlop et al., 2010; Dunlop, Song, Semanik, Sharma, Chang, et al., 2011; Greene et al., 2006, Hutton et al. 2010; Rosemann et al., 2008). In this study, age and body mass index would be selected because the previous studies supported the effects of them, accompany with knee pain and functional limitation, on physical activity. The detail was given as below.

2.4.1.1 Age

The definition of older adult is identified by 1) chronology, 2) change in social role, and 3) change in capacity (Glascok & Feinman, 1980). Adult is divided roughly into young adults (20-35 years), late adults (35-59 years), and older adults (60 years and over) (Sangprasert, 2013). The Thai government divides older adult into young-older (60-69 years), middle-older (70-79 years), and old-older adults (80 years and above) (Foundation of Thai Gerontology Research and Development Institute, 2014).

People have opinions about 'age' differently depending on socioeconomic, cultural, and biological markers. Generally, people perceive 'old age' as 1) declined in societal views of aging, physical attractiveness, the ability to perform everyday tasks, and new learning; 2) increases in wisdom knowledge, and received respect; and 3) stability in family authority and life satisfaction (Löckenhoff et al., 2009). Age might be a cause of low physical activity because of health deterioration, job retirement, and incapacity to learn and understand new knowledge. In contrast, age might promote physical activity because of crystallization of wisdom knowledge

which reflects to ability to make correct judgments and decisions. Therefore, the association between age and physical activity might be both positive and negative.

In worldwide, the prevalence of insufficient physical activity had been increasing with advancing age both genders (Bauman et al., 2009, Guthold, Ono, Strong, Chatterji, Morabia, 2008; Hallol et al., 2012). For women, the study by Guthold et al. (2008) reported that the prevalence of insufficient physical activity in women worldwide increased from 17.7 percent in the age group of 40-49 years, to 21.3 percent in the age group of 50-59 year, and to 28.6 in the age group of 60-69 years, respectively. In Korea, Kim, Kim, Park, and Kim (2010) found that female Korean statistically significance deteriorated to perform physical activity after the age of 40 years. Szanton et al. (2015) found that older American deteriorated from active activities after the age of 80 years which physical activity might be affected by a declination of health. However, Godfrey et al. (2014) did not find significant association between age and levels of physical activity. They found that being retired and being employed, instead of years of age, significant affect to physical activity. Retired older adults spent time to engage ambulatory activity greater than employed older adults, and retired older adults spent time to engage sedative activity less than employed older adult. Godfrey et al. concluded that free time received after retirement might promote doing physical activity. This finding was consistent with the study by Espinel et al. had found. The study by Espinel et al. (2015) found that middle-older adults (≥ 75 years) spent more time to engage housework and leisure activities, comparing with young-old adults (65-74 years). Although, older adults had more time to do leisure-time physical activity, Slingerland et al. (2007) found that the leisure-time physical activity older adults performed after job retirement was not able to compensate work-related transportation physical activity. Therefore, age appears to influence physical activity in several countries. Some countries found increasing activity after retirement.

For Thailand, the forth health survey (2008-2009) in Thailand found that the prevalence of insufficient physical activity in women increased from 14.7 percent in the age group of 40-59 years, to 21.6 percent in the age group of 60-69 year, to 39.5 in the age group of 70-79 years, and to 67.7 percent in the age group of 80 years and above, respectively (Aekplakorn, 2009). Thanakwang, Isaramalai, and

Hatthakit (2014) found that Thai older adults perceived that physical activity and exercise was benefit to promote bodies fit and keep the energy to do activity. Thai older adults desired to be independence as well and wanted to do activity by themselves within their limitation. Therefore, some older women might maintain physical activity to receive benefit from physical activity. Kraithaworn, Sirapo-ngam, Piaseu, Nityasuddhi, and Gretebeck (2011) found that majority of older adults still engage light-intensity recreation (99%), household activity (94%), and transportation (86%), physical exercise (74%). Chuharas et al. (2009) found that the proportion of exercise among Thai older women increasing with advancing age. It increased from 28 percent in the age group 60-69 years to 34 percent in the age group 70-79 years. The proportion of exercise among Thai older women reached to 38 percent after the age of 80 years and above. However, most of them (63%) did only strengthening exercise. Although, physical activity in Thai people seems to deteriorate with advancing age, older adults perceive to benefit of physical activity maintenance. In addition, some older adults maintain physical activity form work-paid to attain personal finance. National Statistical Office (2010 cited in Foundation of Thai Gerontology Research and Development Institute, 2014, p. 43) found that 61 percent of the Thai older adults did paid-work at the age group of 60 - 64 years. Forty-five percent of them did paid-work at the age group of 65 - 69 years. The percentage of Thai older adults who had paid-work gradually decline from 27 percent in the age group of 70 - 74 years to 12 percent in the age group of 75 years and over. Therefore, it is possible that physical activity in Thai older adults might not decrease between 60 and 69 years. However, Thai people who aged 70 years and above tends to decline from moderate- physical activity because they retire from their jobs and select to do light physical exercise after retirement.

For the patients with osteoarthritis, cross-sectional studies had consensus results confirming that the negative association between age and physical activity. Chmelo (2010) examined physical activity among older adults with knee OA, and he examined whether age, gender, education, ethnicity, knee pain, and body mass index were the determinants of physical activity. Chmelo found that physical activity significantly decreased with advancing age among patients with knee OA. In addition, Chmelo categorized activity intensity into light, moderate, and vigorous activities.

He found that statistically significantly negative relationship between age and moderate- and vigorous- intensity activities. Similarly, the prospective study by de Groot, Bussmann, Stam, and Vanhaar (2008) examined factors influence physical activity in patients with end-stage hip and knee OA and found negative influence of age on physical activity. Rosemann et al. (2007) examined factors influencing physical activity in patients with knee OA; however, they found that age only accounted 3 percent of the variance of physical activity. The study by Dunlop, Song, Semanik, Chang, et al. (2011) found that physical activity among patients with osteoarthritis of the knee. Conversely to the former studies, Murphy, Smith, Clauw, and Alexander (2008) did not found the association between age and physical activity when monitored the levels of physical activities of women with hip or knee OA continually for 5 days. In context of arthritis, the study by Greene et al. (2006) and by Brittain et al. (2011) found that age could not to explain the variance of physical activity. Similarly, Hutton et al. (2010) found that no significant difference between insufficient and sufficient activity groups in arthritis patients.

In conclusion, the effect of age on physical activity is still controversy. Older people might have more time to do physical activity, but they might do physical activity not enough to achieve moderate- to high- physical activity. In this study, age would be categorized into two groups, less than 60 years and 60 years and over because the age of 60 years was a criteria of retirement and of being older in Thailand. According to the existing evidence, it was expected that the results would show negative impact of age on physical activity.

2.4.1.2 Body Mass Index

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). World Health Organization Consultation on Obesity (2000) categorizes BMI into 4 groups including underweight, normal weight, overweight, and obesity. Categories of overweight is classified into 3 levels, as can be seen in Table 2.2.

Table 2.2 International Classification of Body Mass Index

Classification of BMI	Cut-off point (kg/m²)
Underweight	< 18.50
Normal range	18.50 – 24.99
Overweight	≥ 25.00
Pre-obese	25.00 – 29.99
Obesity	≥ 30.00
Obese class I	30.00 – 34.99
Obese class II	35.00 – 39.99
Obese class III	≥ 40.00

(World Health Organization Consultation on Obesity, 2000, p. 9)

The study by Sallinen et al. (2009) examined the influence of BMI on physical activity among older adults. Body mass index was categorized older adults into normal weight (20-24.9 kg/m²), overweight (25-29.9 kg/m²), moderate obesity (30-34.9 kg/m²), and severe obesity (≥ 35 kg/m²). Physical inactive was defined as no physical activity or only light physical activity 2 hours per week. Sallinen et al. found that moderate obesity had a risk to be inactive around 2 times of normal weight. The risk of being inactive increased to 5 times for severe obesity. In arthritis patients, Austin et al. (2012) found that the proportion (59%) of non-adherence to physical activity recommendation, which was defined as performing physical activity less than 30 minute of low- to moderate- intensity physical activity per day, in obese patients (BMI ≥ 30 kg/m²) was greater than the proportion (41%) in non-obese patients (BMI < 30 kg/m²). Similarly, the study by Hutton et al. (2010) found association between BMI and non-adherence to physical activity recommendation among patients with arthritis. Hutton et al. found that the proportion of overweight and obesity in non-adherence group (67%) was greater than in adherence group (56%). Dunlop, Song, Semanik, Chang, et al. (2011) categorized physical activity of the patients with osteoarthritis of the knees into inactive, low, active, and very active. They found that the proportion of being active and very active declined from 17.2 percent in normal weight (18.5 – 24.9 kg/m²), to 10.6 percent in

overweight (25 – 29.9 kg/m²). The proportion dramatically declined to 2.1 percent in obesity (≥ 30 kg/m²) (Dunlop, Song, Semanik, Chang, et al., 2011). Farr et al. (2008) assessed physical activity in patients with early knee OA using accelerometer and found small inverse correlation between BMI and physical activity ($r = -0.13$, $p < 0.05$). Therefore, it was possible that BMI would have negative influence on physical activity.

In arthritis patients, Brittain et al. (2011) examined barriers of physical activity among women with arthritis, and they found that BMI (mean = 29.47, SD. = 8.18) significantly negatively influenced an accumulate time of performing moderate- intensity physical activity. For patients with osteoarthritis of the knee, there had only two studies which examined the influence of BMI on physical activity. One study by Rosemann et al. (2007) found inverse association between BMI and physical activity, and BMI significantly explained 4 percent of the variance of physical activity. The other study by de Groot et al. (2008) found BMI significantly explained the variance of physical activity measured by accelerometer ($\beta = -0.35$, $p < 0.05$). To sum, there was agreement to influence of BMI on physical activity.

The influence of BMI on physical activity would be explained by IMCHB. In IMCHB, BMI might directly or indirectly to influence to physical activity. In direction effect, BMI could make the patients to feel tired easily during perform physical activity. Sallinen et al. (2009) found that tiredness in obese persons was a significantly factor influencing physical inactivity. Stemplewski, Maciaszek, Salamon, Tomczak, and Osiński (2012) found that moderate aerobic activities induced fatigue, and fatigue might prevent obese persons from physical activity. Similarly, Focht, Gauvin, and Regesky (2004) found that structured physical activity or exercise significantly increased physical exhaustion among knee OA patients who had obesity. Beyond direct effect to physical activity, BMI might indirect affect to physical activity through knee pain which was exaggerated during performing physical activity. Overweight is overloaded on knee joints, and thus causing exaggerated knee pain. Weiss (2014) found that obese patients (BMI > 30 kg/m²) with osteoarthritis of the knee had knee pain greater than the patients with normal weight and overweight. Similarly, Oyeyemi (2013) found that knee pain score in overweight

(BMI = 25 - 29.9 kg/m²) and obese (BMI $\geq$ 30 kg/m²) patients with knee osteoarthritis was significantly greater than normal weight (BMI = 18.5 – 24.9 kg/m²). In addition, Oyeyemi found significantly greater scores of functional limitation among obese patients, comparing with the patients with normal weight.

In conclusion, the existing evidence convinced the negative influence of BMI on physical activity. Overweight could induce pain and tiredness when the patients perform physical activity. In addition, BMI could influence to physical activity through functional limitation of the knees. Body mass index equal to 25 kg/m² was used as a cut-off point of overweight in this study because the previous studied reported the association between overweight and knee pain (Oyeyemi, 2013), and between overweight and being inactive (Dunlop, Song, Semanik, Sharma, & Chang, 2011) among patients with osteoarthritis of the knees. However, BMI was just a little bit of explanation the variance of physical activity. Beyond demographic variables, other variables was reviewed in the next topic.

2.4.2 Previous health care experiences

Generally, knee pain and functional limitation of the knees are experience of osteoarthritis of the knee, and they might influence physical activity.

2.4.2.1 Knee pain

Knee pain is a major symptom of knee OA, and it often occurs during doing physical activities. Pain is an uncomfortable, unpleasant, distressful, somatic sensory and emotional experience associated with injury, threat of injury, or some type of damage to the body (Encyclopedia, 1988, 1993 cited in Montes-Sandoval, 1999, p. 937). Pain is often mentioned as a major barrier of physical activity in arthritis patients. Gyurcsik et al. (2009) surveyed barriers to physical activity planning among women with arthritis, and over half (51%) of the patients presented pain as major barrier to do moderate-intensity physical activity. Additional, the patients weighted pain at the fifth rank of a barrier that limited them to do moderate-intensity physical activity, after comorbidity, joint swelling/stiffness, fatigue, and stress. Similarly, Brittain et al. (2011) found that most (70.2%) of women with arthritis presented pain as a major barrier to do moderate-intensity physical activity, following poor physical function (63.3%) and joint stiffens (60.1%). The

patients weighted pain at 7 of 10 of scale of physical activity barrier that limited them from moderate-intensity physical activity.

In osteoarthritis, Rosemann et al. (2007) examined factors influencing physical activity in patients with knee OA, and they found that pain could explain 11 percent of the variance of physical activity level. Similarly, Lee et al. (2013) examined whether BMI, depression, health behaviors, knee pain, knee functional limitation, and knee confidence influence physical activity in adults with knee OA. Lee et al. used tertile to group pain into none, moderate, and severe pain. Physical activity was assessed using accelerometer, and 2,220 counts per minutes and above was threshold of moderate- to high- physical activity. They found severe pain significantly influence moderate- to high- physical activity (odd ratio 1.6, 95%CI: 1.2, 2.2). The probability of unmet moderate- to high- physical activity in the patients with moderate pain was greater than the patients without pain though non-statistic significant (odds ratio 1.2, 95%CI: 0.9, 1.6). However, the qualitative study by der Ananian et al. (2006), they found that some arthritis patients still maintain level of physical activity though pain because they perceived benefit of physical activity.

In the Interaction Model of Client Health Behavior, Cox (1982) stated that clients had responsibility to their positive health and they could make choices about their health care behavior. Clients was not static system, and they had own learning and decision processes. Maly and Cott (2009) did qualitative study to understand the process of the people with pre-diagnosis of knee OA recognized and address chronic knee problem. They found that the participants learn to monitor knee symptoms, develop hypotheses to explain the symptoms, and modify activities to accord with their symptoms. Similarly, Mackichan, Adamson, and Gooberman-Hill (2013) examined the reason of older people to adjust their activities when living with chronic pain. They found that the participants would learn to live life within their limitations. The participants would restrict activity to relief pain, and activity restriction would be done in acceptable in their mind. In addition, the participants attempted to preserve activities to attain personal autonomy. Hawker et al. (2008) found that the patients in the early OA had only mild pain which easily to observe, identify and predict the triggers and easily to manage. Therefore, it is possible that knee pain might not influence to physical activity if it is only mild pain.

In conclusion, knee pain might prevent osteoarthritis patients from physical activities, but some patients maintain physical activities because of their perceived benefits of doing customarily physical activities. Therefore, each individual has different pain experience. The study about the influence of osteoarthritis pain on physical activity in context of Thailand was still limited.

2.4.2.2 Functional limitation

Functional limitation is activity limitations or difficulty in executing activities because of negative physiological change or physical impairment (World Health Organization, 2001). The patients with knee OA lost quadriceps muscle strength and knee joint stability. They have difficulty to do daily life activities, such as ascending and descending the stairs, rising from chair and bed, walking long distance. Functional limitation can be assessed by using physical performance testing and self-report on the level of difficulty to perform daily activities (Goldman, Gleib, Rosero-Bixby, & Rochester, 2014). This study focuses on one's perception on difficulty to perform daily activities.

Brittain et al. (2011) found that 63 percent of women with arthritis reported functional limitation was a barrier to do moderate physical activity. Greene et al. (2006) examined the factors influencing physical activity in African-American women with osteoarthritis and rheumatoid arthritis. Types of physical activity in this study comprises sitting or lying down, exercise, leisure-time activity, and household activity. Greene et al. found that Functional limitation was not able to explain the variance of leisure-time and household activities. Functional limitation could explain the variance of exercise only 8 percent. However, it should be noted that this study was not capture physical activity intensity. Conversely, Rosemann et al. (2007) examined the factors influencing physical activity in patients with osteoarthritis of the knees, and they found that functional limitation of lower body could explain the variance of physical activity was greater than pain. Functional limitation of lower body could explain 18 percent of the variance of physical activity, but pain could explain only 11 percent of the variance. Similarly, Lee et al. (2013) examined the factors influencing physical activity, which was assessed by accelerometer, in adults with knee OA. Lee et al. used tertile to group functional limitation due to OA into none, moderate, and severe functional limitation. They

found that the probability of moderate- to high- physical activity in the patients with severe functional limitation was significantly greater than the patients without functional limitation (odds ratio 1.9, 95%CI: 1.4, 2.5). The probability of unmet moderate- to high- physical activity recommendation in the patients with moderate functional limitation was greater than the patients without functional limitation though non-statistic significant (odds ratio 1.2, 95%CI: 0.9, 1.6).

In conclusion, the previous studies support that limitation of knee function influence physical activity in context of knee osteoarthritis. This result is supported both subjective and objective physical activity assessments. However, there is limited in number of study.

2.4.3 Environmental resources

This study defined environmental resource as social support. Social support refers to emotional, informational, or practical assistance from significant others, such as family members, friends, or coworkers; (and that) support actually might be received from others or simply perceived to be available when need (Thoits, 2010, p. S46). Social support is coping resource (Lazarus & Folkman, 1984). Social support can reduce the effect of stress directly through one's perception to the degree of helps that are provided by other persons in stress events. The consequences of perceived social support are increasing of senses of self-esteem, sense of predictability, stability, and controlling over the environment. Also, social supports can reduce the effect of stress indirectly by protecting people from the pathogenic effects of stress (being buffering) (Cohen & Syme, 1985). Social support acts as buffering (moderating role) when person has high stress (Cohen & McKay, 1984). Zimet, Dahlem, Zimet, and Farley (1988) stated that social support affected health directly and indirectly, as buffer. Moreover, social support was benefit to maintain health and illness recovery. To reduce negative impact from stress events, social support helped people to change the situation itself, to alter the meaning it had, and/or to change the individual's affective response to the stressors.

Social support can be assessed in wide range of aspect function, structure, and quantity. It can be measured using the concepts of received support, perceived available support, perceived social relations, and satisfaction with support (Lakey &

Cohen, 2000; Underwood, 2000). Although social support is various in aspects; generally, close ties, such as from partner or family member, provided *bonding* especially emotional support, while public social ties provided *bridging* especially informational support (Gottlieb & Bergen, 2010). Social structure is not expected to be buffering because it derived simply from the existence of the relationship, not from esteem-supporting interactions provided by the relationship (Wills, 1985, p. 69). Therefore, this study focused on the function content of social support based on the participants' perceived on the supports that family, friend, and significant others available to them. Zimet et al. (1988) stated that perceived adequacy of social support, which was subjective measure, was a predictor of psychological status better than the size of social support system, which was objective measure. Therefore, this study focused on function content based on the participants' perceived on the supports that family, friend, and significant others available to them.

According to the Interaction Model of Client of Health Behavior, Cox (1982) stated that environmental resource and previous health care experience had reciprocal relationship and operated each other overtime. The result of operation between environmental resource and previous health care experience is antecedent to cognitive appraisal to produce specific outcome. As stated earlier, osteoarthritis symptoms might be barriers of doing physical activity among osteoarthritis patients. Social support might promote the patients to use active coping might benefit to perceive pain and functional limitation, as well as benefit to perform physical activity. In arthritis context, Evers, Kraaijmaat, Geenen, Jacobs, and Bijlsma (2003) found that rheumatic patients who perceive greater social support perceived less increases of pain and functional disability throughout 5 years. Similarly, two studies which were conducted in contexts of knee osteoarthritis found that inverse association between perceived social support and pain (Weinberger, Tierney, Booher, & Hiner, 1990) and physical disability (Weinberger et al., 1990; Ferreira and Sherman, 2007). In addition, the previous studies found that the social support promoted the patients to use active coping which might facilitate them to engage moderate to high physical activity. Evers et al. (2003) found that rheumatic patients who perceive greater social support attempted to function in spite of pain (using active coping). However, López-Martínez, Esteve-Zarazaga, and Ramírez-Maestre (2008) found that the patients with

chronic pain used passive coping when they perceived less support. Passive coping was positively associated to perceived pain (López-Martínez et al., 2008). Therefore, social support might promote the patients to do physical activity by promoting them to use active coping and by reassess levels of pain and functional limitation. In turn, social support might prevent the patients to use passive coping which was benefit to pain perception. However, the effect of social support on physical activity in osteoarthritis patients has not been found.

2.4.4 Cognitive appraisal

According to the Interaction Model of Client of Health Behavior, Cox (1982) stated that cognitive appraisal was the clients' interpretation of their health state. This appraisal might lead to an affective responses, such as fear. Both cognitive appraisal and affective responses can reciprocal influence the regimen adherence. Pain catastrophizing and pain-related fear were cognitive appraisal of pain which had been found in the patients with chronic musculoskeletal pain, as well as osteoarthritis of the knees. They are mentioned as causes of sustain pain and disability after pathology relieve. Pain catastrophizing and pain-related fear can push persons to vicarious cycle of fear-avoidance, and resulting avoidance behavior, such as limitation of physical activity and guarding. Short-term of avoidance behaviors can relieve pain, but long-term of avoidance behaviors leads to reducing of pain tolerance, physical disability and depression. Therefore, pain catastrophizing and pain-related fear become a two-edged sword (Vlaeyen & Linton, 2000). For osteoarthritis patients, knee pain induced during activity and those cognitive appraisals make the patients to avoid and limit activity, and thus causing muscle weakness, knee joints instability, and loss of physical function (Dekker et al., 2009). The influence of pain catastrophizing and pain-related fear on pain intensity and physical disability has been studied in chronic musculoskeletal pain, such as low back pain, neck pain, as well as osteoarthritis pain.

2.4.4.1 Pain catastrophizing

Pain catastrophizing refers to the patients' negative self-statement, catastrophizing thought, and ideation related to pain which reflects to helplessness and pessimism about ability to cope with pain (Lukkahatai, 2004;

Rosenstiel & Keefe, 1983). Pain catastrophizing is an extremely negative thought about pain, and it affects pain perception and physical function. Moreover, it is a precursor of pain-related fear (Vlaeyen & Linton, 2000; 2012).

Catastrophic thinking magnifies pain as a sign of injury. Sufferers spent more attention to scan pain stimuli (hypervigilance) and avoided or escaped from those stimuli. Avoidance behavior was a safety-seeking behavior. Avoidance behavior could protect sufferers from pain; in the long-term, conversely, it could exacerbate pain. Sufferers avoided pain-induced activities as soon as they anticipated the negative consequences of pain. Pain catastrophizing and avoidance behavior caused perceived excessive pain, disuse, disability, and depression (De Peuter et al., 2009; Vlaeyen & Linton, 2000; 2012).

Patients with greater pain catastrophizing are likely to perceive greater pain intensity and functional limitation. Keefe et al. (2000) examined the effect of pain catastrophizing on knee pain and function by asking the patients with knee OA to execute the tasks in their lab, such as sitting, standing, walking, reclining, and walking. Keefe et al. (2000) found significant impact of pain catastrophizing on knee pain and knee function. Somers et al. (2009) found that pain catastrophizing could explain 10 percent the variance of knee pain and 11 percent of the variance of functional limitation among overweight patient with knee OA. Similarly, Wideman et al. (2014) examined the impact of pain catastrophizing on knee pain and function among the patients with knee OA. They found pain catastrophizing significantly explain knee pain and function, 11 and 16 percent, respectively. In 2014, Sinikallio, Helminen, Valjakka, Vaisanen-Rouvali, and Arokoski. examined the correlation between pain catastrophizing and knee pain and function. They divided the patients with knee OA into two groups, the lowest and highest, based on tertile of pain catastrophizing, and they found that the patients who were in the highest group had significantly knee pain and functional limitation greater than who were in the lowest group (Sinikallio et al., 2014). Thompson, Urmston, Oldham, and Woby (2010) found that increasing of pain catastrophizing was significant associated with greater pain intensity when studied in population with chronic neck pain. However, Woby et al. (2004) did not find the association between pain catastrophizing and pain perception when studied in chronic low back pain. This difference results might be because of

different in pain experience. Pain in the neck and knee were more specific location than pain in back.

Taken together, pain catastrophizing and pain-related fear can explain the variance of physical function. Denison et al. (2004) found that combination between pain catastrophizing and pain-related fear could explain 7 percent of the variance of functional limitation among the patients with sub-acute and chronic musculoskeletal pain (including chronic pain in head, neck, shoulder, low back, and multiple sites). Similarly, Woby et al. (2004) found that combination between pain catastrophizing and pain-related fear could explain 22 percent of the variance of functional limitation among the patients with chronic low back pain. Therefore, it is possible that pain-catastrophizing and pain-related fear affect to physical function because of effects of them on pain perception and physical function.

However, pain-catastrophizing might not influence physical activity. There are two different ways to measure pain catastrophizing. One is situation analysis that pain catastrophizing would be measured during or immediately after expose to a noxious situation. The other is dispositional or trait measurement that pain catastrophizing would be rated as the recall events (Leung, 2012). In the latter, pain catastrophizing was related to anxiety sensitivity, and it did not varied in fluctuation of pain. Quartana et al (2009) stated that maladaptive thought recalling might too distal to the moment of measurement. Pain-catastrophizing might promote physical activity instead of being barrier. Sullivan et al. (2001) argued that pain catastrophizing did not maladaptive coping because the result of pain catastrophizing did not always being worse health. Pain catastrophizing was inter-personal process and as coping style. Sullivan stated that catastrophizers might engage in exaggerated pain expression to take advantage from significant others. In other word, pain catastrophizers might be the way to inform other to obtain support (Martorella, Côté, & Choinière, 2008). Throne, Keefe, and Anderson (2004) stated that pain catastrophizing might be friendly for short pain duration. Moreover, engaging physical activity might be alternative way to distract from negative affect (Cotter & Lachman, 2010), such as feeling of helplessness. Therefore, pain catastrophizing might influence physical activity by worsening knee pain which is a cause of limitations of doing physical activity. Finally, pain catastrophizing can result in a loss

of knee function. Conversely, pain catastrophizing and physical activity might have positive association because some patients might convey catastrophizing thought to attain support.

2.4.4.2 Pain-related fear

Pain-related fear is defined as personal beliefs that doing physical activity provoked pain and injury, and resulting to stop or limit activities (Waddell, Newton, Henderson, Somerville, & Main, 1993). Pain-related fear refers to an excessive and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to pain as well (Somers et al., 2009). Du, Jananiste, Champion, and Yap (2008) stated that fear was acquired in 2 pathways. One was innate or genetic trait, and the other was environmental learning. Avoidance-learning process might acquire from direct pain experience from after-effects of physical activities. The other sources of pain-related fear were pain catastrophizing, interpersonal distress, and anxiety sensitivity (Asmundson, Norton, & Norton, 1999; Crombaz, Vlaeyen, Heuts, & Lysens, 1999). Pain-related fear reflected to fear of pain, fear of injury, and fear of movement which led to limit and avoid activity which the patients perceived as a threat. Pain-related fear makes the patients stop or limit activities (Waddell, et al., 1993). It is possible that pain-related fear prevents the patient to engage moderate to high physical activity by inducing avoidance behavior. Prolong pain-related fear results exaggerate pain and physical disability which make the patients have more avoidance behavior (Vlaeyen & Linton, 2000).

The previous studies examined the effects of pain-related fear on pain, physical function, and physical activity. They showed that pain-related fear inversely influenced on pain and/or functional limitation in various contexts of chronic musculoskeletal pain, such as chronic pain in head, neck, shoulder, back, and knee. Damsgard, Thrane, Anke, Fors, and RØe (2010) found that pain-related fear among patients with chronic musculoskeletal pain was significantly influence pain during performing general activity (odds ratio 1.08, 95%CI: 1.08-1.03) and exercise (odds ratio 1.08, 95%CI: 1.03-1.29). In contrast, the correlation between pain-related fear and pain perception was not found among the patients with chronic low back pain and chronic neck pain (Thompson et al., 2010; Woby et al., 2004). For the effect of pain-relayed fear and limitation of physical function, Koho et al. (2011) found that

greater pain-related fear was significantly associated with limitation of physical function, but non-significantly associated with pain intensity among the patients with chronic musculoskeletal pain. Similarly, Woby et al. (2004) found that pain-related fear could explain 19 percent of the variance of limitation of physical function, but could not explain pain intensity among the patients with chronic low back pain.

In knee osteoarthritis, Scopaz, Piva, Wisniewski, and Fitzgerald (2009) examined the relationships among pain-related fear, knee pain, and physical function among the patients with knee osteoarthritis, and they found that pain-related fear was mildly positively related to pain intensity (Spearman rho coefficient = 0.20, $p < 0.01$) and functional limitation (Spearman rho coefficient = 0.22, $p < 0.01$). Sinikallio et al. (2014) compared knee pain and physical function between low and high pain-related fear among the patients with osteoarthritis of the knee. They divided pain-related fear into low and high based on tertile score. Sinikallio et al. found significantly greater pain and physical function in the group of high pain-related fear. However, they did not find significant the effect of pain-related fear on pain and physical function after performing logistic regression analysis. Similarly, Somers et al. (2009) examined the effect of pain-related fear on pain, functional limitation, and walking speed in patients with knee OA. They found that pain-related fear influenced walking speed, but did not influence pain and functional limitation. This result implied that pain-related fear influence to physical performance but do not influence to pain and physical function.

According to the previous studies above, the effect of pain-related fear on pain and physical function is inconsistency in the results. It is difficult to give explanation because the existing studies are different in sites of pain and methods of statistical analysis. In addition, there is limited in number of the studies. However, the tendency to the effect of pain-related fear on functional limitation is more often than on pain. According the existing evidence, it is possible that pain-related fear might influence to physical activity by worsening knee pain and knee function. Up to now, there is little known about the effect of pain-related fear on physical activity. Only two studies examined the effect of pain-related fear on physical activity. The first study done by Elfving et al. (2007), they categorized patients with chronic back pain into low and high physical activity. Pain-related fear

was categorized into low, medium, and high. Elfving et al. found that the patients who had low activity had medium or high pain-related fear around 6 times greater than those who had high activity. This result was consensus to Koho et al.'s study. The second study done by Koho et al. (2011), they categorized pain-related fear of patients with chronic musculoskeletal pain into low, medium, and high. They found that decrease of leisure time physical activity was explained by low (13%), medium (35%), and high (41%) pain-related fear. Therefore, it is possible that pain-related fear induced the patients to limit activity.

In conclusion, pain catastrophizing and pain-related fear might influence physical activity. Most of studies have done in patients with chronic low back pain, and they might limit to apply in context of osteoarthritis because of different in pain experience. Chronic low back pain is non-specific pain, and it is often found in young adults. The patients with non-specific low back pain might feel insecurity because their pathology is unknown. It makes them stop their working for long period. The patient with non-specific low back pain tended to have anxiety, distress, powerlessness, and self-blame (Ellegaard & Pedersen, 2012). In contrast, OA pain is specific pain in the knees. Knee OA is often found in older adults. Some patients with knee OA believed that knee OA is natural process of getting older (Pouli, Das Nair, Lincoln, & Walsh 2014). In addition, the patients rather have experience of gradually deterioration of symptoms more often than abrupt onset of the symptoms. Previous studies were unable to provide insight into the effects of pain catastrophizing and pain-related fear on physical activity in patients with knee OA.

Summary of Literature Reviews

Osteoarthritis of the knee is commonly found in women with advancing age. Pain and functional limitation are common symptoms of osteoarthritis of the knee. In addition, osteoarthritis patients are likely to fall easily comparing to adults without osteoarthritis. These physical impacts are causes of depression and poor quality of life. Physical activity is beneficial for OA patients to manage osteoarthritis pain, maintain function, and prevent falls. In addition, physical activity is benefit to

prevent and maintain other chronic conditions, such as cardiovascular diseases and diabetes. Osteoarthritis patients are expected to do moderate to high physical activity. The Interaction Model of Client Health Behaviors guided the researcher to explore the influence of client singularity on physical activity.

The existing evidences show that the prevalence to insufficient physical activity in adults worldwide is increasing with age. However, some studies argue that older adults are more active than young adults because of more free time to do active leisure-time physical activity after retirement. In addition, change in family structure into nuclear family in Thailand, older adults still undergo their jobs to attain personal income. They might achieve moderate to high physical activity from occupational physical activity. Therefore, it is unclear whether age influences physical activity among Thai women. Many previous studies confirm the negative effect of BMI on physical activity because overweight induces the patients felt tiredness easily and elicits knee pain. However, BMI could little explain the variance of physical activity. Knee pain and functional limitation are OA symptoms that the patients report as barriers of physical activity. However, some studies found the patients still perform physical activity though they feel knee pain. While social support can be a buffer to stress for patients and help them cope with their symptoms, the influence of social support on physical activity in context of OA especially in Thai women has not well been explored. Pain catastrophizing and pain-related fear induced avoidance behavior, but the effects of them on physical activity have been unknown. Up to date, the existing studies related to factors influencing physical activity among women with knee OA in Thailand are limited. Evidently, most studies are conducted in Western and European countries. According to the literature review, advancing age, body mass index, knee pain, and functional limitation, as well as pain catastrophizing and pain-related fear might negatively influence physical activity. In contrast, social support might promote physical activity because it could help people to cope with pain and functional limitations.

CHAPTER III

MATERIALS AND METHODS

This chapter provides description of research materials and methods to be used in the study which includes: research design, population and sampling, sample size, setting, research instruments, validity and reliability of research instruments, protection of human rights, data collection and data analysis.

3.1 Research Design

This research was a cross-sectional study aiming to examine factors influencing physical activity in women with knee osteoarthritis.

3.2 Population and Sampling

The target population in this study were Thai women with osteoarthritis of the knee who aged 50 years and above, who had attended the Departments of Orthopedic Surgery, Orthopedic Treatment and Follow-Up, and Rehabilitation Medicine at Siriraj Hospital. The diagnosis of knee osteoarthritis was confirmed by physicians, using the standard clinical criteria of the American College of Rheumatology (Altman et al., 1986, see the topic 2.1.1). Convenience sampling was used to gather the samples, based on the inclusion and exclusion criteria as follows.

Inclusion criteria:

- Being able to communicate in Thai language
- Not being wheelchair-bound or bedridden

Exclusion criteria:

- Having history of knee replacement surgery in a previous year

- Being diagnosed with major depression, psychosis, Parkinsonism, and other arthritis beyond osteoarthritis including rheumatoid arthritis and gout
- For women who aged 60 years and above, having cognitive impairment which was not able to pass Mini-Mental State Examination version Thai 2002 (MMSE-Thai 2002) (The Committee of MMSE-Thai development, cited in Department of Medical Services, Ministry of Public Health, 2014, pp. 28-35), at cut-point scores 14 and lower for illiterate, 17 and lower for the elderly who graduated from elementary school, 22 and lower for the elderly who graduated from high school and above (see Appendix K).

3.3 Sample Size

Logistic regression analysis was used in this study. Sample size would be estimated using G* Power 3.1.9 program which the researcher set the program at one tail, odd ratio 1.5, probability ($Y=1|X=1$) 0.2, type I error 0.05, power of test ($1-\beta$) 0.80. Sample size was 242.

3.4 Settings

The study was conducted at Department of Orthopedic Surgery, Department of Orthopedic Treatment and Follow-Up, and Department of Rehabilitation Medicine, Siriraj Hospital, Mahidol University. The office hours were from 7 a.m. to noon on Monday to Friday. Each department provided health service to osteoarthritis patients, as the detail below:

3.4.1 Orthopedic Surgery Department: Osteoarthritis patients visited here on average 830 visits per month between 1 October 2013 and 30 September 2014. Health care providers comprise orthopedic physicians, professional nurses, practical nurses, and physiotherapists. Professional nurses are responsible for screening health status before the patients to meet orthopedic physicians and providing health education both individual and group before the patients seeing the doctors. Also, physiotherapist provide exercise training for the patients who are referred from the doctors. The exercise training are varied deeply on complexity of knee issues.

3.4.2 Department of Orthopedic Treatment and Follow-Up: Osteoarthritis patients visited here on average 100 visits per month between 1 October 2013 and 30 September 2014. The department of Orthopedic Treatment and Follow-Up provides services to OA patients who wait Total Knee Arthroplasty (TKA). Waiting time for TKA is between 1 month and 1 year. In addition, this unit provides services to OA patients with TKA post-operation. Health care providers comprise orthopedists, professional nurses, and practical nurses. Professional nurses are responsible to inquire and screen health history before the patients to meet orthopedists and provide health education both individual and group. The topics provided to osteoarthritis patients are self-care after knee surgery. Practical nurses are responsible to measure blood pressure and check queue and appointment systems.

3.4.3 Department of Rehabilitation Medicine: Osteoarthritis patients visited here on average 190 visits per month between 1 October 2013 and 30 September 2014. Health care providers comprise physical medicine and rehabilitation doctors, professional nurses, practical nurses, and physiotherapists. During waiting the doctor health education are provided clients by professional nurses and physiotherapists. VDO-based exercise group are also provided to the patients.

The researcher collected the data at those settings between Monday and Friday, from 7 a.m. to noon.

3.5 Research Instruments

The instruments comprised six questionnaires including 1) Personal Data Questionnaire, 2) Thai version of Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), 3) Thai version of Catastrophizing subscale of the Coping Strategies Questionnaire-Revised (CSQ-Revised), 4) Thai version of Fear-avoidance Beliefs Questionnaire about Physical Activity (FABQ-PA) modified for osteoarthritis of the knee, 5) Revised Thai version of Multidimensional Scale of Perceived Social Support (rMSPSS), and 6) Thai version of short form International Physical Activity Questionnaire (IPAQ-short form). All questionnaires were interviewed by the researcher.

3.5.1 Personal Data Questionnaire

Personal Data Questionnaire which was developed by the researcher aiming to collect information about demography and health status. This questionnaire included demographic questionnaire, health questionnaire (patient's part), and health questionnaire (reviewed by the researcher) (see Appendix E).

3.5.1.1 Demographic questionnaire: the participants would be asked about general data including age, marital status, job status, educational level, monthly income, and living with others.

3.5.1.2 Health questionnaire (patient's part): the participants would be asked about knee stiffness in the past 7 days, number of falling in a previous year, and exercise behaviors. Participants would rate current pain on 0-10 numeric rating scale of which 0 (no pain) and 10 (worst possible pain). Knee stiffness in previous 7 days was assessed by stiffness scale of Modified Thai version of the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index. Stiffness subscale has 2 items for assessing knee stiffness in the morning after first waking and during working, which are provided on 0-10 numeric rating scale of which 0 (no stiffness) and 10 (mostly stiffness).

3.5.1.3 Health questionnaire (reviewed by the researcher): the researcher used it to record data about duration of knee OA, the number of the affected knee, OA treatment in the last 6 months, comorbidity. Those health histories were reviewed from medical record by the researcher. Body weight, height, and body mass index were recorded in this part also.

3.5.2 Modified Thai version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

Western Ontario and McMaster Universities Osteoarthritis Index was developed by Bellamy in 1986 to assess health status that specific to osteoarthritis patients. It was a well-accepted disease-specific instrument to assess health status for hip and knee OA. Western Ontario and McMaster Universities Osteoarthritis Index comprises 24 items of 3 subscales including pain, stiffness, and physical functioning. Responders can complete the questionnaire within 5 minutes. Western Ontario and McMaster Universities Osteoarthritis Index is provided in 3 formats including Likert

Scale, Visual Analogue Scale, and Numeric Rating Scale. In general, the responders have to recall their pain, stiffness, and physical in preceding 48 hours. However, the researcher can ask the patient to recall on the time frame 1 to 14 days (Bellamy, 2014).

In 2007, 0-10 Numeric Rating Scale of WOMAC version 3.1 (WOMAC[®] NRS 3.1 Index) was translated from English into Thai language, and it was little modified to be compatible to Thai culture, called 'Modified Thai version of WOMAC'. It is provided in a form of 11-point horizontal Numerical Rating Scale. Knee pain and functional limitation in this study were assessed by pain and function subscales of modified Thai version of WOMAC[®] NRS 3.1 Index. Thai version of WOMAC-pain scale has 5 items, as can be seen in Appendix F. The responders will rate their pain in daily life activities including pain when walking, ascending the stairs, standing, resting, as well as pain in the night on NRS ranging from 0 (no pain) to 10 (extremely pain). The possible scores are 0 to 50, and higher scores refer higher pain intensity. Thai version of WOMAC, two items of function scale from original version were excluded because of failing to catch the content validity (content validity index equaled to zero). Therefore, Thai version of WOMAC has 22 items including 5 items of pain, 2 items of stiffness, and 15 items of function, as can be seen in Appendix F. The responders would rate difficulty in performing physical activities, including ascending and descending the stairs, rising from chair and bed, standing, sitting, walking on flat floor, getting in/out a car, going shopping or market, putting on and taking off pants, taking a bath, getting on/off toilet, and engaging light and heavy household activities, on horizontal Numeric Rating Scale ranging from 0 (excellent ability) to 10 (mostly difficulty). The possible scores are 0 to 150, and higher scores indicate greater functional limitation. In the current study, the participants were requested to recall the average pain and function in previous 7 days. If the patients had pain in both knees, they would assess their pain on the side produced greatest pain. Similarly, if the patients had functional limitation in both knees, they would assess their functional limitation on the side produced greatest difficulty. In addition, if the patients had functional limitation of different activities; for example getting in differing from out a car, they would assess their limitation on the direction produced greatest difficulty. If the patients had no experience of some activities, for example getting in/out a car, they would answer this item hypothetically.

Psychometric properties of modified Thai version of WOMAC: Kuptniratsaikul and Rattanachaiyanont (2007) reported that Thai version of WOMAC-pain and WOMAC-function had moderate convergent validity, high internal consistency, and moderate stability. For Thai version of WOMAC-pain, it was moderately related to pain scale of Lequense index pain scale (Spearman's correlation coefficient was 0.66, $p < 0.001$). Cronbach's alpha coefficient of Thai WOMAC-pain scale was 0.87. Stability for 3 week interval accounted by Spearman's correlation coefficients was 0.61. Intraclass correlation coefficient was 0.75. Similarly, Thai version of WOMAC-function was moderately related to function of Lequense index (Spearman's correlation coefficients were 0.69, $p < 0.001$). Function scale of Western Ontario and McMaster Universities Osteoarthritis Index was moderately related to maximum walking distance of Lequense index also (Spearman's correlation coefficients were 0.59, $p < 0.001$). Cronbach's alpha coefficient of Thai WOMAC-function scale was 0.96. Stability accounted by Spearman's correlation coefficients was 0.70. Intraclass Correlation Coefficient was 0.79 (Kuptniratsaikul & Rattanachaiyanont, 2007).

3.5.3 Thai version of Catastrophizing subscale of the Coping Strategies Questionnaire-Revised (CSQ-Revised)

The Coping Strategies Questionnaire (CSQ) was developed by Rosenstiel and Keefe (1983). It is a self-administrated questionnaire aiming to assess cognitive and behavior coping in the patients with chronic low back pain. Original CSQ comprises 48 items with six coping response scales. Cognitive coping comprises 6 subscales including diverting attention, repeating pain sensation, coping self-statements, ignoring pain sensation, praying and hoping, and catastrophizing. Behavior coping comprises two domains including increase of activity level and increase of pain behaviors. Coping scale is provided in seven-point Likert scales on which 0 = never, 3 = sometimes, and 6 = always. In addition, CSQ has two extra items to assess self-control over pain and ability to decrease pain. These extra items is provided in 7 point Likert scales also. Coping Strategies Questionnaire has accepted reliability, excepting subscales of increasing pain behaviors. During development, CSQ was reduced into 27 items with six subscales coping after conducting factor analysis, called Coping Strategies Questionnaire-Revised. Coping Strategies Questionnaire-Revised

deleted domains of behavioral coping. However, items in catastrophizing subscale had no change. Revised Coping Strategies Questionnaire was translated into Thai by Lukkahatai (2004) (see appendix G), and it was used in Thai cancer patients. Cronbach's alpha for total scale was 0.83. Catastrophizing subscale of CSQ-Revised comprises six items. It aims to assess participants' negative self-statement, catastrophizing thought, and ideation about pain. The items are 1) 'It is terrible and I feel it is never going to get any better', 2) 'It's awful and I feel that it overwhelms me', 3) 'I feel of my life is not worth living', 4) 'I worry all the time about whether it will end', 5) 'I feel I cannot stand it anymore', and 6) 'I feel like I cannot go on. The participants will respond each item on 7-point Likert scale, including 0 = never, 1 = almost never, 2 = rarely, 3 = seldom, 4 = often, 5 = almost always, and 6 = always. Possible scores are 0 to 36, and higher scores indicates higher pain catastrophizing.

Psychometric properties of CSQ: Original catastrophizing subscale of CSQ had been examined in the patients with knee osteoarthritis. It had accepted reliability when used in the patients with knee osteoarthritis, and Cronbach's alpha coefficients were between 0.81 and 0.97 (Keefe, Affleck, France, et al., 2004; Keefe et al., 2000; Keefe, Rumble, Scipio, et al., 2004; Shelby et al., 2008; Somers et al., 2009). Thai version of Coping Strategies Questionnaire-Revised had been used in patients with cancer, and it had accepted reliability with alpha coefficient ranging from 0.72 to 0.86 (Lukkahatai, 2004, p. 65). Up to date, there is no study that examines psychometric properties of Thai version of catastrophizing subscale of CSQ-Revised in osteoarthritis patients.

3.5.4 Thai version of Fear-Avoidance Beliefs Questionnaire about Physical Activity (FABQ-PA) Modified for Osteoarthritis of the Knee

Fear-Avoidance Beliefs Questionnaire about physical activity is a self-administered questionnaire developed by Waddell and colleagues to assess one's opinion about back pain. This opinion implies to patients' belief about how physical activity and work affected to their current back pain. Fear-Avoidance Beliefs Questionnaire focused on beliefs about the seriousness of the illness and its effect on the patients' life. In addition, FABQ reflects to the concept of increase of somatic awareness or somatic focusing. Fear-Avoidance Beliefs Questionnaire about physical

activity has 11 items with two subscales, including 4 items of fear-avoidance beliefs about physical activity (FABQ-PA), 7 items of fear-avoidance beliefs about work (FABQ-W). Moreover, FABQ includes 1 extra item in FABQ-PA and 4 extra items in FABQ-W. In this study, FABQ-PA was used to assess pain-related fear.

Physical Activity subscale of Fear-Avoidance Beliefs Questionnaire about physical activity comprises 5 items. The items were 1) 'My pain was caused by physical activity, 2) 'Physical activity makes my pain worse', 3) 'Physical activity might harm my back', 4) 'I should not do physical activities should (might) make my pain worse', and 5) 'I cannot do physical activities should (might) make my pain worse'. The examples of physical activity are given, including bending, lifting, walking, or driving. The participants have to rate their opinion in 7-point Likert scales ranging from completely disagree to completely agree, with 0 = completely disagree, 3 = unsure, and 6 = completely agree. Item 1 is extra item; therefore, only 4 items were scored in total (item 2-5). Possible scores of FABQ-PA are 0 to 24. Higher scores indicate greater pain-related fear.

Psychometric properties of FABQ-PA: Waddell et al. (1993) examined psychometric property of FABQ. They reported that FABQ had good test-retest stability in 48-hour period which presented kappa statistic values 0.88 for physical activity subscale, 0.95 for work subscale, and 0.74 for overall scales. In addition, FABQ-PA showed good internal consistency with Cronbach's alpha coefficients 0.77 for physical activity subscale, and 0.88 for work subscale. FABQ had good construct validity also analyzed by principal-component analysis (Waddell et al., 1993). Physical Activity subscale of Fear-Avoidance Beliefs Questionnaire had been used in the patients with knee osteoarthritis. To be compatible to patients with knee OA, Scopaz et al. (2009) replaced the word 'back pain' with 'knee pain', and they replaced the examples of 'bending, lifting, walking, or driving' with 'running, walking, kneeling, and driving'. This modified FABQ-PA had Cronbach's alpha coefficient equal to 0.75 (Scopaz et al., 2009). Therefore FABQ-PA modified for knee osteoarthritis was used in this study, as can be seen in Appendix H. The researcher received the permission from Waddell to modified FABQ.

3.5.5 Revised Thai version of The Multidimensional Scale of Perceived Social Support (rMSPSS)

Original Multidimensional Scale of Perceived Social Support was developed by Zimet et al. in 1988 to assess one's perceived adequacy supports provided by family, friends, and significant others. However, Zimet et al. (1988) did not categorize types of social support. Multidimensional Scale of Perceived Social Support comprised 3 sub-scales of family, friends, and significant others. Each subscale has 4 items. Multidimensional Scale of Perceived Social Support can score subscale separately or sum all.

Multidimensional Scale of Perceived Social Support is provided in 12 items with 7-point Likert scale ranging from very strongly disagree (1) to very strongly agree (7). The responders will be introduced by the statement 'How you feel about the following statements'. For example, the following statements are 'This is a special person who is around when I am in need', 'My family really tries to help me', and 'I can talk about my problems with my friends'. The score will be divided by number of items. Therefore, the possible scores are 1 to 7 for each subscale and overall. Higher scores indicate higher social support.

Wongpakaran, T., Wongpakaran, N., and Ruktrakul (2011) translated MSPSS from English into Thai language and back translated MSPSS from Thai into English language. They examined the psychometric properties in medical students and psychiatric outpatients. Thai version of MSPSS had good concurrent validity. Three subscales were accepted from factor analysis. It was positively related to Rosenberg self-esteem scale, and it was negatively related to depression and anxiety scales. However, Wongpakaran et al. (2011) found quite high correlation between subscales of social significant other and friends ($r = 0.60$, $p < 0.001$) in student group. Moreover, they found quite high correlation between social significant other and family ($r = 0.48$, $p < 0.001$) in patient group. It might be because of unclear the meaning of the term 'significant other'. In the following year, Wongpakaran N. and Wongpakaran T. (2012) little revised Thai MSPSS defining 'special person excluded friends and family'. The revised version had more fit index. Three subscales were still accepted. The revised version is called "Revised Thai version of The Multidimensional Scale of Perceived Social Support" (rMSPSS). Revised Thai version of The Multidimensional Scale of

Perceived Social Support was used in this study to assess perceived social support, as can be seen in Appendix I.

Psychometric properties of MSPSS: Zimet et al. (1988) examined the internal consistency of original MSPSS, Cronbach's alpha coefficients were 0.87, 0.85, 0.91 and 0.88 for family, friends, significant others, and overall, respectively. The test-retest reliability for 2-3 months were 0.85, 0.75, 0.72, and 0.85 for family, friends, significant others, and overall, respectively. Zimet, Powell, Farley, Werkman, and Berkoff (1990) examined the psychometric properties of MSPSS in adolescent, pediatric residents, and postpartum women, and MSPSS had Cronbach's alpha coefficients more than 0.80 in both subscale and total scores. The psychometric properties had been reported in older adults with and without anxiety disorder also. Stanley, Beck, and Zebb (1998) found good internal consistency both non-anxiety and anxiety groups, Cronbach's alpha coefficients ranging from 0.87 to 0.94. Test-retest reliability (3-week interval) was less than in significant others scale. Test-retest reliability (Pearson's correlation coefficients) was 0.74 for family, 0.73 for friends, 0.54 for significant others, and 0.73 for overall.

Thai Multidimensional Scale of Perceived Social Support is good instrument because it has accepted reliability. Internal consistency of Thai Multidimensional Scale of Perceived Social Support had been examined in medical students and psychiatric outpatients. In student group, Cronbach's alpha coefficients were 0.83, 0.91, 0.86, and 0.91 for family, friends, significant others, and overall, respectively. In psychiatric group, Cronbach's alpha coefficients were 0.85, 0.84, 0.74, and 0.87 for family, friends, significant others, and overall, respectively. For stability (retest 4-week interval), Intraclass Correlation Coefficient was 0.75. For Revised Thai version of Multidimensional Scale of Perceived Social Support (rMSPSS), the properties had been examined in medical students also. Cronbach's alpha coefficients as 0.88, 0.91, 0.92, and 0.92 for family, friends, significant others, and overall, respectively (Wongpakaran, N. & Wongpakaran, T., 2012).

3.5.6 Thai version of short form International Physical Activity Questionnaire (IPAQ-short form)

In 1996, International Physical Activity Questionnaire (IPAQ) was developed by International Physical Activity Questionnaire Group. Original of IPAQ is a self-administered questionnaire that is provided in English version both short form and long form. Telephone-administered short form is provided also. Its' aim to assess physical activity for adults aged 15 to 69 years worldwide.

Long Form International Physical Activity Questionnaire comprises 27 items to ask person's frequency and duration of vigorous- intensity physical activity, moderate- intensity physical activity, and walking with long lasting at least 10 minute in the last 7 days. Long Form International Physical Activity Questionnaire is arranged in sequence vigorous- intensity physical activity, moderate- intensity physical activity, and walking. In addition, long form IPAQ provides separate domain of types of physical activity including a) job-related physical activity, b) transportation physical activity, c) housework, house maintenance, and caring for family, and d) recreation, sport, and leisure-time physical activity. For scoring, long form IPAQ provides separate domain specific scores for vigorous- intensity physical activity, moderate- intensity physical activity, and walking of each domain of types of physical activity.

Short Form International Physical Activity Questionnaire comprises 6 items to inquiry frequency and duration of vigorous physical activity, moderate physical activity, and walking with long lasting at least 10 minute in the last 7 days, and 1 item to inquiry duration of sitting in a period of weekday. Short Form International Physical Activity Questionnaire does not provide separate domain of types of physical activity. However, it provides both continuous and category score as same as IPAQ long form. Similarly to long form, intensity physical activity in short form IPAQ is arranged in sequence of vigorous-intensity physical activity, moderate-intensity physical activity, and walking, respectively. Both long and short forms of IPAQ had been examined validity and reliability in 12 countries. They had accepted criterion validity and test-retest reliability, and there no difference between both forms. Additionally, the correlation between long form and short form (Spearman's coefficients) was high, ranging between 0.78 and 0.85. Therefore, short form IPAQ

was recommended to decrease burden of participants (Craig et al., 2003). In this study, short form IPAQ form was used, as can be seen in Appendix J.

For scoring, short form IPAQ can calculate separate scores on vigorous-intensity physical activity, moderate-intensity physical activity, and walking, with excluding sitting. For sitting, it can calculate separate scores by summation of the duration (in minutes) per a day. However, Hallal et al. (2010) found that it difficult to make distinction between walking and doing moderate-intensity physical activities which included occupational and household activities. People in developing countries often reported that they walked all days during doing occupational and household activities. To prevent the problem of duplicate answer, Hallal et al. suggested to remind the responders that the activities should not report more than once and used sum across activities instead of separating each activity. Therefore, the scoring of short form IPAQ in this study aimed to use all of activities vigorous-intensity physical activity, moderate-intensity physical activity, and walking for classifying the levels of physical activity.

Levels of physical activity assessed by short form IPAQ can be calculated using continuous scores or MET values and categorical score (International Physical Activity Questionnaire Group, 2005), as the following.

- *Continuous scores*: The researcher can calculate vigorous physical activity, moderate physical activity, and walking using MET values. Ainsworth et al. (2011) provides Compendium of Physical Activities to estimate MET values. Continuous scores of physical activity can calculated as the following formula:

Walking MET-minutes/week = 3.3 x Walking minutes x Walking days

Moderate MET-minutes/week = 4.0 x Moderate-intensity activity minutes x
Moderate-intensity activity days

Vigorous MET-minutes/week = 8.0 x Vigorous-intensity activity minutes x
Vigorous-intensity activity days

Total physical activity MET-minutes/week = sum of Walking + Moderate +
Vigorous MET-minutes/week scores

- *Categorical scores*: The researcher can calculate the scores by summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity, and vigorous-intensity activities. Categorical scores of short form IPAQ

provides 3 levels of physical activity, including low, moderate, and high. Ainsworth et al. provides the criteria for each level as below:

Category 1 Low physical activity: no meet criteria of moderate and high physical activity.

Category 2 Moderate physical activity: a) 3 or more days of vigorous-intensity activity of at least 20 minutes per day; **or** b) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day; **or** c) 5 or more days of any combination of walking, moderate-intensity activity, and vigorous-intensity activity achieving a minimum total physical activity of at least 600 MET-minutes/week.

Category 3 High physical activity: a) vigorous-intensity activity on at least 3 days achieving a minimum total physical activity of at least 1,500 MET-minutes/week; **or** b) 7 or more days of any combination of walking, moderate-intensity activity, and vigorous-intensity activity achieving a minimum total physical activity of at least 3,000 MET-minutes/week.

This study categorized the levels of physical activity into low, and moderate to high physical activity based on the criteria as below:

- Moderate to high physical activity is minimum of a) 3 or more days of vigorous-intensity activity of 20 minutes per day; or b) 5 or more days of moderate-intensity and/or walking 30 minutes per day.
- Low physical activity is not moderate to high physical activity.

Psychometric properties of short form IPAQ: Craig et al. (2003) reported psychometric properties of short form IPAQ when it was used in 12 countries. Short form IPAQ had good test-retest reliability for 3 to 7 days periods with Spearman's coefficients ranged from 0.66 to 0.88 for overall and from 0.71 to 0.95 for sitting time. Although IPAQ prefers for adults aged 15 to 69 years, it had been used in older adults aged over 69 years. Short form of IPAQ had low to moderate test-retest reliability for 2 weeks period among older adults aged 65 to 74 years and 75 to 89 years, which ICC ranged from 0.33 to 0.39 for vigorous, 0.47 to 0.63 for moderate, 0.55 to 0.73 for walking, 0.50 to 0.65 for overall, and 0.66 to 0.82 for sitting time (Tomioka, Iwamoto, Saeki, & Okamoto, 2011). For criterion-related validity, Ekelund et al. (2006) examined criterion validity of short form IPAQ with accelerometer and found small

correlation between them ($r = 0.34$, $p < 0.001$). Craig, et al. (2003) synthesized 6 studies which examined criterion validity of self-report short form IPAQ with accelerometer and found small correlations between them ($r = 0.02 - 0.47$). Similarly, Lee, Macfarlane, Lam, and Stewart (2011) synthesized 23 studies which examined criterion validity of short form IPAQ with accelerometer and pedometer and found small correlations between them ($r = 0.09 - 0.39$). Comparing to accelerometer, five of six studies reported that short form IPAQ had over report physical activity between 86 and 176 percent. Only one study reported that short form IPAQ had under report physical activity, 28 percent (Lee, et al. 2011). In Thailand, Ratanawitpongse, Khunphasee, Pongrugsore, and Intarakamhang (2006) examined criterion validity of short form IPAQ with accelerometer and found fair observed agreement between them ($\kappa = 0.22$, $p < 0.05$). However, observed agreement between short form IPAQ and accelerometer increased to $\kappa 0.59$ ($p < 0.000$) when was retested within 7 days.

Although, short form IPAQ has low correlation between the test and criterion variables, there is acceptable agreement of classification of levels of physical activity, into sufficient and insufficient physical activity, between short form IPAQ and accelerometer. Ekelund et al. (2006) found that sensitivity of short form IPAQ to identify people who had insufficient physical activity according to the criterion of accelerometer was 45 percent, and specificity of short form IPAQ to identify people who had sufficient physical activity according to the criterion of accelerometer was 77 percent. It meant that short form IPAQ could classify people who had insufficient physical activity correctly 45 percent, and predict people who had sufficient physical activity correctly 77 percent. Therefore, short form IPAQ identified person with sufficient physical activity better than person with insufficient physical activity.

According to evidence above, short form IPAQ which was used in older adults was lower stability than IPAQ which was used in adults. However, short form IPAQ was selected for this study because the criteria validity of short form IPAQ in older adults was nearly to that in adults (Craig et al., 2003; Tomioka et al., 2011). Moreover, short form IPAQ had intraclass correlation coefficient nearly to Physical Activity Scale for the Elderly (PASE) when using in OA patients aged 40 to 80 years (Svege, Kolle, & Risberg, 2012). In addition, IPAQ short form is benefit to compare among international prevalence studies. However, it had been found that some older

participants did not understanding difference of moderate- and vigorous- intensity. In addition, bouts of 10 minutes of performing physical activity in the last 7 days was difficult to recall (Hallal et al., 2010; Heesch, van Uffelen, Hill, & Brown, 2010). Misunderstanding the questions might result to underestimate the prevalence of physical inactivity (Dumith, Hallal, Reis, & Kohl, 2011). To prevent these problems, Hallal et al. (2010) suggested the researcher used face-to-face interview instead of self-administer for developing countries, stimulated the participants think out loud, constantly reminded them about the 10-minutes bouts, applied to use calendars.

3.6 Validity and Reliability of Research Instruments

3.6.1 Validity of the instruments

Personal Data Questionnaire was developed by the researcher. Western Ontario and McMaster Universities Osteoarthritis Index, Coping Strategies Questionnaire, and Multidimensional Scale of Perceived Social Support which had been provided in Thai version were asked for permission from developers. The original instruments including Fear-Avoidance Beliefs Questionnaire and short form International Physical Activity Questionnaire had been provided in English version, and they were asked for permission from the developers.

Fear Avoidance Belief Questionnaire and short form International Physical Activity Questionnaire were translated from English into Thai language by two doctoral students in nursing and back-translated by two bilinguals (see Appendix N). Translation and back-translation processes have to hold meaning rather than the words. In translation process, the researcher compared two Thai versions and find agreement. Therefore, only one of Thai version would be sent to two bilinguals to back-translated from Thai into English languages. Two back-translations versions were compared by original developers.

For validity examination, five experts included one physician who had experience for caring orthopedic patients at outpatient departments, one physician who had experience for rehabilitation, one instructor in the field of sport science, one nursing instructors who had experience in mental health care, and one nursing

instructors who had experience in community health care (see Appendix M). Thai versions of WOMAC-pain scale, WOMAC-functional scale, Catastrophizing subscale of revised CSQ, modified FABQ-PA, rMSPSS, and IPAQ-short form were sent to those experts to assess content validity. In each of item of the questionnaires, the experts were asked the relevance of content to theoretical definitions. They had to rate the score for Content Validity Index (CVI), on ordinal point scale of 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. To examine inter-rater agreement among experts, item level CVI (I-CVI) and overall scale CVI (S-CVI) were calculated. The proportion of agreement of I-CVI was calculated by the number of experts giving a rating of either 3 or 4 dividing by the number of experts. The expected value of S-CVI is 0.78 and above (Polit, Beck, & Owen, 2007). S-CVI was calculated by the number of items that the experts giving a rating of either 3 or 4 dividing by the total number of items. The expected value of S-CVI is 0.80 and above (Davis, 1992 cited in Polit et al., 2007). All of the questionnaires in this study had accepted CVI, as can be seen in Table 3.1.

Table 3.1 Item Level Content Validity (I-CVI) and Scale Level Content Validity (S-CVI) of Instruments

Instruments	I-CVI	S-CVI
WOMAC – pain scale	1.00	1.00
WOMAC – functional scale	0.80-1.00	0.93
Catastrophizing subscale of CSQ-Revised	1.00	1.00
Modified FABQ-PA	1.00	1.00
rMSPSS	1.00	1.00
IPAQ-short form	1.00	1.00

3.6.2 Reliability of the instruments

Thai versions of WOMAC, catastrophizing subscale of revised CSQ, FABQ-PA, and rMSPSS would be tried out to identify Cronbach's alpha coefficients and to examine face validity. Cronbach's alpha coefficient should not be lower than 0.70, consequently lack of homogeneity of items, and it should not be higher than 0.90, consequently redundant number of items (Tavakul & Dennick, 2011). To reflect good test-retest reliability, Intraclass Correlation Coefficient should not be less than 0.60 (Srisathitnarakul, 2012, p. 332).

For reliability in this study, all instruments were tried out in 30 patients with osteoarthritis of the knee. The participants would complete Participant Information Sheet and Consent Form prior interview. Then, they would be assessed cognitive impairment using Mini-Mental State Examination version Thai 2002 (MMSE-Thai 2002). If they had no risk of cognitive impairment, interview would be performed in sequence, IPAQ-short form, Personal data questionnaire, WOMAC-pain, WOMAC-function, catastrophizing subscale of CSQ-Revised, modified FABQ-PA, and rMSPSS. Cronbach's alpha coefficient of instruments were between 0.75 and 0.95, as can be seen in the Table 3.2. IPAQ-short form interview would be performed again after 7 days by mobile phone. Time interval of repeated interview was average 7.40 days, SD = 1.07, Min-Max = 7 - 11. Kappa coefficient of IPAQ-short form was 0.74. To sum, reliability and test-retest reliability were accepted.

Table 3.2 Cronbach's Alpha Coefficient of Instruments

Instruments	Cronbach's Alpha Coefficient
WOMAC – pain scale	0.93
WOMAC – functional scale	0.95
Catastrophizing subscale of CSQ-Revised	0.85
FABQ-PA	0.75
rMSPSS	0.85

3.7 Protection of Human Rights

In this study, human ethics was established prior and during data collection, as well as in the process of storing and reporting data. All samples completed the Participant Information Sheet and Consent Form prior to the interview. They were informed that they could withdraw from the study whenever they wanted without any penalty or prejudice. Data were kept confidential. Details about the protection of human rights were delineated as below.

3.7.1 Prior to the data collection

The researcher submitted the research proposal for Institutional Review Boards (IRBs) of Siriraj Hospital, Faculty of Medicine, Mahidol University. The research proposal was approved from IRBs, with the protocol number 109/2558(EC3) (see Appendix B). In addition, the researcher sent a formal letter from Faculty of Nursing, Mahidol University to the Director of Siriraj Hospital to ask permission to collect the data.

3.7.2 During the data collection

After gaining permission from the Institutional Review Boards' and Hospital Director, the researcher contacted with head nurses of each department to inform about the research project. Professional nurses of each department invited the patients to participate in the study. If any patients were interested to participate in the study, the professional nurses would inform the researcher to contact those patients. The researcher introduced herself and gave information about purposes, procedure, benefit, and harm of the study to them. Then, the researcher availed the time for those patients to read Participant Information Sheet (see Appendix C), and ask additional information. The researcher would assure that they could withdraw from the study at any time without any negative impact. The patients who met the inclusion criteria and desired to participate in the study were then asked to voluntarily sign the Consent Form (see Appendix D).

3.7.3 Storing and reporting data

The name, address, and hospital number of the informants have been keeping a secret in personal notebook. All documents were given the codes that could not refer to informants. Related document was kept in personal locker. Both electronic and paper data are kept not exceed 3 years, and they will be destroyed as soon as the study is published. The researcher will destroy all paper data using shredder machine.

3.8 Data Collection and Data Analysis

3.8.1 Data collection

After approving letter from IRBs and heads of setting, the researcher started the study as the following steps:

3.8.1.1 The researcher contacted to head nurse each setting to introduce herself and explain objectives and processes of the study. To prevent the problems of disturbance of health services, the researcher and head nurse set a plan to collect the data together.

3.8.1.2 Professional nurses of each setting screened some inclusion and exclusion criterion from medical record (excepting cognitive impairment screening) and invited patients to participate in the study. The researcher contacted with those volunteers when they desired to participate in the study. The researcher introduced herself and took them to a private room to explain objectives and processes of the study and gave them the Participant Information Sheet to read. The researcher gave patients the time for decision making, and the patients could ask when they had doubts. The researcher asked the participants to sign the Consent Form when they agreed to participate in this study.

3.8.1.3 The researcher checked inclusion and exclusion criteria using medical record again. The participants who aged 60 years and above were screened cognitive impairment using Mini-Mental State Examination version Thai 2002. The researcher performed data collection when the participants had accepted properties.

3.8.1.4 Data were collected during waiting the treatment. The researcher began face-to-face interview in sequent of IPAQ-short form, Personal Data Questionnaire, WOMAC-pain, WOMAC-function, catastrophizing subscale of CSQ-Revised, modified FABQ-PA, and rMSPSS, respectively.

3.8.1.5 After the completed the questionnaires, weight and height were measured by the researcher. Weight in kilograms was measured by a weighing machine without shoes and heavy cloths. Standing height in centimeters was measured by a stadiometer without shoes. Weighing machine and stadiometer were calibrated by the hospital staff monthly to attain standard measurements. Body mass index was calculated from height in kilograms divided by the square of height in meters. Then, researcher gave them thanks for the devotion of a great deal of time.

3.8.1.6 The researcher contacted professional nurse to permit to review participant's medical record.

3.8.3 Data analysis

Data analysis used descriptive and multivariate statistical analyses, as below.

3.8.3.1 Descriptive statistical analysis

For demographic data, including age, BMI, and social support were analyzed by mean, standard deviation, and range. Category data, including age group, classification of BMI, marital status, education level, occupation, and living status were described using frequency and percentage.

For health-related data, duration of OA, currently average knee pain, knee stiffness, number of comorbidity, number of falling in a previous year, OA pain, functional limitation, pain catastrophizing, and pain-related fear were described using mean, standard deviation, and range. OA treatments and type of exercises were described using frequency and percentage.

For physical activity, low, moderate, and high physical activities were analyzed by frequency and percentage. Time spending for sitting were analyzed by median.

3.8.3.2 Multivariate statistical analysis

Logistic regression was used to conclude whether pain, functional limitation, pain catastrophizing, pain-related fear, and social support influence physical activity. Continuous score of independent variables were used, excepting age and BMI. Age was coded as 0 for the age less than 60 years, and 1 for the age of 60 years and over. Body mass index less than 25 kg/m² was coded as 0, and BMI 25 kg/m² and over was coded as 1. Dependent variable was divided into 2 groups, including low activity and moderate to high activity groups. Low activity group was coded as 0, and moderate to high activity groups was coded as 1.

To identify factors influencing physical activity in this study, both univariate and multivariate logistic regression analyses were used. Univariate logistic regression model was attained firstly using enter method. Age, BMI, knee pain, functional limitation, pain catastrophizing, pain-related fear, and social support would be entered into the model separately to calculate each variable's unique effect. Next, the statistically significantly independent variables (p-value < 0.05) were entered in the model simultaneously to establish multivariate logistic regression model. Statistical Package for the Social Science for Windows (SPSS) version 17 was used for data analysis. The significant value was set at 0.05. Confident Interval of exponential was set at 95 percent.

CHAPTER IV

RESULTS

The study was conducted to examine factors influencing physical activity among women with osteoarthritis of the knee. The factors included age, body mass index, knee pain, functional limitation, pain catastrophizing, pain-related fear, and social support. This chapter presented characteristics of the participants, followed by, characteristics of the study variables and factors influencing physical activity were presented.

4.1 Characteristics of the Participants

The targeted population in this study was women with being diagnosed with osteoarthritis of the knee. Two hundred and forty-four women with knee osteoarthritis who visited at the outpatient departments, Siriraj Hospital were invited to join the study. Two women were excluded from the study because of failing to pass the cut-point scores of MMSE-Thai 2002. Finally, 242 patients were included in the study. No patients withdrew from the study during the data collection process. Almost all (96.28%) of the participants were the patients of Department of Orthopedic Surgery. The rest were the patients of Department of Treatment of Orthopedic Treatment and Follow-Up (3 cases), and Department of Rehabilitation Medicine (6 cases), Siriraj Hospital, Mahidol University. Characteristics of participants were described as below.

4.1.1 Demographics characteristics of the participants

The age of participants was between 50 and 83 years, with an average of 65.1 years (SD = 8.1). Body mass index (BMI) of the participants was between 17.35 and 43.00 kg/m², with an average of 26.64 kg/m² (SD = 4.12). Approximately 58 percent of the participants were married. Only 5 percent of them live alone. Well over

half (53%) of the participants had elementary school. Only 5 percent of them were uneducated. Although half (50%) of the participants had no occupation, 86 percent of them had monthly income greater than 2,500 Bahts. This was considered enough for Thai people's living when benchmarking with the Basic Minimum Need Criteria (2012 – 2016), which determined family income 30,000 Bahts per person per year or 2,500 Bahts per person per month (Community Development Department, Ministry of the Interior & Department of Local Administration, 2012), as can be seen in Table 4.1.

Table 4.1 Demographics Characteristics of the Participants (n = 242)

Demographics characteristics	n	%
Age (min-max = 50-83, M = 65.1, SD = 8.1)		
< 60 years	69	28.5
≥ 60 years	173	71.5
Body Mass Index (min-max = 17.35-42.98, M = 26.64, SD = 4.12)		
< 25 kg/m ²	94	38.8
≥ 25 kg/m ²	148	61.2
Marital status		
Single	26	10.7
Married	140	57.9
Widowed/ Divorced/ Separated	76	31.4
Education		
Uneducated	12	5.0
Elementary school	127	52.5
High school, vocational certificate, and diploma	63	26.0
Bachelor and above	40	16.5
Occupational status		
Being unemployed	122	50.4
Being workers	120	49.6

Table 4.1 Demographics Characteristics of the Participants (n = 242) (cont.)

Demographics characteristics	n	%
Monthly income		
< 2,500 Bahts/month	33	13.6
≥ 2,500 Bahts/month	209	86.4
Living status		
Living alone	12	5.0
Living with others	230	95.0

4.1.2 Clinical characteristics of the participants

Most of the participants (55.0%) had bilateral of osteoarthritis of the knees. The participants with bilateral knee OA were likely to have worse knee pain and functional limitation, pain catastrophizing, and pain-related fear, comparing with the participants with unilateral knee OA. However, the participants with bilateral knee OA were likely to perceive adequacy of social support, comparing with the participants with unilateral knee OA, as can be seen in Appendix S. Duration being diagnosed with osteoarthritis of the knee was between 1 month and 30 years. Most of the participants (74%) had diagnosis less than 5 years, and the rest of them (25.6%) had diagnosis longer than 5 years. Knee stiffness was examined by 2 items of 0 (no stiffness) to 10 (most stiffness) numeric scales, and mean scores of knee stiffness was mean 4.5 (SD = 5.3).

Almost all of the participants (91.3%) used pharmaceutical managements to relieve knee pain, such as analgesic drugs, non-steroidal anti-inflammatory drugs, and to relax muscles. Twenty-two percent of the participants used non-pharmaceutical management, e.g. total knee arthroplasty, corrective osteotomy, knee support, physical therapist, and knee exercise training. None of them had currently received rehabilitation program.

Around twenty-seven percent of the participants reported history of fall in a previous year. Fifteen percent of fallers had single falls, and 12.8 percent of them had multiple falls. Analyses showed that 78.5 percent of the participants had minimum 2 other diseases simultaneously with osteoarthritis of the knee. Top three of

comorbidity were hypertension (60.7%), dyslipidemia (50.4%), and diabetes (22.3%), respectively.

For exercise, 22.7 percent of the participants did exercise minimum 3 days of 30 minutes. Top five of favorite types of exercise were walking (34.5%), cycling (23.6%), aerobic dance (16.4%), walking with swing arms (12.7%), and swing arms without walking (7.2%). Other types of exercise were found including running (3.6%), Tai chi (3.6%), yoga (3.6%), swimming (1.8%), stick dance (1.8%), and weight lifting (1.8%). Only 7 percent of the participant did knee strengthening exercise 2 to 4 times per day. Details of the clinical characteristics of the participants were shown in Table 4.2.

Table 4.2 Clinical Characteristics of the Participants (n = 242)

Clinical Characteristics	n	%
Site of Osteoarthritis (OA) of the knee		
Unilateral	109	45.0
Bilateral	133	55.0
Duration of knee OA		
< 5 years	180	74.4
≥ 5 years	62	25.6
Knee stiffness (min-max = 0-18, M = 4.5, SD = 5.3)		
Morning stiffness	124	51.2
Daytime stiffness	115	47.5
OA managements (answers more than 1 item)		
Pharmacology	221	91.3
Non-pharmacology	54	22.3
Number of falling in a previous year		
None	176	72.7
Fall (min-max = 1-5, M = 1.9, SD = 1.2)		
- Single fall	35	14.5
- Multiple falls	31	12.8

Table 4.2 Clinical Characteristics of the Participants (cont.)

Clinical Characteristics	n	%
Number of falling in a previous year		
None	176	72.7
Fall (min-max = 1-5, M = 1.9, SD = 1.2)		
- Single fall	35	14.5
- Multiple falls	31	12.8
Number of comorbidity (answers more than 1 item)		
Without comorbidity	52	21.5
With comorbidity (min-max = 1-5, M = 2.1, SD = 0.9)	190	78.5
- Hypertension	146	60.7
- Dyslipidemia	122	50.4
- Diabetes	54	22.3
- Others (e.g. asthma, heart disease, stroke, cancer, thyroid diseases)	69	28.5
Exercise (at least 30 minutes, 3 days/week)		
- Yes	55	22.7
- No	187	77.3

4.2 Characteristics of the Study Variables

The independent variables in this study included age, BMI, knee pain, functional limitation, social support, pain catastrophizing, and pain-related fear. Descriptive statistics of characteristics of the independent variables were shown in Table 4.3. Characteristic of the independent variables categorized by levels of physical activity were presented in Appendix Q.

Age : Participants' age ranged from 50 to 83 years, with a mean of 65.1 and a standard deviation of 8.1.

Body Mass Index : Body mass index of the participants ranged from 17.35 to 42.98, with a mean of 26.64 and a standard deviation of 4.12.

Knee pain : Possible scores of knee pain are 0 to 50, and higher score indicates higher pain. The participants' actual score of knee pain ranged from 0 to 46, with a mean of 13.0 and a standard deviation of 10.4. The participants had worse pain during walking, standing, climbing up and down the stairs, night time, and rest, respectively (see Appendix R).

Functional limitation : Functional limitation reflected to difficulties in activities of daily life because of knee osteoarthritis. Possible scores of functional limitation of the knee are 0 to 150, and higher score indicated greater functional limitation. The participants' actual score of functional limitation ranged from 0 to 119, with a mean of 45.6 and a standard deviation of 28.9. The top five activities that were difficulty to do were putting on pants, getting in or out of car, ascending stairs, heavy domestic duties, and putting off pants (see Appendix R).

Social support : Social support was participants' perception on adequacy supports provided by family, friends, and significant others. The participants in this study defined the significant others as partner, employer, and health professional. Possible score of social support are 0 to 7, and higher score indicates greater support. Actual score of social support was between 1.25 and 7.00, with a mean of 5.2 and a standard deviation of 1.1. The participants perceived adequacy of support from family greater than friends and significant others.

Pain catastrophizing : Pain catastrophizing reflects to frequency of extremely negative thought about knee pain. Possible score of pain catastrophizing are 0 to 36, and higher score indicates that participants produced more frequencies of negative thought about knee pain. The participants' actual score of pain catastrophizing ranged from 0 to 35, with a mean of 8.4 and a standard deviation of 8.3. Twenty-two percent of the participants had score of pain catastrophizing as zero. Well over half of them (51.2%) had the score lower than median.

Pain-related fear : Pain-related fear reflects to belief that physical activity induces and magnifies knee pain resulting fear of pain. Possible score of pain-related fear are 0 to 24, and higher score indicates greater pain-related fear. Actual score of pain-related fear was between 0 and 24, with a mean of 12.2 and a standard deviation of 6.4. Crombaz et al. (1999) defined the score of modified FABQ-PA greater than 15 was a cut-off point of high pain-related fear. According to the criteria of Crombaz et

al., 36.4 percent of the participants in the current study had high pain related fear. The proportion of the participants with high pain-related fear in low physical activity group (47.3%) was greater than in moderate to high physical activity group (19.8%).

Table 4.3 Characteristics of the Independent Variables (n = 242)

Variable	Possible range	Actual range	Median	M	SD
Age	-	50 - 83	64.50	65.10	8.10
Body Mass Index	-	17.35 - 42.98	26.53	26.64	4.12
Knee pain	0 - 50	0 - 46	11.00	13.00	10.43
Functional limitation	0 - 150	0 - 119	42.00	45.58	28.93
Social support	1 - 7	1.25 - 7.00	6.00	5.17	1.12
- Family	1 - 7	1.00 - 7.00	6.50	6.11	1.15
- Friend	1 - 7	1.00 - 7.00	5.00	4.80	1.67
- Significant others	1 - 7	1.00 - 7.00	5.00	4.60	1.91
Pain catastrophizing	0 - 36	0 - 35	13.00	8.37	8.25
Pain-related fear	0 - 24	0 - 24	5.25	12.21	6.36

4.3 Levels of Physical Activity of the Participants

The participants engaged 27.6 minutes per week (SD = 124.5) of 10 minutes bouts of vigorous physical activity that they had to take hard physical effort and make their breathe much harder than normal, such as heavy lifting, digging, cutting down trees, aerobic dance, or fast bicycling. They engaged 137.5 minutes per week (SD = 309.0) of 10 minutes bouts of moderate physical activity that they had to take moderate physical effort and make their breathe somewhat harder than normal, such as carrying light loads, doing household tasks, doing farming, watering the trees, cutting/removing glass, bicycling at a regular pace, or doubles tennis, beyond walking. The participants engaged 99.7 minutes per week (SD = 192.7) of 10 minutes bouts of walking at home and work places for recreation, sport, exercise, leisure, and to travel from place to place. They spent 243.5 minute per day (SD = 155.0) for 10 minutes bouts of sitting, as can be seen in Table 4.4.

International Physical Activity Questionnaire Group (2005) classifies physical activity into low, moderate, and high; however, this study categorized levels of physical activity into two groups, including low and moderate to high. Moderate to high is minimum 3 or more days of vigorous-intensity activity of at least 20 minutes per day; or minimum 5 or more days of moderate-intensity and/or walking at least 30 minutes per day. International Physical Activity Questionnaire Group (2005) suggested performing accumulate 10 minutes bouts of physical activity through the days to meet the goals of moderate to high physical activity. Based on IPAQ Group's criteria, only 39.7 percent of the sample had moderate to high physical activity. Around sixty percent (60.3%) of them had low physical activity, as can be seen in Table 4.5.

Table 4.4 Characteristics of Physical Activity of the Participants (n = 242)

Characteristics of physical activity	Min-Max	Median	M	SD
Vigorous physical activity (minutes/week)	0 - 1,260	0	27.6	124.5
Moderate physical activity (minutes/week)	0 - 2,160	30.0	137.5	309.0
Walking (minutes/week)	0 - 1,890	35.0	99.7	192.7
Sitting (minutes/day)	30 - 1,260	210.0	243.5	155.0

Table 4.5 Levels of Physical Activity of the Participants (n = 242)

Levels of physical activity	Frequency	Percentage
Low physical activity	146	60.3
Moderate to high physical activity	96	39.7

4.4 Factors Influencing Physical Activity

Before performing a binary logistic regression analysis, the missing data were examined. Missing data was not found. In addition, the assumptions of binary logistic regression including multicollinearity and outliers were tested. Multicollinearity was examined using multiple correlation and variance inflation factor (VIF). If correlation coefficient is more than 0.80 or VIF more than 10, it means the problem of multicollinearity (Kaiwan, 2013, p. 141). Two independent variables was correlated greater than 0.85, indicating the problem of multicollinearity (Munro, 2005, pp. 287-288). The values of variance inflation factor in this study were between 1.04 and 2.26. Correlation Matrix was established to examine multicollinearity, as can be seen in Table 4.6, and the analyses showed no high correlation (> 0.85) between independent variables. Therefore, it had no the problem of multicollinearity. The interaction effect on dependent variable were not examined in this study because of no high correlation between independent variables.

Outliers were detected by box plot of each variable separately. Box plots showed that some values of body mass index, pain, and pain-catastrophizing were between 1.5 and 3 upper interquartile range which were minor outliers (Munro, 2005, pp. 54-56). The influence of outlier to dependent variables were examined by comparing the results between holding outliers and removed outliers. The results were similar. Therefore, the outliers were kept in this study because of non-influence to the results (Munro, 2005, pp. 56-57).

Table 4.6 Correlation Matrix among the Independent Variables (n = 242)

Variables	X1	X2	X3	X4	X5	X6	X7	X8
Age (X1) ^a	1.00							
Body mass index (X2) ^b	-0.09	1.00						
Knee pain (X3)	-0.75	0.06	1.00					
Functional Limitation (X4)	0.43	0.13*	0.70**	1.00				
Pain-catastrophizing (X5)	-0.00	-0.01	0.55**	0.51**	1.00			

Table 4.6 Correlation Matrix among the Independent Variables (n = 242) (cont.)

Variables	X1	X2	X3	X4	X5	X6	X7	X8
Pain-related Fear (X6)	-0.39	0.05	0.25**	0.26**	0.26*	1.00		
Social support (X7)	-0.01	0.11	-0.15*	-0.14*	-0.12	-0.03	1.00	
Physical activity (X8)^c	-0.03	-1.51*	-0.02	-0.14*	0.03	-0.20**	0.05	1.00

^a Age coded as 0 = less than 60 years, 1 = 60 years and over.

^b Body mass index coded as 0 = less than 25 kg/m², 1 = 25 kg/m² and above

^c Physical activity coded as 0 = low physical activity, 1 = moderate to high physical activity

* p < 0.05, ** p < 0.01

4.4.1 Univariate logistic regression analysis

Univariate logistic regression was conducted to examine the influence of each dependent variable on physical activity, including age, body mass index, knee pain, functional limitation, social support, pain catastrophizing, and pain-related fear. Enter method of logistic regression analysis was used.

The finding showed that only three independent variables were significantly ($p < 0.05$) influencing to physical activity including body mass index, functional limitation, and pain-related fear. Those variables decreased probability of moderate to high activity. The participants who had BMI 25 kg/m² and above had opportunity to achieve moderate to high physical activity less than the participants who had BMI less than 25.00 kg/m² (OR = 0.53, 95%CI: 0.31-0.90, $p < 0.01$). There was odds of moderate to high physical activity decreased around 1 time for an increase of every one unit of functional limitation (OR = 0.99, 95%CI: 0.98-0.99, $p < 0.05$). Similarly, there was odds of moderate to high physical activity decreased around one time for an increase of every one unit of pain-related fear (OR = 0.94, 95%CI: 0.90-0.98, $p < 0.01$). The other variables including age, knee pain, pain catastrophizing, and social support were non- statistically associated with physical activity, as can be seen in Table 4.7.

Table 4.7 Univariate Logistic Regression of Each Variable between Two Categories of Levels of Physical Activity

Predictors	b	S.E.	Odds ratio	95%CI	Wald	p
Age (years)						
< 60	Ref.		Ref.			
≥ 60	- 0.14	0.29	0.87	0.49 – 1.54	0.22	> 0.05
Body mass index (kg/m ²)						
< 25.00	Ref.		Ref.			
≥ 25.00	- 0.63	0.27	0.53	0.31 – 0.90	5.46	< 0.01
Knee pain	- 0.004	0.01	0.99	0.97 – 1.02	0.10	> 0.05
Functional limitation	- 0.01	0.01	0.99	0.98 – 0.99	4.43	< 0.05
Social support	0.09	0.12	1.09	0.87 – 1.37	0.53	> 0.05
Pain catastrophizing	0.01	0.20	1.01	0.98 – 1.04	0.20	> 0.05
Pain-related fear	- 0.07	0.02	0.94	0.90 – 0.98	9.77	< 0.01

4.4.2 Multivariate logistic regression analysis

Multivariate logistic regression analysis was performed to examine whether body mass index, functional limitation, and pain-related fear were influencing factors of physical activity. In multivariate logistic regression analysis, those variables were simultaneously entered into the model using enter method.

The results showed that BMI and pain-related significantly contributed the model (model No. 1), with $-2LL = 308.71$, pseudo R^2 8.8%. To establish additive model, functional limitation would be excluded because of non-statistical significant, and the result (model No. 2) showed that BMI and pain-related fear still significantly contributed logistic regression model, with $-2LL = 309.98$, pseudo R^2 8.2%, as can be seen in Table 4.8. However, the additive model (model No. 2) gave a model less fit

than the first model (Model No. 1), with more log likelihood. Therefore, the most parsimonious model in this study was:

$$\text{Log odds} = 0.88 - 0.57 \text{ Body Mass Index} - 0.01 \text{ Functional limitation} \\ - 0.06 \text{ Pain-related fear}$$

If the patients had BMI 25.00 kg/m² and above, odds of moderate to high physical activity would decrease half (OR = 0.57, 95%CI: 0.33 – 0.97, $p < 0.05$). If functional limitation increased one unit, odds of moderate to high physical activity would decrease only one time (OR = 0.99, 95%CI: 0.99 – 1.00, $p > 0.05$). If pain-related score increased one unit, odds of moderate to high physical activity would decrease only one time (OR = 0.94, 95%CI: 0.90 – 0.98, $p < 0.01$), as can be seen in Table 4.9. The overall rate of correct classification of the most parsimonious model was 60.3%, with 63.7% of low physical activity (sensitivity), and 50.0% of moderate to high physical activity (specificity). Only 39.7 percent of the participants were misclassified in the model (see Table 4.10).

Table 4.8 Comparison of Multiple Logistic Regression Models for Physical Activity among Women with Osteoarthritis of the Knee

No.	Logistic regression models	-2LL	Pseudo R ²
1	0.88 – 0.57 X1* - 0.01 X2 – 0.06 X3 **	308.71	8.8%
2	0.73 – 0.61 X1* - 0.07 X3 **	309.98	8.2%

X1 = Body Mass Index ≥ 25.00 kg/m²

X2 = Functional limitation

X3 = Pain-related fear

* p-value < 0.05 , ** p-value < 0.01

Table 4.9 Parsimonious Logistic Regression Models for Physical Activity among Women with Osteoarthritis of the Knee

Predictors	b	S.E.	Odds ratio	95%CI	Wald	p
Body Mass Index (dummy code)	- 0.57	0.28	0.56	0.33 – 0.97	4.26	< 0.05
Functional limitation	- 0.01	0.01	0.99	0.99 – 1.00	1.25	> 0.05
Pain-related fear	- 0.06	0.02	0.94	0.90 – 0.98	7.12	< 0.01

Model (likelihood ratio) chi-square = 16.36, df = 3, p < 0.01

Nagelkerke R^2 = 8.8%

Percent correctly classified = 60.3%

Table 4.10 Classification Table of Overall Participants

Observed	Predicted		Total	Percent Correct
	Low physical activity	Moderate to high physical activity		
Low physical activity	116 (63.7%)	30 (50.0%)	146	79.5
Moderate to high physical activity	66 (36.3%)	30 (50.0%)	96	31.3
Total	182	60	242	60.3

In conclusion, most of the participants (60.3%) did only low physical activity. The independent variables comprised age, BMI, knee pain, functional limitation, pain-catastrophizing, pain-related fear, and social support. In this study, only three of them could explain physical activity independently, including BMI, functional limitation, and pain-related fear. The probability of moderate to high physical activity would decrease when patients had BMI 25.00 kg/m² and above,

greater functional limitation, and greater pain-related fear. Body mass index, functional limitation, and pain-related fear altogether could explain decrease of probability of moderate to high physical activity 8.8 percent. Age, knee pain, social support, and pain catastrophizing did not significantly influence physical activity. All results would be discussed in the next chapter.



CHAPTER V

DISCUSSION

This chapter aimed to discuss the results of the study. The contents of this chapter were presented into 2 sections including levels of physical activity and the factors influencing physical activity among women with knee osteoarthritis.

5.1 Levels of Physical Activity of the Participants

In this study, the participants were women with osteoarthritis of the knee aged between 50 and 83 years ($M = 65.1$, $SD = 8.1$). The results found that 39.7 percent of the participants met the criteria of moderate to high physical activity, which was defined as 3 or more days of vigorous-intensity activity of 20 minutes per day or 5 or more days of moderate-intensity and/or walking 30 minutes per day. The participants spent time to do walking, moderate and vigorous activities on average 99.7, 137.5, and 27.6 minutes per week, respectively.

Levels of physical activity among osteoarthritis of the knee had been examined by the previous studies (de Groot et al., 2008; Dunlop, Song, Semanik, et al., 2011; Farr et al., 2008; Lee et al., 2013; Murphy et al., 2008; Roseman et al., 2008; White et al., 2012). Most of those studies used objective measurements including pedometer and/or accelerometer, and two of those studies, done by Dunlop, Song, Semanik, et al. (2011) and Lee et al. (2013), classified the levels of physical activity into sufficient and insufficient physical activity. Dunlop, Song, Semanik, et al. (2011) found that only 8.9 percent of women with knee OA had sufficient physical activity. Similarly, Lee et al. (2013) found that only 7.9 percent of women with knee OA had sufficient physical activity. The proportion of physical activity in both previous studies were less than around 5 times of the current study, because, comparing with self-report, accelerometer was underestimate to measure levels of physical activity (Ekelund et al., 2006). Accelerometer could not capture some

activities, such as walking while carrying a load, walking uphill, biking, climbing stairs, weight lifting, and water activities (Farr et al., 2008; Murphy, 2009).

Only two studies, done by Rosemann et al. (2008) and Farr et al. (2008) used subjective measurement. Previously, Rosemann et al. (2008) used short form IPAQ and found 45.0 percent of women with osteoarthritis of the knee achieving criteria of moderate to high physical activity. Therefore, the proportion of the participants achieving the criteria of moderate to high physical activity in Rosemann et al.'s study (45.0%) was nearly to the current study (39.7%).

In another study, Farr et al. (2008) surveyed physical activity in patients with knee osteoarthritis who lived in Arizona using the Aerobics Center Longitudinal Study Physical Activity Questionnaire. Minimum 30 minutes per day of moderate to vigorous activity on at least 5 days of the week was a cut-off criterion of sufficient physical activity. Farr et al. found that 24 percent of female participants meet this criterion which was lower than 39.7 percent of the participants in the current study. This proportion was dramatically lower than the current study because of difference in domain of physical activity measurement. The prior studies examined only duration and frequency of leisure-time physical activity, but the current study examined total volume of physical activity which implied to duration, frequency, and intensity of occupational, household, leisure-time, and transport activities.

Referring to the study done by Rosemann et al. (2008), it also reported the time the participants spent to perform vigorous and moderate physical activity and walking. The participants spent time performing vigorous activities ($M = 72.1$ minutes/week, $SD = 113.4$) which was 2.6 times greater than the time that the participants in the current study spent ($M = 27.6$ minutes/week, $SD = 124.5$). The participants in previous study spent time performing moderate activity ($M = 99.2$ minutes/week, $SD = 122.9$) which was 1.4 times lesser than the time that the participants in the current study spent ($M = 137.5$ minutes/week, $SD = 309.0$). In addition, the participants of Rosemann et al. spent more time to walk ($M = 279.5$ minutes/week, $SD = 288.6$) which was 2.8 times greater than the time the patients in the current study spent ($M = 99.7$ minutes/week, $SD = 192.7$). It was possible that most (72%) of the participants in Rosemann et al.'s study were retirees. Retirees might have free time to do exercise, and walking had been found as a favorite

physical exercise among older people (Szanton, et al., 2015). About half (50.4%) of the participants in the current study still worked; therefore, they were likely to achieve moderate to high physical activity from domain of moderate-physical activity than walking. However, Hallal et al. (2010) stated that it was difficult to extract walking form moderate- physical activity in developing countries. Often, the responders in developing countries tended to duplicate answers as they reported walking all days during doing occupational and household activities (Hallal et al., 2010). The items of moderate activity and walking in previous and current studies therefore required careful justification as they might be subject to individual's interpretation. In the current study, the researcher prevented duplicate answers by confirming the participants whether the activity answered was walking separately from doing occupational and household activities. In addition, in the current study, some participants could not distinguish between vigorous (activity that highly increase respiratory rate than normal) and moderate (activity that slightly increase respiratory rate than normal) activities. However, the levels of physical activity was estimated from overall items, excepting item of sitting. Therefore, the proportion of the participants achieving the criteria of moderate to high physical activity in Rosemann et al.'s study was similar to the current study.

To sum, the proportion of the participants in the current study who achieved moderate to high physical activity, basing on short form IPAQ questionnaire, was similar to the previous study. However, the time to engage vigorous, moderate, and walking were different. It was difficult to give the reasons of difference of the results between Rosemann et al.'s study and the current study. According to existing evidence, it might claim that doing jobs was a cause of this difference.

5.2 The Factors Influencing Physical Activity among the Participants

According to the Interaction Model of Client Health Behavior (IMCHB), background variables are complexity. Background variables can influence health behaviors (e.g. physical activity) through cognitive appraisal. Background variables overtime interact each other, they often cumulatively or simultaneously interact health behaviors. In addition, background variables can affect to health outcomes directly.

In this study, background variables included age, body mass index, knee pain, functional limitation, and social support. Cognitive appraisal in the current study comprised pain catastrophizing and pain-related fear. Referring to univariate logistic regression, there were body mass index, functional limitation, and pain-related fear which could influence physical activity. The rest did not influence physical activity including age, knee pain, social support, and pain-catastrophizing. The Interaction Model of Client Health Behavior was a guide for criticized the results both expected and unexpected results, as below.

5.2.1 Age

Chronological time is commonly criteria to define age. In this study, an age refers to years of age that was recorded in medical record. A mean of age in this study was 65.1 (SD = 8.1). The previous studies supported that physical activity among older adults with knee OA decreased with advancing age (Chmelo, 2010; de Groot, et al., 2008; Rosemann et al., 2007). Older adults were claimed that they had low physical activities because of losses of job and declination of health. Therefore, the hypothesis was a negative influence of age on physical activity.

In the current study, age was categorized into 2 groups, including 50 - 59 years (late adults) and 60 years and above (older adults). Contrary to the hypothesis, age could not lower odds of physical activity (OR = 0.87, 95%CI: 0.49-1.54, $p > 0.05$). It meant that physical activity between the groups of age was similarly. Unexpected result was discussed as below.

Firstly, most of the participants were older adults, and they might have more free time to do active leisure-time physical activity. In the current study, the proportion of being unemployed of the participants in the age group of 60 years and above (57.8%) was more than that of the participant in the age group 50-59 years (32.0%). In addition, the proportion of doing exercise in the age group of 60 years and above (23.7%) was more than that of the participant in the age group 50-59 years (20.3%). It might imply to more free time in the age group of 60 years and above. The previous studies found that being retirement increased free time to do leisure-time activities (Barnett, van Sluijs, & Ogilvie, 2012; Godfrey et al., 2014; McDonald, O'Brien, White, & Sniehotta, 2015). In addition, some studies found that older adults

attempted to maintain routine activity and healthy lifestyle to be long-life active and independent (Horton, Baker, Cote, & Deakin, 2008; Thanakwang et al., 2014). Therefore, opportunity to do physical activity between late adults and older adults in the current study did not difference. This result accorded to the study by Godfrey et al. (2014) which no found association between age and levels of physical activity.

Secondly, the previous study found that levels of physical activity dramatically decrease after the age of 80 years (Szanton et al., 2015). It might reflect dramatic health declination after the age of 80 years. An average of age of participants in the current study was 65.1 (SD = 8.1), therefore, physical activity of the participants might not yet regress.

Finally, a decrease of personal financial resources after retirement might not be a barrier of doing physical activity in this study, such as walking, jogging, and cycling because those activities were low cost activities (Horton et al., 2008; Szanton et al., 2015). In the current study, the result showed that walking and cycling were popular exercises among the participants. In addition, most of the participants (86.4%) had enough personally monthly income. They also perceived support quite well.

In conclusion, age did not influence physical activity. Desire in longevity and being independent might motivate older adults to do moderate to high physical activity. In the Interactions Model of Clients Health Behaviors, Cox (1982, p. 49) stated that motive was future-oriented cognitive representations. In addition, Cox (1982, p. 49) stated that human needed experience himself to attain feeling competent. Everybody has competency to make choice for his health (Carter & Kulbok, 1995). Free time that was attained after retirement might help older adults to manage activities in their life easily. Older adults could compensate loss of work-related activity by doing active leisure-time and household activity instead.

5.2.2 Body Mass Index

Body mass index 25 kg/m^2 and above is a criteria of overweight and obesity. In the current study, around 61.2 percent of the participant were overweight and obesity. Being overweight and obese might influence to physical activity. The first reason is that obese people feel tired easily during performing physical activity (Focht et al., 2004; Sallinen et al., 2009; Stemplewski et al., 2012). The other is that

BMI could induce knee pain from weight-overloading on the knee joints (Rai & Sandell, 2011). Therefore, the influence of BMI on physical activity in negative direction was the hypothesis in this study.

Consistent with the proposal hypothesis, the result showed that BMI 25 kg/m² and above lowered odd of physical activity (OR = 0.53, 95%CI: 0.31-0.90, $p < 0.01$). The result in the current study was consistent with the previous studies. Rosemann et al.'s study (2008) found that 4 percent of the variance of physical activity in patients with knee OA was explained by BMI. de Groot et al. (2008) found that greater BMI would lower physical activity. Similarly, Farr et al. (2008) found significantly negative correlation between BMI and physical activity among elderly women with osteoarthritis of the knees. Although the two latter studies assessed physical activity using accelerometer, the effect of BMI on physical activity were the same.

In the current study, however, the correlation matrix did not show significant association between BMI and knee pain. Therefore, the influence of BMI on physical activity through knee pain was not found in the current study. It was interesting that the correlation matrix showed significant association between BMI and functional limitation ($r = 0.13$, $p < 0.05$). It was possible that BMI influenced physical activity through functional limitation instead of knee pain. According to IMCHB, Cox stated that all background variables could interact simultaneously with each other. This opinion seems to be reasonable because the previous study found the association between BMI and functional limitation (Gomes-Neto et al., 2015). Similarly, the previous studies found that weight loss could improve physical function (Messire et al., 2006; Miller et al., 2006).

In conclusion, overweight could prevent the patients to perform moderate to high physical activity by inducing tiredness. In addition, the patients with overweight tended to have more functional limitation which prevented the participants to engage moderate to high physical activity. This finding was in the line with IMCHB which Cox (1982) stated that all background variables were often interact each other to produce specific health behaviors.

5.2.3 Knee pain

Knee pain during walking, ascending the stairs, standing, resting, and pain in the night in the previous 7 days was measured by WOMAC pain scale. Possible scores are between 0 and 50. Higher scores indicate greater knee pain. In the current study, an average score of knee pain was 13.00, with standard deviation 10.43. It meant that participants in this study had only mild knee pain in the previous 7 days. One-tenth (10%) of the participants had the scores as zero (the result not showed) which meant no knee pain in the previous 7 days. The current study had the hypothesis that knee pain negatively influenced physical activity.

Contrary to the proposal hypothesis, knee pain did not influence physical activity (OR = 0.99, 95%CI: 0.97-1.02, $p > 0.05$). This result differs from the study by Rosemann et al. (2007) found that 11 percent of the variance of physical activity was explained by knee pain. Unexpected results was discussed as below.

Firstly, unexpected result in the current study might be explained by levels of knee pain. The study by Lee et al. (2013) found that severe knee pain could decrease odd of physical activity, whilst moderate knee pain could not. In this study, the participants perceived mild knee pain. In general, knee pain in the patients with knee OA was triggered by the activities (Perrot et al., 2009). It was easily to observe what were activities triggering knee pain and easily learnt to modify activities or to manage (Hawker et al., 2008). In the current study, the result showed the participants reported intensified knee pain when walking, standing, and climbing up and down the stairs. Mild knee pain in the current study might easily control by stop doing activity in short period or took pain killer. Majority (91.3%) of the participants in the current study used medicines to relieve knee pain.

Secondly, knee pain might influence physical activity by worsening functional limitation and eliciting pain-related fear. In the current study, the correlation matrix showed correlation between knee pain and functional limitation ($r = 0.70$, $p < 0.01$), as well as between knee pain and pain-related fear ($r = 0.25$, $p < 0.01$). The results in the current study was consistent with the previous studies. The previous studies had found that knee pain was a predictor of functional limitation (Jinks et al., 2007; van Dijk et al., 2010). Positive association between knee pain and pain-related fear had been found as well (Scopaz et al., 2009; Sinikallio, et al., 2014).

Therefore, the results might imply that knee pain might influence physical activity indirectly through functional limitation and pain-related fear.

Thirdly, the patients might attempt learning to do activity within their limitation, although they had knee pain. Previous qualitative researches, for example, the study by Pouli et al. (2014) found that the patients perceived that knee pain was never go away, and they knew that pain would be induced by specific activities such as too long sitting or long distance working. The study by Maly and Cott (2009) found that the patients with knee OA would monitor and develop hypothesis about knee pain for modifying activities to suit themselves. Moreover, the patients would make the plan to maintain activity and to try to carefully engage activity. Mackichan et al. (2013) studied the experience of older patients with chronic musculoskeletal pain. They found that older patients desired to be independent as long as possible and fear to loss autonomy or decline. It was possible that the participants in the current study might learn to do activity within their limitations.

Finally, it was possible that the supports that the participants received from family, friends, and significant others was a buffering against stress from pain. In addition, the previous study found that greater support could reduce pain among the patients with knee OA (Ferreira & Sherman, 2007). Although uncomfortable symptom of knee pain was individual's experience, the interaction with others influenced individual's opinion about pain. Family, friends, and significant others might help the patients to cope with knee pain by providing emotional and information supports. According to the Interaction Model of Client Health Behavior, Cox (1982) stated that health information and some technical skill that occurred during client-professional interaction helped the clients to deal with their problems and reduced clients' negative arousal. It is possible that the setting in the current study was the hospital where the patients had more opportunity to learn symptom and management of knee pain from other patients and health care providers.

In conclusion, knee pain did not influence physical activity in the current study because most of the participants had only mild pain. In addition, the desired to live long with being independent might motivate the patients to engage physical activity even though pain. The participants might attempt to do physical activity within their limitation. Although knee pain did not influence physical activity, knee pain might be a

cause of functional limitation and pain-related fear which could influence physical activity. Cox (1982) stated that previous health care experience was an antecedent of cognitive appraisal to produce health outcomes. Each of background variable can influence each other before it affects cognitive appraisal. Therefore, pain can influence physical activity through functional limitation and pain-related fear.

5.2.4 Functional limitation

Functional limitation is a result of quadriceps weakness (Glass et al., 2013) which leads to knee pain because of increase of lower limb loading during gait cycle and loss of weight-pressure distribution in the knee joints (Egloff, HÜgle, Valderrabano, 2012). The patients is difficult to do day-to-day activities because of functional limitation. In this study, functional limitation was measured by WOMAC function scale. Functional limitation refers to participant's perception on difficulty of knee joints to ascend and descend the stairs, rise from chair and bed, stand, sit, walk on flat floor, get in/out a car, go shopping or market, put on and take off pants, take a bath, get on/off toilet, and engage light and heavy household activities in the previous 7 days. Possible scores of WOMAC function scale are between 0 and 150. Higher scores indicate greater functional limitation. The current study had the hypothesis that functional limitation negatively influenced physical activity.

The results showed the average score of functional scale as 45.58, (SD = 28.93). Only two of the participants (0.8%) had the scores as zero (the result not showed) which meant no functional limitation in the previous 7 days. As expected, the results showed that functional limitation lowered physical activity (OR = 0.99, 95%CI: 0.98-0.99, $p < 0.05$). The result was consistent with the previous study. Rosemann et al. (2007) found that functional limitation significantly predicted low physical activity in the patients with osteoarthritis of the knee. Similarly, Lee et al. (2013) found significantly inverse association between functional limitation and physical activity in patients with OA.

Referring to the final model for logistic regression, BMI, functional limitation, and pain-related fear were factors simultaneously influencing physical activity. In addition, correlation matrix showed association between functional limitation and knee pain, as well as between functional limitation and pain-related

fear (see Table 4.6). Although, knee pain was not included in the model, Vlaeyen and Linton (2000) stated that knee pain might elicit pain-related fear which led to avoidance behavior. The consequences of avoidance behaviors were loss of muscle strength and decrease of pain tolerance. Therefore, the patients had more difficulty to engage activities and more exacerbated pain (Vlaeyen & Linton, 2000). The previous studies in context of knee OA had found significant association between pain-related fear and knee pain, as well as between pain-related fear and functional limitation (Scopaz et al., 2009; Sinikallio, et al., 2014). Therefore, the patients in the current study might restrict moderate to high physical activity because of functional limitation itself or simultaneously with pain-related fear. In addition, functional limitation might influence physical activity simultaneously with BMI, as discussed in the topic 5.2.2.

5.2.5 Social support

Social support was expected that it might help the patients to enhance physical activity because the previous studies supported that it was a resource to deal with knee pain and functional limitation in patients with osteoarthritis of the knee (Ferreira & Sherman, 2007; Weinberger et al., 1990). In the current study, social support refers to the participants' perception toward social support adequacy provided by family, friend, and significant others, measured by revised Thai version of Revised Multidimensional Scale of Perceived Social Support (rMSPSS). Possible scores are between 1.00 and 7.00. Higher scores indicate greater support. In this study, the average score of social support was 5.17, with standard deviation 1.12. This result found that the social support was quite well.

It was contrary to the proposal hypothesis that social support did not influence physical activity (OR = 1.09, 95%CI: 0.87-1.37, $p > 0.05$), although the result showed negative correlation between social support and knee pain, and between social support and functional limitation (see Table 4.6) which were consistent with the previous studies (Evers et al., 2003, Ferreira & Sherman, 2007; Weinberger et al., 1990). Unexpected result was discussed next.

Firstly, it was possible that social support did not influence physical activity because the participants had only mild knee pain and functional limitation. The participants might have ability to manage their osteoarthritis symptoms and might

not expect to receive social support from other person. In addition, the previously qualitative studies found that some patients perceived knee OA as normal process of growing to be older (Paskin et al., 2014; Pouli et al. 2014). The patients perceived nothing to be done for OA beyond living with it and preventing long-life pain and disability (Pouli et al., 2014).

Secondly, it was possible that social support did not influence to physical activity because the participants had low score of pain-catastrophizing. Pain catastrophizing reflected to disability to overcome pain or helplessness (Quartana et al., 2009). Cohen & Wills (1985) stated that social support could reduce stress reaction by providing a solution to the problem or by reducing importance of event. Therefore, the patients might feel helplessness when they were inability to cope knee pain. Helplessly patients demanded support to obtain effective solution (Cohen & Wills, 1985). In the current study, the participants had only low pain catastrophizing. Therefore, the demand of social support might be low.

Thirdly, it was possible that the participants visited the outpatient departments where they received health education to promote their health occasionally. Although some healthcare professionals, such as physicians, nurses, and physiotherapist, provided information about knee exercise and weight reduction to the patients, it was unclear whether this information was adequate or appropriate to each individual. According to Cox (1982), the interaction between client and health care professionals requires clinical competencies and affective support of staff to influence positive behaviors of the clients. The characteristics of interaction therefore are important to influence people's behaviors. However, quality or intensity of interaction between health care professionals and participants was not explored in the current study. As participants received social support only partly from healthcare professionals, social support from them therefore did not influence physical activity of the participants in the current study.

5.2.6 Pain catastrophizing

Pain catastrophizing was well known in context of chronic nonspecific pain such as chronic pain at neck, shoulder, and lower back, and it affected to pain and function (Damsgard et al., 2010; Parr et al. 2012; Vlaeyen & Crombez, 1999;

Woby et al., 2004). The knowledge of pain catastrophizing was extended to context of chronic specified pain, such as osteoarthritis of the knee, and the evidence from previous studies still supported these effects (Keefe, Affleck, France, et al., 2004; Sinikallio et al., 2014; Somers et al., 2009; Wideman et al., 2014). Pain catastrophizing is negative thought and ideation related to pain which reflects to helplessness and pessimism about ability to cope with pain. Therefore, the current study had the hypothesis that pain catastrophizing could negatively influence physical activity.

Pain catastrophizing was measured by Thai version of catastrophizing subscale of the Coping Strategies Questionnaire. Possible scores are between 0 and 36. Higher scores indicate greater pain catastrophizing. In the current study, the average score of pain catastrophizing was 8.37 (SD = 8.25). More than a half (51.2%) of them had the score lower than median (score < 6) which might imply to low pain catastrophizing. Twenty-two percent of the participants in the current study had no pain catastrophizing.

Contrary to the proposal hypothesis, there was no influence of pain catastrophizing on physical activity, although the correlation matrix showed association between pain catastrophizing and knee pain, as well as between pain catastrophizing and functional limitation. In addition, the current study found positive correlation between pain catastrophizing and physical activity ($r = 0.26$, $p < 0.01$). This results was not accordance to the study by Elfving et al. (2007) which found that the patients, with chronic low back pain, who had pain catastrophizing had physical activity lower than the participants who had low to medium pain catastrophizing.

One explanation for unexpected finding was difference of pain type and age of participants. Elfving et al. included the patients with low back pain aged less than 65 years, the current study included the patients with knee osteoarthritis aged 50 years and above. Low back pain was non-specific musculoskeletal pain which was common found in young adults. The patients with lower back pain often absent from their jobs because of pain interfere (Elfving et al., 2007). The patients were likely to upset and elicit catastrophic thinking because of unknown about cause of back pain. Osteoarthritis pain was often found in late adults and was specific musculoskeletal pain which produced gradually pain (Allen, Coffman, Golightly, Stechuchak, & Keefe, 2009).

Another reason was that pain catastrophizing in the current study was not influence physical activity because of low pain catastrophizing. Most of the participants in the current study had low pain catastrophizing because they had only mild knee pain. Elfving et al. (2007) found that the opportunity to do low physical activity in the participants with low pain catastrophizing was 4.4 times greater than the participants with no pain catastrophizing. The opportunity to do low physical activity in the participants with medium to high pain catastrophizing was 7.4 times greater than the participants with low pain catastrophizing.

Finally, it was possible that the current study excluded the participants who had diagnosis of major depression. Evidences from previous studies suggested that pain catastrophizing accompanied with depression could influence pain and functional disability greater than pain catastrophizing alone (Bergbom, Boersma, Overmeer, & Linton, 2011; Westman, Boersma, Leppert, & Linton, 2011). Therefore, catastrophizing alone, especially low pain catastrophizing, might not enough influence physical activity. However, Keefe et al. (2000) found that women with knee OA could produce catastrophic thinking though without depression. In addition, pain catastrophizing could increase pain intensity and physical activity after controlled depression. However, pain catastrophizing in Keefe et al.'s study and the current study was difference in concepts of measurement. Keefe et al. inquired pain catastrophizing during the participants perform the tasks that challenged knee pain, such as standing, reclining, and walking. In the current study, the participants had to recall their thought about pain. There are two different ways to measure pain catastrophizing. One is situation analysis that pain catastrophizing will be measured during or immediately after expose to a noxious situation. The other is dispositional measurement that pain catastrophizing will be rated as the recall events (Leung, 2012). Disposition assessment of pain catastrophizing might not vary in fluctuation of pain (Quartana et al, 2009).

Moreover, positive direction of correlation between pain catastrophizing and physical activity was found in this study (see Table 4.7). Sullivan (2001) stated that the consequence of pain catastrophizing was not always the worse health. Pain catastrophizing was inter-personal process and coping style. Engaging physical activity might be alternative way to distract from negative affect (Cotter & Lachman,

2010). In addition, pain catastrophizing might be the way to inform other to obtain support (Martorella et al., 2008).

In conclusion, pain catastrophizing could not explain physical activity. It was possible that most of the participants had low pain catastrophizing. Some patients might show catastrophizing ideas about pain to attain support from health professional.

5.2.7 Pain-related fear

Pain-related fear reflects to personal beliefs about the effect of physical activity on knee pain and seriousness of knee pain. Pain-related fear is induced when person perceived pain as threat. Fearful person tends to limit their activity to prevent exaggerate pain and injury, thus leading to decrease of pain tolerance and increase of disability and depression (Vlaeyen & Linton, 2000). The evidence from previous studies supported the impact of pain-related fear on deteriorations of pain and physical function among the patients with osteoarthritis of the knee (Heuts et al., 2004; Scopaz et al., 2009; Somers et al., 2009). The previous studies also found significant influence of pain-related fear on physical activity in context of non-specified chronic musculoskeletal pain (Elfving et al., 2007; Koho et al., 2011). Therefore, the current study had the hypothesis that pain-related fear would prevent the patients to meet moderate to high physical activity.

In the current study, pain-related fear was measured by Thai version of Fear-Avoidance Beliefs Questionnaire about physical activity (Thai FABQ-PA) modified for osteoarthritis of the knee. Possible scores are between 0 and 24. Higher scores indicate greater pain-related fear. The result showed that the average score of pain-related fear was 12.21, with standard deviation 6.36. Only two percent of the participants had the scores as zero (the result not showed) which meant no fear. Around thirty-six percent of the participants in the current study had high pain related fear.

Consistent with the proposal hypothesis, pain-related fear significantly influence physical activity (OR = 0.94, 95%CI: 0.90-0.98, $p < 0.01$). This finding was consistent with the previous studies (Elfving et al., 2007, Koho et al., 2011), but it was not in line with the study by Lundberg, Larsson, Östlund, and Styf (2006) and the study by Basler, Luckman, Wolf, and Quint (2008). It was possible that the study by

Lundberg et al. included both acute and chronic musculoskeletal pain including pain at head, cervical, upper limbs, thoracic, lower back, lower limbs, and pelvic. It might poorly clarified what activity the participant perceived as threat of pain which could elicit fear. The study by Basler et al. used photographs series of daily activity to assess harmful perception in various activity specific to patients with lower back pain. The photograph series and FABQ were different in construct. The photograph can measure actual activity-specific fear, but FABQ is likely to measure boarder fear (Pincus, Smeets, Simmonds, & Sullivan, 2010). Although Basler et al. used activity-specific fear measurement, they found that the levels of physical activity between the patients with chronic low back pain and pain-free people was not different while the patients with chronic low back pain and greater pain-related fear. Basler et al. explained their unexpected results. The first reason was that their participants might not actual reduce activity levels, but only avoid the activities in some days that they perceived as risk of pain and reinjury. The other reason was that physical activity questionnaire did not capture overall daily activities, such as occupational and household activities.

Similar to the previous studies, pain-related fear in the current study was superior in influencing physical activity, comparing with pain. Crombaz et al. (1999) found that the patients with chronic pain were disable because of pain-related fear, instead of pain intensity. Elfving et al. (2007) found that pain-related fear among the patients with chronic low back pain was superior in influencing physical activity also. In addition, this results confirmed the hypothesis that pain-related fear induced avoidance behavior or disuse syndrome and leaded to deconditioning (Vlaeyen & Linton, 2000). The remaining of pain-related fear, despite of relived pain, caused decline of engaging moderate-intensity physical activity and loss of muscle strength. The current study found that pain-related fear and functional limitation simultaneously influence physical activity. Pain-related fear in the current study might induce the participants limit their activity to protect knee harm, and leading to loss of knee function which was in the line in the hypothesis Vlaeyen and Linton (2000) proposed.

In addition, Vlaeyen and Linton (2000) hypothesized that pain catastrophizing was a precursor of pain-related fear. Up to now, there is little known

about the influence of pain catastrophizing accompany with pain-related fear on pain, physical function, and physical activity. It was noticeably that odd ratio in the current study showed that pain-related fear prevented the patients to engage moderate to high physical activity. Conversely, pain catastrophizing tended to promote physical activity. It was possible that pain-related fear did not stem from pain-catastrophizing in the current study. Du et al. (2008) stated that fear could derive from the both innate and environmental learning. In learning process, Fordyce (1986) stated that avoidance behavior because of fear of pain resulted pain reduction. Pain reduction became negative-reinforcement that made person continue activity limitation. Therefore, pain-related fear might be elicited despite without catastrophic thinking. In addition, pain-related fear is specific to belief in harmful from knee joint movement which is different form pain catastrophizing which reflects to helplessness to cope with pain. The patients with knee OA were likely to perceive knee pain as natural process of older adults (Pouli, et al., 2014), and overuse of the joint was a cause of joint pain (Grime, Richardson, & Ong, 2010). Some patients stopped to do activity in a day to protect their knees for the next day. Therefore, pain-related fear influenced physical activity greater than pain intensity and pain catastrophizing because osteoarthritis patients in the current study might perceive knee OA as a natural process which had to depend on pain killers to relieve pain. Some patients might attempt to communicate their catastrophizing thought about their pain to attain supports form the others (Martorella et al., 2008), such as pain killer from health professionals. Therefore, pain catastrophizing might not induce pain-related fear in the current study.

In conclusion, the result showed that the influence of pain-related fear on physical activity was superior pain and pain catastrophizing. Pain-related fear might be a result of learning process. Limitation of daily physical activities that make the knee harmful become personal belief. The patients believe that physical activities should be avoided to protect the knees. In addition, the result showed that pain catastrophizing might not a precursor of pain-related fear. Cox (1982) stated that clients would adhere the recommendation when it accordance with their perception of reality which might not congruent with objective reality. The patients with knee osteoarthritis might perceive fear of pain; although they have no knee pain. Pain which is imagined was reality that fearful patients perceived. Referring to IMCHB,

Cox stated that the clients would adhere to the recommendations when they have no negative emotions. Pain-related fear could negatively influence physical activity which was in the line with IMCHB.

Summary of Discussion

This study was guided by the Interaction Model of Client Health Behavior, and the results confirmed complexity among elements of client singularity on adherence to the recommendation care regimen. In the Interaction Model of Client Health Behavior, demographic characteristics, previous health experience, and environmental support were reciprocal interaction that influenced clients' cognitive appraisal and client's decision to adhere the recommendation. In addition, the Interaction Model of Client Health Behavior provided a feedback loop from health outcome to health care experience and cognitive appraisal. Age, body mass index, knee pain, functional limitation, and social support were background variables in elements of client singularity that might be the factors influencing physical activity. Pain catastrophizing, and pain-related fear were cognitive appraisals which might influence physical activity as well.

The result found that age, knee pain, pain catastrophizing, and social support did not influence physical activity. Years of age did not influence physical activity. It was possible that older adults tended to maintain because they wanted to take advantage from physical activity such as being lifelong independence. In addition, older adults might have free time to do favorite activity more than young adults. Knee pain, pain catastrophizing, and social support did not influence physical activity because most of the participants had only mild knee pain and pain catastrophizing which might be easily to manage by themselves. According to IMCHB, Cox believed that the client had responsibility to their positive health. The participants with low knee pain and low pain catastrophizing might not expect to receive social support from others because they were likely able to manage their OA symptoms by themselves. In addition, the current study found positive correlation between knee pain and pain catastrophizing, and between knee pain and social support. There association confirmed reciprocal association between previous health

care experience and environmental support. The current study found that the participants had low knee pain, and it was possible that greater support can lower knee pain. The reciprocal association between knee pain and pain catastrophizing might influence patients' cognitive appraisal which was a cause of low score of pain catastrophizing.

According to IMCHB, demographic characteristics and previous healthcare experience are reciprocal association which are precursor of cognitive appraisal. The current study found that BMI, functional limitation, and pain-related fear simultaneously influence physical activity. According to a previous study, overweight patients felt tired easily during performing activities (Sallinen et al., 2009). A recent study also found that overweight made the patients have more functional limitation (Gomes-Neto, et al., 2015). Functional limitation reflects to difficulty to perform activities, and it might influence physical activity directly. Pain-related fear could influence physical activity because it could provoke avoidance behavior. The current study found that pain-related fear was related to knee pain and functional limitation. The effect of knee pain on knee function might simultaneously provoke pain-related fear. Therefore, the results supported the reciprocal among background variables which were precursors of cognitive appraisal.

The current study examined the influence of pain catastrophizing and pain related fear on physical activity also. The hypothesis that pain catastrophizing was a precursor of pain-related fear had been proposed (Vlaeyen & Linton, 2000). Although, pain-related fear and pain catastrophizing were related, pain-related fear in the current study inhibited physical activity. Conversely, pain catastrophizing promoted physical activity. It was possible that pain catastrophizing was not a precursor of pain-related fear, although pain catastrophizing and pain-related fear might stem from knee pain.

In conclusion, body mass index, functional limitation, and pain-related fear influenced physical activity. Body mass index might deteriorate knee function by making osteoarthritis patients to feel tiredness and to short the period of doing physical activities, thus leading to functional limitation. Pain-related fear which derived from pain experience limited the patients to do physical activity, thus leading to functional limitation also. Functional limitation in the current study might not be

the result of pain directly, but it might be the result of tiredness and avoidance behavior due to overweight and pain-related fear. However, the current study limited to confirm those hypotheses because the current study limited to examine the feedback loop from physical inactivity to functional limitation.

5.3 Limitations and Strengths of the Study

5.3.1 Limitations

5.3.1.1 This study uses a cross-sectional study. The result should be interpreted with caution with respect to causality. The study used convenience sampling which limit to generalize the result to Thai women with knee osteoarthritis who have knee replacement surgery and live in community.

5.3.1.2 It should be noted that short form International Physical Activity Questionnaire in the current study correctly classified 63.7 percent (sensitivity) of people with low physical activity and correctly classified 50.0 percent (specificity) of people with moderate to high physical activity. It was possible that most of participants had low physical activity. It was differ from the study by Ekelund et al. (2006) which used short form IPAQ to assess physical activity among adults aged 40 to 69 years. Ekelund et al. reported sensitivity and specificity as 45 and 77 percent, respectively. Most of participant (85%) in Ekelund et al.'s study had moderate to high physical activity; therefore, short form IPAQ was more specific to people with moderate to high physical activity. Although short form IPAQ had been used in Japanese age 69 years and above and had accepted test-retest reliability (Tomioka et al., 2011). However, sensitivity and specificity was not reported in the latter study. Therefore, short form IPAQ requires re-examination in Asia. In addition, short form IPAQ is limited to capture domains of physical activity, including occupational, household, leisure-time and transport activities which might be benefit to design tailor-program.

5.3.2 Strengths

5.3.2.1 This study examines factors influencing physical activity using integrative model of bio-psychosocial model, such as Interaction Model of Client Health Behavior. The results assist health care providers to understand the complexity of demographic characteristics, previous healthcare experience, and cognitive appraisal which might independently, cumulatively, or simultaneously influence physical activity. It implies that women with knee osteoarthritis requires specific OA management program to promote them to participate more physical activity, especially those who are overweight or have elevated pain-related fear as they could lead to functional limitation and low physical activity. Nurses can integrate this bio-psychosocial model for use when caring from women with OA knee to maximize physical activity of this group of patients.

5.3.2.2 Most previous studies were prone to examine the prevalence of physical activity among osteoarthritis of the knee based on a criteria of objective measurements, such as pedometer and accelerometer (de Groot et al., 2008; Dunlop, Lee et al., 2013; Murphy et al., 2008; White et al., 2012). The use of subjective measurement in this study helps nurses and other healthcare professionals better understand perceptions of the patients, including their experiences and feelings such as fear, perceived physical intensity, and perceived symptoms such as pain and their difficulties to perform physical activities. This could lead to further development of physical activity promotion programs that are tailored made to individual women with knee OA.

Moreover, many previous studies aimed to examine levels of physical activity both genders, not specific to women, although the previous studies confirmed that women perceived osteoarthritis symptoms more than men. Recovery of knee function in women was less than men in post total knee replacement also (Elboim-Gabyzon et al., 2014; MacDonald et al., 2008; O'Corner, 2011; Tonelli et al., 2011). In addition, up to date, there was little known about physical activity in Thai women with knee osteoarthritis.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusion of the Study

This study was a cross-sectional research aiming to examine levels of physical activity and factors influencing physical activity among women with osteoarthritis of the knee. Research proposal was approved by Institution review Boards of Siriraj Hospital. Interaction Models of Client Health Behavior (IMCHB) was a theoretical guide in this study. In this study, possible factors influencing physical activity included demographic variables (age and body mass index), environmental support (social support), and cognitive appraisal (pain catastrophizing and pain-related fear).

Knee pain, functional limitation, pain catastrophizing, pain-related fear, and social support were measured by the questionnaires, including 1) pain subscale of modified Thai version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), 2) function subscale of Thai version of WOMAC, 3) catastrophizing subscale of revised Coping Strategies Questionnaire (CSQ), Thai version of Fear-Avoidance Belief Questionnaire about physical activity (FABQ-PA) modified for osteoarthritis of the knee, and revised Thai of the Multidimensional Scale of Perceived Social Support (rMSPSS), respectively. Those questionnaires had accepted reliability. Cornbach' alpha coefficients were 0.93 for WOMAC-pain, 0.95 for WOMAC-function, 0.85 for catastrophizing subscale of CSQ-revised, 0.75 for FABQ-PA, and 0.85 for rMSPSS.

Physical activity was measured by short form International Physical Activity Questionnaire (IPAQ). International Physical Activity Questionnaire includes frequency and duration of doing vigorous and moderate activities and walking in bouts of 10 minutes in the last 7 days. In addition, IPAQ inquiries minutes per a day of sitting in weekdays. In this study, short form IPAQ had accepted test-retest reliability reported by Kappa coefficient 0.74. Levels of physical activity were

categorized into low and moderate to high physical activity. Moderate to high physical activity was a minimum of 3 or more days of vigorous-intensity activity of 20 minutes per day; or 5 or more days of moderate intensity and/or walking 30 minutes per day.

Data collection was done between May 2015 and September 2015. Two hundred and forty-two patients with knee osteoarthritis who visited Outpatient Departments of Orthopedic Surgery, Orthopedic Treatment and Follow-Up, and Rehabilitation Medicine, Siriraj hospital were invited to participate in this study. Convenience sampling was performed basing on inclusion and exclusion criteria. Inclusion criteria were being able to communicate in Thai language and not being wheelchair-bound or bedridden. Exclusion criteria were having history of knee replacement surgery in a previous year, diagnosed with major depression, psychosis, Parkinsonism, and other arthritis beyond osteoarthritis. The patients who had risk of cognitive impairment assessed by Mini-Mental Sated Examination version Thai 2002 (MMSE-Thai 2002) were also excluded.

The results showed that participants aged between 50 and 83 years, and on the average of 65.1 years ($SD = 8.1$). Forty percent of the participants achieved moderate to high physical activity. Univariate logistic regression analysis was performed using SPSS version 17. Age was coded as 0 for less than 60 years and 1 for age 60 years and above. Body mass index (BMI) was coded as 0 for BMI less than 25.00 kg/m^2 and 1 for BMI 25.00 kg/m^2 and above. Physical activity was given dummy code as 0 for low activity and 1 for moderate to high activity. Hypotheses of the study were: 1) age, BMI, knee pain, functional limitation, pain catastrophizing, and pain-related fear had a negative impact on physical activity, and 2) social support had a positive impact on physical activity.

The analyses showed BMI 25.00 kg/m^2 and above, functional limitation, and pain-related fear statistically significantly lower physical activity. Opportunity of achieving moderate to high activity the participants with BMI 25.00 kg/m^2 and above decreased a half, comparing with the participants with BMI less than 25.00 kg/m^2 ($OR = 0.53$, $95\%CI: 0.31 - 0.90$, $p < 0.01$). Increasing of one score of functional limitation decreased one time of opportunity of achieving moderate to high activity ($OR = 0.99$, $95\%CI: 0.98 - 0.99$, $p < 0.05$). Increasing of one score of pain-related fear decreased

one time of opportunity of achieving moderate to high activity (OR = 0.94, 95%CI: 0.90 – 0.98, $p < 0.01$). A multivariate logistic regression analysis showed that 8.8 percent of opportunity of achieving moderate to high activity of the participants was simultaneously explained by BMI, functional limitation, and pain-related fear.

6.2 Recommendations

6.2.1 Recommendations for nursing practice

The results showed that knee pain did not influence physical activity among women with knee OA, but experience of knee pain could elicit pain-related fear which influence physical activity. Pain-related fear made the patients to avoid to engage physical activity. Its consequences were functional limitation and overweight. Pain-related fear, functional limitation, and body mass index simultaneously negative influence physical activity. This finding provided the recommendations for nursing practice and further research as follows.

6.2.1.1 Body mass index, functional limitation, pain-related fear and physical activity in women with knee osteoarthritis should be assessed.

6.2.1.2 Overweight patients were likely to do low physical activity. In addition, overweight patients were likely to lose their knee function. Therefore, weight control and knee strengthening exercise should be encouraged to foster their physical activity.

6.2.1.3 The participants in the current study were likely to believe that knee movements as a cause of pain, injury, and harmful, which Rainville et al. (2011) classified them as misinformation avoiders, but most of them did not have a persistence irrational fear of physical activities, which Rainville et al. classified them as affective avoiders. Rainville et al. stated that misinformation avoiders required new information and new experience which contradicted their concern to restore self-confidence, such as gradually engaging activity inducing pain and comparing the benefit between pre- and post- gradually engaging activity. Affective avoiders often distort explanation and magnify precaution given by providers; therefore, the intervention should aim to modify catastrophic thinking by inducing

fearful patients to exposure to activity inducing fear and challenge catastrophic expectations and disconfirmed fears. Therefore, osteoarthritis patients who have elevated pain-related fear without catastrophic thinking should receive the education aiming to understanding pathology of knee pain, pain-inducing activities, and gradually engaging osteoarthritis patients in activity inducing pain, beyond promoting efficacy to manage pain and board health education.

6.2.2 Recommendations for further study

6.2.2.1 Long form International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire might be alternative measurements in the future study, because they could capture various types of physical activity. They might be benefit to clarify whether working status influence physical activity. In addition, it is benefit to clarify whether or not women achieved moderate to high physical activity from doing domestic activity.

6.2.2.2 International Physical Activity Questionnaire provides specific examples that are different in intensity of physical activity which are linked to the physical responses such as increasing breath and heart rate. The current study found that it is difficult to distinguish between moderate and vigorous physical activity. In addition, some examples of activity in IPAQ such as playing tennis is not commonly activity in Thailand. Hallal et al. (2010) recommended to use photos that portrayed different in intensity of activity and were culturally relevant. Therefore, the further research might use the photos accompany with IPAQ. In addition, the further research might use other methods to identify the intensity such as index of exertion, index of effort, and compendium of physical activities.

6.2.2.3 The further research might examine physical activity using both subjective and objective measurements to enhance the reliability of the findings (Ekelund et al., 2006).

6.2.2.4 The percentage of prediction of physical activity by body mass index, functional limitation, and pain-related fear was quite low (8.8%). There was no influence of knee pain, pain catastrophizing, and social support on physical activity. It might be because of the data crowding in the patients with mild knee pain. Therefore, those factors are a need for examining replication. The further research should include the

participants covering mild, moderate, and severe pain. In addition, the previous studies showed that other factors might influence physical activity, such as marital status, living status, occupation, number of comorbidity, and number of falling (Espinell et al., 2015; Fletcher, Guthrie, Berg, & Hirdes, 2010; Friedman, Munoz, West, Rubin, & Fried, 2002; Greene et al., 2006; Hutton et al., 2010; Kim, Kim, Park, et al., 2010; Murtagh et al., 2015; Plonczynski, et al., 2008; White et al., 2012). They might additional explain physical activity.

6.2.2.5 Referring to the Interaction Models of Client Health Behavior (IMCHB), other elements in this model, such as client-professional interaction could possibly influence adherence to the recommended care regimen. Further research should examine other variables within this model to investigate whether they have influence on physical activity.

6.2.2.6 The current study found more recurrent fall in moderate to high physical activity group. This result was not in the line of fear-avoidance model. It was possible that fear of falling and physical impacts of falls might influence physical activity, and mild fear and injury might motivate the patients to get benefit from physical activity to prevent future falls. Hadjistavropoulos et al. (2007) had found both pain-related fear and fear of falling influencing avoidance behaviors in older adults. Therefore, the influence of fear of falling and physical activity should be examined in further study.

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APPENDIX A
BORG CATEGORY RATIO (BORG CR-10)

0	Nothing at all
0.5	Very, very weak (just noticeable)
1	Very weak
2	Weak (light)
3	Moderate
4	Somewhat strong
5	Strong (heavy)
6	
7	Very strong
8	
9	
10	Very, very strong (almost max)
.	

From Borg (1982)

APPENDIX B

CERTIFICATE OF APPROVAL FROM SIRIRAJ INSTITUTIONAL REVIEW BOARD

2 WANGLANG Rd. BANGKOKNOI
BANGKOK 10700



Tel. +66 2419 2667-72
Fax. +66 2411 0162

Siriraj Institutional Review Board

Certificate of Approval

COA no. SI193/2015

Protocol Title : Factors Influencing Physical Activity Among Women with Osteoarthritis of the Knee

Protocol number : 109/2558(EC3)

Principal Investigator/Affiliation : Assist. Prof. Umaporn Hanrungharotorn / Faculty of Nursing, Mahidol University

Research site : Faculty of Medicine Siriraj Hospital

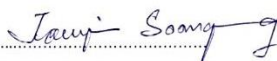
Approval includes :

1. SIRB Submission Form
2. Proposal
3. Participant Information Sheet
4. Informed Consent Form
5. Questionnaire
6. The mini-mental state examination, Thai version (MMSE-Thai 2002)**
7. Curriculum Vitae

Approval date : April 7, 2015

Expired date : April 6, 2016

This is to certify that Siriraj Institutional Review Board is in full Compliance with international guidelines for human research protection such as the Declaration of Helsinki, the Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP).


(Prof. Jarupim Soongswang, M.D.)
Chairperson

16 APR 2015
date


(Prof. Prasit Watanapa, M.D., Ph.D.)

17 APR 2015
date

Dean of Faculty of Medicine Siriraj Hospital

Page 1 of 2

APPENDIX C

PARTICIPANT INFORMATION SHEET

เอกสารหมายเลข 3ก: เอกสารชี้แจงผู้เข้าร่วมวิจัย/อาสาสมัคร

เอกสารชี้แจงผู้เข้าร่วมการวิจัย/อาสาสมัคร

(Participant Information Sheet)

ในเอกสารนี้อาจมีข้อความที่ท่านอ่านแล้วยังไม่เข้าใจ โปรดสอบถามหัวหน้าโครงการวิจัยหรือผู้แทนให้ช่วยอธิบายจนกว่าจะเข้าใจดี ท่านอาจจะขอเอกสารนี้กลับไปอ่านที่บ้านเพื่อปรึกษาหารือกับญาติพี่น้อง เพื่อนสนิท แพทย์ประจำตัวของท่าน หรือแพทย์ท่านอื่น เพื่อช่วยในการตัดสินใจเข้าร่วมการวิจัย

ชื่อโครงการวิจัย ปัจจุบันที่มีอิทธิพลต่อกิจกรรมทางกายในหญิงข้อเข่าเสื่อม

ชื่อหัวหน้าโครงการวิจัย ผู้ช่วยศาสตราจารย์ อุมพร น่านรุ่งโรธร

สถานที่วิจัย คือ โรงพยาบาลศิริราช มหาวิทยาลัยมหิดล ประกอบด้วย

- หน่วยตรวจโรคออร์โธปิดิกส์ ตึกผู้ป่วยนอก
- หน่วยตรวจและติดตามผลการรักษาออร์โธปิดิกส์ ตึกสยามินทร์
- หน่วยตรวจเวชศาสตร์ฟื้นฟู ตึกศรีสังวาลย์

สถานที่ทำงานและหมายเลขโทรศัพท์ของหัวหน้าโครงการวิจัยที่ติดต่อได้ทั้งในและนอกเวลาราชการ

ผู้ช่วยศาสตราจารย์ อุมพร น่านรุ่งโรธร

คณะพยาบาลศาสตร์ มหาวิทยาลัยนครสวรรค์

เลขที่ 99 หมู่ 9 ตำบลท่าโพธิ์ อำเภอเมือง จังหวัดพิษณุโลก 65000

หมายเลขโทรศัพท์ 0 8841 9992 9

ผู้สนับสนุนทุนวิจัย คือ ทุนพัฒนาอาจารย์ ภายใต้โครงการส่งเสริมการวิจัยในอุดมศึกษาและพัฒนา

มหาวิทยาลัยแห่งชาติ ประจำปี 2554 ในสังกัดสำนักงานคณะกรรมการอุดมศึกษา

การมีส่วนได้ส่วนเสียกับแหล่งทุน (/) ไม่มี () มีระบุ

ระยะเวลาในการวิจัย 3 ปี (1 ม.ค. 2557 – 31 ธ.ค. 2559)



เอกสารหมายเลข 3ก: เอกสารชี้แจงผู้เข้าร่วมวิจัย/อาสาสมัคร

ที่มาและวัตถุประสงค์ของโครงการวิจัย

ข้อเข่าเสื่อมเป็นปัญหาที่พบบ่อยในวัยผู้ใหญ่ตอนปลายและวัยสูงอายุ หากตรวจคนในวัยนี้ 100 คน จะตรวจพบคนในวัยนี้เป็นโรคข้อเข่าเสื่อม 20 คน ซึ่งข้อเข่าเสื่อมจะพบในผู้หญิงมากกว่าผู้ชาย ข้อเข่าเสื่อมทำให้มีอาการปวดเข่าและมีความลำบากในการทำกิจกรรมที่ต้องใช้ข้อเข่า รวมถึงมีโอกาสเสี่ยงต่อการหกล้มได้ง่าย ทำให้เพิ่มโอกาสเสี่ยงต่อปัญหากระดูกสะโพกหัก

ในปี พ.ศ.2553 ศูนย์ควบคุมและป้องกันโรคระหว่างประเทศร่วมกับมูลนิธิโรคข้ออักเสบได้เสนอแนะให้มีการส่งเสริมผู้ป่วยข้อเข่าเสื่อมเพิ่มกิจกรรมทางกาย ได้แก่ การเคลื่อนไหวร่างกายทุกรูปแบบจากการประกอบอาชีพ การทำงานบ้าน และการออกกำลังกาย ส่งผลให้ลดอาการปวดเข่าและเพิ่มความสามารถในการใช้ข้อเข่า แต่งานวิจัยที่ผ่านมากลับพบว่า จำนวนผู้ป่วยข้อเข่าเสื่อมที่ทำกิจกรรมทางกายในระดับที่เพียงพอยังมีจำนวนน้อย การทำกิจกรรมทางกายนั้นขึ้นอยู่กับปัจจัยหลายประการ แต่ในปัจจุบันการศึกษากิจกรรมทางกายในผู้ป่วยข้อเข่าเสื่อมยังมีจำนวนจำกัด ดังนั้น ผู้วิจัยจึงสนใจจะศึกษาการออกกำลังกายในหญิงข้อเข่าเสื่อม โดยมีวัตถุประสงค์ คือ

- เพื่อศึกษาระดับกิจกรรมทางกายในหญิงข้อเข่าเสื่อม
- เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อกิจกรรมทางกายในหญิงข้อเข่าเสื่อม

ท่านได้รับเชิญให้เข้าร่วมการวิจัยนี้เนื่องจาก ท่านมีคุณสมบัติ คือ ท่านเป็นผู้หญิงที่มีอายุ 50 ปีขึ้นไป และได้รับการวินิจฉัยว่าเป็นโรคข้อเข่าเสื่อม

จะมีผู้เข้าร่วมวิจัย/อาสาสมัครทั้งสิ้น ประมาณ 242 คน

หากท่านตัดสินใจเข้าร่วมการวิจัยแล้ว จะมีขั้นตอนการวิจัยดังต่อไปนี้ คือ ผู้วิจัยจะอธิบายวัตถุประสงค์และขั้นตอนการเก็บรวบรวมข้อมูลแก่ท่าน พร้อมทั้งเปิดโอกาสให้ท่านได้ซักถามในสิ่งที่ไม่เข้าใจ ท่านสามารถปรึกษาญาติ แพทย์ หรือพยาบาลก่อนการตัดสินใจ เมื่อท่านเข้าใจวัตถุประสงค์ของการวิจัย รายละเอียดขั้นตอนต่างๆ และยินดีเข้าร่วมโครงการวิจัย ผู้วิจัยจะให้ท่านลงชื่อในหนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย



เอกสารหมายเลข 3ก: เอกสารชี้แจงผู้เข้าร่วมวิจัย/อาสาสมัคร

ผู้วิจัยจะหาสถานที่ที่เหมาะสมสำหรับการสัมภาษณ์ในครั้งนี้ ผู้วิจัยจะเก็บรวบรวมข้อมูลโดยวิธีการสัมภาษณ์แบบตัวต่อตัว หากท่านเป็นผู้มีอายุ 60 ปี ขึ้นไป ผู้วิจัยจะประเมินระดับความสามารถด้านการจำ หากท่านผ่านเกณฑ์ดังกล่าว ผู้วิจัยจะสัมภาษณ์ท่านโดยใช้แบบสอบถาม 6 ฉบับ ได้แก่ 1) แบบสอบถามกิจกรรมทางกายนานาชาติ ชุดสั้น 2) แบบสอบถามข้อมูลส่วนบุคคล 3) แบบสอบถามอาการข้อเข่าเสื่อม 4) แบบสอบถามยุทธวิธีในการแก้ปัญหาบ้นย่อ ในส่วนการประเมินความคิดที่มีต่ออาการปวด 5) แบบสอบถามความเชื่อเกี่ยวกับความกลัวและการถอยหนีจากอาการปวด อันเนื่องมาจากการมีกิจกรรมทางกาย และ 6) แบบสอบถามความรู้สึกหลากหลายมิติเกี่ยวกับความช่วยเหลือทางสังคม รวมจำนวนทั้งสิ้น 60 ข้อ โดยการสัมภาษณ์จะใช้เวลาประมาณ 30-45 นาที ในการวิจัยครั้งนี้ ท่านจะถูกถอนจากการเข้าร่วมงานวิจัย กรณีที่ท่านไม่ทราบหรือไม่แน่ใจระยะเวลาของการมีกิจกรรมทางกาย เพราะการขาดข้อมูลดังกล่าว ทำให้ผู้วิจัยไม่สามารถประเมินระดับกิจกรรมทางกายของท่านได้ กรณีที่ท่านถอนตัวจากงานวิจัยด้วยเหตุผลดังกล่าว ผู้วิจัยจะยุติการสัมภาษณ์เพื่อประหยัดเวลาของท่าน หากการสัมภาษณ์ดำเนินการจนครบ ผู้วิจัยจะชั่งน้ำหนักและวัดส่วนสูงของท่านเพื่อประเมินดัชนีมวลกาย และจะศึกษาระยะเวลาของการเป็นโรคข้อเข่าเสื่อม ประวัติการรักษาข้อเข่าเสื่อมและโรคประจำตัวในระยะ 6 เดือนที่ผ่านมาจากแฟ้มประวัติของท่าน หากผู้วิจัยประเมินพบภาวะเสี่ยงหรือปัญหาสุขภาพอื่นๆ ผู้วิจัยจะสอบถามความต้องการของท่านในการส่งต่อการรับการดูแลรักษาที่เหมาะสมจากเจ้าหน้าที่ทางสุขภาพต่อไป ท่านมีสิทธิตัดสินใจที่จะรับหรือไม่รับบริการดังกล่าว ผลการประเมินและการตัดสินใจของท่านถือเป็นความลับ

ความเสี่ยงที่อาจเกิดขึ้นเมื่อเข้าร่วมการวิจัย

การเก็บรวบรวมข้อมูลวิจัยในครั้งนี้มีความเสี่ยงที่อาจเกิดขึ้นน้อย เนื่องจากไม่ได้มีการปฏิบัติกิจกรรมใดๆ ต่อท่าน นอกเหนือจากการตอบแบบสอบถาม และไม่เคยมีรายงานการเกิดเหตุการณ์ไม่พึงประสงค์มาก่อนจากการวิจัยที่ผ่านมาในลักษณะเดียวกัน แต่ท่านอาจเสียเวลาในการตอบแบบสอบถาม หรืออาจมีความรู้สึกอึดอัด อ่อนล้า โดยหากพบว่ามีอาการดังกล่าว ผู้วิจัยจะให้ท่านพักจนกว่าอาการจะดีขึ้น หากท่านพักแล้วอาการดีขึ้นและยินดีที่จะเข้าร่วมการวิจัยต่อ ผู้วิจัยจะ



เอกสารหมายเลข 3ก: เอกสารชี้แจงผู้เข้าร่วมวิจัย/อาสาสมัคร

ทำการสัมภาษณ์ท่านต่อไป หรือหากท่านต้องการยุติการเข้าร่วมวิจัย ท่านสามารถปฏิเสธหรือถอนตัวจากโครงการวิจัยเมื่อใดก็ได้ โดยไม่ต้องชี้แจงเหตุผล และท่านจะไม่ได้รับผลกระทบใดๆ ต่อแผนการรักษาพยาบาล ท่านยังคงได้รับการตรวจรักษาจากเจ้าหน้าที่ตามมาตรฐาน แต่หากภายหลังการดูแลรักษาแล้วอาการของท่านไม่ดีขึ้น ผู้วิจัยจะยุติการสัมภาษณ์และถอนท่านจากงานวิจัย ทั้งนี้ในระหว่างการตรวจรักษา ผู้วิจัยจะทำการประสานเรื่องลำดับคิวการตรวจรักษาของท่านกับพยาบาลประจำห้องตรวจ เพื่อให้ท่านได้รับการตรวจตามลำดับคิว หากในระหว่างที่ผู้วิจัยกำลังทำการสัมภาษณ์ท่าน และถึงลำดับคิวการตรวจของท่าน ท่านสามารถเข้ารับการตรวจได้ในทันที หากมีข้อสงสัยเกี่ยวกับการวิจัย ผู้เข้าร่วมวิจัย/อาสาสมัครสามารถติดต่อผู้วิจัยได้ 24 ชั่วโมง ที่เบอร์โทร 0 8841 9992 9

ประโยชน์ที่คิดว่าจะได้รับการวิจัย

ผลการวิจัยในครั้งนี้จะเป็นประโยชน์ต่อพยาบาลและเจ้าหน้าที่ที่มึสุขภาพในการพัฒนาโปรแกรมส่งเสริมกิจกรรมทางกายที่เหมาะสมกับหญิงข้อเข่าเสื่อม

ค่าตอบแทนสำหรับผู้เข้าร่วมวิจัย/อาสาสมัครจะได้รับ

ผู้เข้าร่วมวิจัย/อาสาสมัครจะไม่ได้รับค่าตอบแทนจากการวิจัยนี้

หากมีข้อมูลเพิ่มเติมทั้งด้านประโยชน์และโทษที่เกี่ยวข้องกับการวิจัยนี้ ผู้วิจัยจะแจ้งให้ทราบโดยรวดเร็วและไม่ปิดบัง

ข้อมูลส่วนตัวของผู้เข้าร่วมวิจัย/อาสาสมัครจะถูกเก็บรักษาไว้เป็นความลับและจะไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล แต่จะรายงานผลการวิจัยในภาพรวม ข้อมูลของผู้เข้าร่วมวิจัย/อาสาสมัครเป็นรายบุคคลอาจมีคณะบุคคลบางกลุ่มเข้ามาตรวจสอบได้ เช่น ผู้ให้ทุนวิจัย ผู้กำกับดูแลการวิจัย สถาบันหรือองค์กรของรัฐที่มีหน้าที่ตรวจสอบ รวมถึงคณะกรรมการจริยธรรมการวิจัยในคน เป็นต้น โดยมีได้ละเมิดสิทธิของผู้เข้าร่วมวิจัย/อาสาสมัครในการรักษาความลับเกินขอบเขตที่กฎหมายอนุญาตไว้



เอกสารหมายเลข 3ก: เอกสารชี้แจงผู้เข้าร่วมวิจัย/อาสาสมัคร

ผู้เข้าร่วมวิจัย/อาสาสมัครมีสิทธิถอนตัวออกจากโครงการวิจัยเมื่อใดก็ได้ โดยไม่ต้อง
แจ้งให้ทราบล่วงหน้า และการไม่เข้าร่วมการวิจัยหรือถอนตัวออกจากโครงการวิจัยนี้ จะไม่มีผลต่อการ
บริการและการรักษาที่สมควรจะได้รับตามมาตรฐานแต่ประการใด

หากท่านได้รับการปฏิบัติที่ไม่ตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงนี้ ท่านสามารถ
ร้องเรียนไปยังประธานคณะกรรมการจริยธรรมการวิจัยในคนได้ที่ สำนักงานคณะกรรมการจริยธรรม
การวิจัยในคน อาคารเฉลิมพระเกียรติ ๘๐ พรรษา ๕ ธันวาคม ๒๕๕๐ ชั้น 2 โทร. 0 2419 2667 72
โทรสาร 0 2411 0162

ลงชื่อ.....ผู้เข้าร่วมวิจัย/อาสาสมัคร

(.....)

วันที่

	รับรอง
	โดยคณะกรรมการจริยธรรมการวิจัยในคน
	รหัสโครงการ 109/2558 (EC1)
	COA No. SI... 193/2015
	วันที่รับรอง 7 มี.ย. 2558

APPENDIX D

CONSENT FORM

เอกสาร 3: หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย (Consent Form)

วันที่.....เดือน.....พ.ศ.

ข้าพเจ้า.....อายุ.....ปี

อาศัยอยู่บ้านเลขที่.....ถนน.....แขวง/ตำบล.....

เขต/อำเภอ.....จังหวัด.....รหัสไปรษณีย์.....

โทรศัพท์.....

ขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง บัณฑิตที่มีอิทธิพลต่อกิจกรรมทางกาย
ในหญิงข้อเท้าเสื่อม

โดยข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ประโยชน์ที่คาดว่าจะได้รับของการวิจัย และความเสี่ยงที่อาจเกิดขึ้นจากการเข้าร่วมการวิจัย รวมทั้งแนวทางป้องกันและแก้ไขหากเกิดอันตรายขึ้น ค่าใช้จ่ายที่ข้าพเจ้าจะต้องรับผิดชอบจ่ายเอง โดยได้อ่านข้อความที่มีรายละเอียดอยู่ในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด อีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยเป็นที่เรียบร้อยแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมการวิจัยนี้

หากข้าพเจ้ามีข้อข้องใจเกี่ยวกับขั้นตอนการวิจัย หรือหากเกิดผลข้างเคียงที่ไม่พึงประสงค์จากการวิจัยขึ้นกับข้าพเจ้า ข้าพเจ้าสามารถติดต่อกับผู้ช่วยศาสตราจารย์อุมาพร ห่านรุ่งโรจน์ คณะพยาบาลศาสตร์ มหาวิทยาลัยนเรศวร และโทรศัพท์ได้ที่เบอร์ 0 8841 9992 9

หากข้าพเจ้าได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารคำชี้แจง ผู้เข้าร่วมการวิจัยต้องการปรึกษาปัญหา ข้อกังวล มีคำถามหรือต้องการข้อมูลเพิ่มเติมเกี่ยวกับการวิจัย ข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนได้ที่ สำนักงานคณะกรรมการจริยธรรม



เอกสาร 3ข: หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย

การวิจัยในคน อาคารเฉลิมพระเกียรติ ๘๐ พรรษา ๕ ธันวาคม ๒๕๕๐ ชั้น 2 โทร. 0 2419 2667 72
โทรสาร 0 2411 0162

ข้าพเจ้าได้ทราบถึงสิทธิที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติมทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และสามารถถอนตัวหรืองดเข้าร่วมการวิจัยได้ทุกเมื่อโดยไม่ต้องแจ้งล่วงหน้าหรือระบุเหตุผล โดยจะไม่มีผลกระทบต่อการบริการและการรักษาพยาบาลที่ข้าพเจ้าจะได้รับต่อไปในอนาคต และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอข้อมูลเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

ข้าพเจ้าได้เข้าใจข้อความในเอกสารนี้แจ้งผู้เข้าร่วมการวิจัย และหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้ว จึงลงลายมือชื่อไว้

ลงชื่อ.....ผู้เข้าร่วมวิจัย/อาสาสมัคร/วันที่.....
(.....)

ลงชื่อ.....หัวหน้าโครงการวิจัย/วันที่.....
(ผู้ช่วยศาสตราจารย์ อุมพร ห่านรุ่งโรจน์)

ในกรณีผู้เข้าร่วมวิจัย/อาสาสมัครอ่านหนังสือไม่ออก มีพยานซึ่งไม่มีส่วนได้ส่วนเสียอยู่ด้วยตลอดระยะเวลาที่มีการให้ข้อมูลและผู้ร่วมวิจัย/อาสาสมัครให้ความยินยอมเข้าร่วมวิจัย พยานขอยืนยันว่าข้อมูลในหนังสือแสดงเจตนายินยอมหรือข้อมูลที่ได้รับและเอกสารอื่นได้รับการอธิบายอย่างถูกต้องและผู้เข้าร่วมวิจัย/อาสาสมัครแสดงความเข้าใจรายละเอียดต่างๆ พร้อมทั้งให้ความยินยอมโดยสมัครใจ จึงได้ลงลายมือชื่อไว้เป็นพยาน

ลงชื่อ.....พยาน/วันที่.....
(.....)



APPENDIX E

PERSONAL DATA QUESTIONNAIRE

คำชี้แจง ข้อคำถามต่อไปนี้จะสอบถามข้อมูลส่วนบุคคล อาการปวดเข่า อาการข้อเข่าฝืด
ประวัติการหกล้ม และพฤติกรรมออกกำลังกายของคุณ

ส่วนที่ 1 ข้อมูลส่วนบุคคล (สำหรับผู้ให้ข้อมูล)

1. คุณอายุเท่าใด ปี
2. สถานภาพสมรสปัจจุบันของคุณเป็นเช่นไร
☐ โสด ☐ คู่ ☐ หม้าย หย่า แยก
3. ปัจจุบันคุณประกอบอาชีพอะไร (ตอบได้มากกว่า 1 ข้อ)
☐ ไม่ได้ประกอบอาชีพ ☐ เกษตรกรรม
☐ รับจ้างทั่วไป ☐ ค้าขายหรือทำธุรกิจส่วนตัว
☐ พนักงานในองค์กรเอกชน/รัฐวิสาหกิจ/มหาวิทยาลัย
☐ ข้าราชการ หรือข้าราชการบำนาญ ☐ อื่นๆ (ระบุ).....
 .
 .
 .
 .
 .
6. ปัจจุบันท่านอาศัยอยู่กับใคร
☐ อยู่ตัวคนเดียว
☐ อยู่กับผู้อื่น (ตอบได้มากกว่า 1 รายการ) คือ
☐ คู่สมรส ☐ บุตร ☐ เครือญาติ เช่น พี่น้อง หลาน ☐ อื่นๆ
 (ระบุ).....

ส่วนที่ 2 ข้อมูลสุขภาพ (สำหรับผู้ให้ข้อมูล)

7. ในระยะ 7 วันที่ผ่านมา คุณมีอาการข้อเข้าฝืดมากน้อยเพียงใด โดย 0 หมายถึง ไม่ฝืดเลย และ

10 หมายถึง ฝืดมากที่สุด

7.1 ข้อเข้าฝืดในช่วงเช้า (พิจารณาขณะตื่นนอน)

0	1	2	3	4	5	6	7	8	9	10
ไม่ฝืดเลย					ฝืดมากที่สุด					

.....
.....
.....
.....
.....

9. ในระยะ 7 วันที่ผ่านมา คุณออกกำลังกายบ้างหรือไม่ หากทำ คุณออกกำลังกายวิธีใด

() ไม่ทำ () ทำ ด้วยวิธี.....

ส่วนที่ 3 ข้อมูลสุขภาพ (สำหรับผู้วิจัย)

10. ระยะเวลาของการเป็นโรคข้อเข้าเสื่อม ปี

11. ตำแหน่งของข้อเข้าเสื่อม

() เข่าซ้าย () เข่าขวา () ทั้งสองข้าง

.....
.....
.....
.....
.....

14. น้ำหนัก =.....ก.ก.

ส่วนสูง =.....ซ.ม.

ดัชนีมวลกาย =.....ก.ก./ม.²

APPENDIX F

MODIFIED THAI VERSION OF THE WESTERN ONTARIO AND MCMASTER UNIVERSITIES OSTEOARTHRITIS INDEX

คำชี้แจง คำถามต่อไปนี้ เป็นการสอบถามเกี่ยวกับอาการปวดเข่าของคุณ และความสามารถในการใช้ข้อเข่าทำกิจกรรม ในระยะ 7 วันที่ผ่านมา

ส่วนที่ 1 ระดับความปวดของข้อเข่า

ในระยะ 7 วันที่ผ่านมา คุณมีอาการปวดเข่ามากน้อยเพียงใด โดย 0 หมายถึง ไม่ปวดเข่าเลย และ 10 หมายถึง ปวดมากจนทนไม่ได้ หากอาการปวดของข้อเข่าทั้งสองข้างไม่เท่ากัน หรือหากปวดเข่าทั้งสองข้าง ให้คุณพิจารณาเข่าข้างที่มีอาการปวดมากกว่า

1. อาการปวดเข่าขณะเดินบนพื้นราบ

0 1 2 3 4 5 6 7 8 9 10

ไม่ปวดเลย

ปวดมากจนทนไม่ได้

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. .
. .
. .
. .

5. อาการปวดเข่าขณะขึ้นลงบันได โดยไม่มีการจับข้อเข่า

0 1 2 3 4 5 6 7 8 9 10

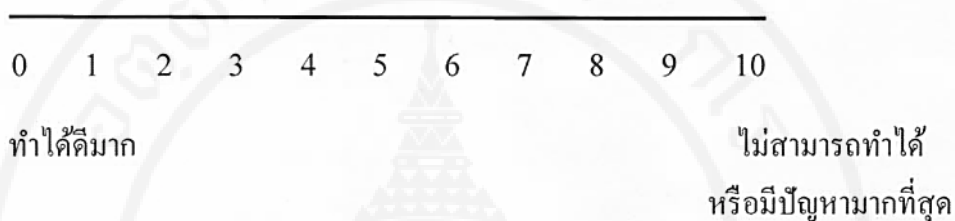
ไม่ปวดเลย

ปวดมากจนทนไม่ได้

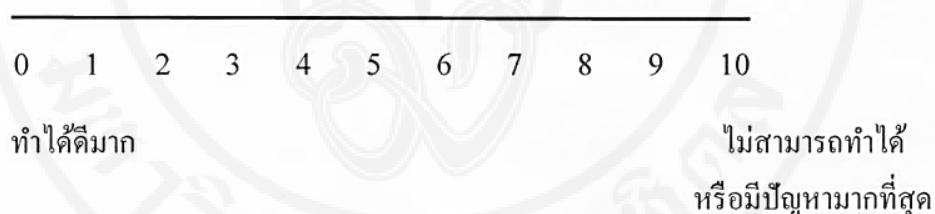
ส่วนที่ 2 ความสามารถในการใช้งานของข้อเท้า

ในระยะ 7 วันที่ผ่านมา ระดับความสามารถในการใช้งานของข้อเท้าในการทำกิจกรรมต่อไปนี้มีมากน้อยเพียงใด โดย 0 หมายถึง ข้อเท้าสามารถทำกิจกรรมนั้นๆ ได้ดีมาก และ 10 หมายถึง ไม่สามารถทำกิจกรรมนั้นๆ ได้เลย หรือมีปัญหาหนักที่สุด

1. การลงบันได

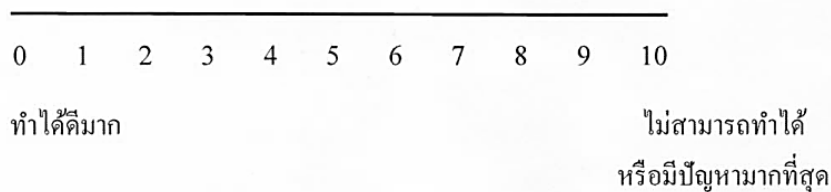


2. การขึ้นบันได



..

15. การทำงานบ้านเบาๆ เช่น ทำกับข้าว ล้างถ้วยจาน ปิดฝุ่้น เช็ดโต๊ะ จัดโต๊ะ เป็นต้น



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APPENDIX G

CATASTROPHIZING COPING SCALE OF REVISED COPING STRATEGIES QUESTIONNAIRE

คำชี้แจง คำถามต่อไปนี้ เป็นการสอบถามเกี่ยวกับความคิดของคุณต่ออาการปวดเข่า หากมีความคิดต่อไปนี้ ความคิดเหล่านี้เกิดขึ้นบ่อยครั้งเพียงใด โดยมีตัวเลือกตอบ 7 ระดับ คือ ไม่เคย, เกือบไม่เคย, นานๆ ครั้ง, บางครั้ง, หลายครั้ง, เกือบทุกครั้ง, และทุกครั้ง

	ไม่เคย (0)	เกือบ ไม่เคย (1)	นานๆ ครั้ง (2)	บาง ครั้ง (3)	หลาย ครั้ง (4)	เกือบ ทุกครั้ง (5)	ทุกครั้ง (6)
1. อาการปวดเข่ามันแย่มาก ฉันคิดว่า มันจะไม่มีวันดีขึ้นเลย							
2. อาการปวดเข่ามันน่ากลัว ฉันคิดว่าอาการปวดมันมาก เกินไปสำหรับฉัน							
.....							
.....							
.....							
6. ฉันคิดว่า ฉันไม่สามารถที่จะ ดำเนินชีวิตได้ต่อไป							
รวมคะแนน							
คะแนนรวม					/ 36		

APPENDIX H

MODIFIED FEAR-AVOIDANCE BELIEFS QUESTIONNAIRE ABOUT PHYSICAL ACTIVITY

คำชี้แจง คำถามต่อไปนี้ เป็นการสอบถามความคิดเห็นของคุณต่อการทำกิจกรรมทางกาย เช่น ก้มหลัง ยกของ เดิน และขับรถ ว่าจะมีผลต่ออาการปวดเข่าของคุณระดับใด โดยมีตัวเลือกตอบ 7 ระดับ คือ ไม่เห็นด้วยอย่างมาก, ไม่เห็นด้วย, ค่อนข้างไม่เห็นด้วย, ไม่แน่ใจ, ค่อนข้างเห็นด้วย, เห็นด้วย, และเห็นด้วยอย่างมาก

	ไม่เห็น ด้วย อย่าง มาก (0)	ไม่ เห็น ด้วย (1)	ค่อนข้าง ไม่เห็น ด้วย (2)	ไม่ แน่ใจ (3)	ค่อนข้าง เห็นด้วย (4)	เห็น ด้วย (5)	เห็น ด้วย อย่าง มาก (6)
1. การทำกิจกรรมทางกาย ทำให้อาการปวดเข่าของฉันทัน รุนแรงขึ้น							
.....							
.....							
4. ฉันทไม่สามารถปฏิบัติ กิจกรรมทางกายที่ทำให้ หรืออาจทำให้อาการปวด เข่าของฉันทันรุนแรงขึ้น							
รวมคะแนน							
คะแนนรวม					/ 24		

APPENDIX I

REVISED THAI VERSION OF THE MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT

คำชี้แจง ข้อคำถามต่อไปนี้เป็นข้อความเกี่ยวกับแหล่งสนับสนุนที่คุณได้รับจากครอบครัว เพื่อน และบุคคลพิเศษ ซึ่งบุคคลพิเศษในที่นี้ คือ บุคคลที่นอกเหนือจากครอบครัวและเพื่อน เมื่อผู้วิจัยอ่านข้อคำถามต่อไปนี้ ผู้วิจัยอยากทราบว่าความรู้สึกอย่างไร โดยมีตัวเลือกตอบคือ ไม่เห็นด้วยอย่างมาก, ไม่เห็นด้วย, ก่อนข้างไม่เห็นด้วย, เฉยๆ, ก่อนข้างเห็นด้วย, เห็นด้วย, และเห็นด้วยอย่างมาก

	ไม่เห็น ด้วย อย่าง มาก (1)	ไม่เห็น ด้วย (2)	ก่อนข้าง ไม่เห็น ด้วย (3)	เฉยๆ (4)	ก่อน ข้างเห็น ด้วย (5)	เห็น ด้วย (6)	เห็น ด้วย อย่าง มาก (7)
1. ครอบครัวของฉันพยายามช่วยฉันจริงๆ							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12. ฉันมีบุคคลพิเศษในชีวิตนอกเหนือจากครอบครัวและเพื่อนที่คอยห่วงใยความรู้สึกของฉัน							
รวมคะแนน							

ที่มา: Wongpakaran, N. & Wongpakaran, T. (2012). A revised version of the Thai Multidimensional Scale of Perceived Social Support (MSPSS). *Span J Psychol.* 2012; 15(3): 1503-9. **สงวนลิขสิทธิ์**

APPENDIX J

SHORT FORM INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

คำชี้แจง คำถามต่อไปนี้ เป็นแบบสอบถามเกี่ยวกับกิจกรรมทางกายที่คุณทำอยู่ในชีวิตประจำวันในช่วง 7 วันที่ผ่านมา กิจกรรมทางกายนี้ หมายถึง กิจกรรมที่คุณใช้ทำเพื่อประกอบอาชีพ ทำงานบ้าน การเดินทางจากที่หนึ่งไปอีกที่หนึ่ง กิจกรรมสันทนาการ การออกกำลังกาย และการเล่นกีฬา โปรดตอบข้อคำถามแต่ละข้อ โดยไม่ต้องคิดว่า คุณจะเป็นคนกระตือรือร้นหรือกระฉับกระเฉงหรือไม่

1. ในช่วง 7 วันที่ผ่านมา คุณทำกิจกรรมที่ใช้แรงอย่างน้อย 10 นาทีหรือไม่ [กิจกรรมที่ใช้แรงมาก หมายถึง กิจกรรมที่คุณต้องออกแรงมากและทำให้คุณหายใจแรงและเร็วกว่าปกติมาก เช่น การยกของหนัก ขุดดิน หรือการปั่นจักรยานเร็วๆ] หากทำ คุณทำกี่วันต่อสัปดาห์

() ไม่ทำ, เข้าไปข้อ 3

() ทำ จำนวน..... วันต่อสัปดาห์

2. โดยปกติ ในแต่ละวันคุณทำกิจกรรมที่ใช้แรงมานานเท่าใด

..... ชั่วโมง..... นาที ต่อวัน

() ไม่ทราบ หรือไม่แน่ใจ

.

.

..

.

7. ข้อคำถามต่อไปนี้เป็นคำถามเกี่ยวกับระยะเวลาที่คุณใช้ในการนั่งในวันธรรมดา (จันทร์ถึงศุกร์) ในช่วง 7 วันที่ผ่านมา การนั่งนี้ รวมถึง การนั่งคุยกับเพื่อน การนั่งทำงานที่โต๊ะ การนั่งเพื่อพักผ่อน การนั่งอ่านหนังสือ การนั่งหรือนอนดูทีวี

ในช่วง 7 วันที่ผ่านมา โดยปกติคุณใช้เวลาสำหรับการนั่งนานเท่าใด

..... ชั่วโมง..... นาที ต่อวัน

() ไม่ทราบ หรือไม่แน่ใจ

APPENDIX K

MINI-MENTAL STATE EXAMINATION-THAI 2002

ในกรณีที่ผู้ถูกทดสอบอ่านไม่ออกเขียนไม่ได้ ไม่ต้องทำข้อ 4,9 และ 10

บันทึกคำตอบไว้ทุกครั้ง คะแนน
(ทั้งคำตอบที่ถูกต้องและผิด)

1. Orientation for time (5 คะแนน)

(ตอบถูกข้อละ 1 คะแนน)

- | | | |
|------------------------|-------|--------------------------|
| 1.1 วันนี้วันที่เท่าไร | ..... | ☐ |
| 1.2 วันนี้วันอะไร | ..... | ☐ |
| 1.3 เดือนนี้เดือนอะไร | ..... | ☐ |
| 1.4 ปีนี้ปีอะไร | ..... | ☐ |
| 1.5 ฤดูนี้ฤดูอะไร | ..... | ☐ |

2. Orientation for place (5 คะแนน) (ให้เลือกข้อใดข้อหนึ่ง)

(ตอบถูกข้อละ 1 คะแนน)

2.1 กรณีอยู่ที่สถานพยาบาล

- | | | |
|---|-------|--------------------------|
| 2.1.1 สถานที่ตรงนี้เรียกว่าอะไร และชื่อว่าอะไร | | ☐ |
| 2.1.2 ขณะนี้ท่านอยู่ที่ชั้นที่เท่าไรของตัวอาคาร | ..... | ☐ |
| 2.1.3 ที่อยู่ในอำเภอ - เขตอะไร | ..... | ☐ |
| 2.1.4 ที่นี้จังหวัดอะไร | ..... | ☐ |
| 2.1.5 ที่นี้ภาคอะไร | ..... | ☐ |

2.2 กรณีที่อยู่ที่บ้านของผู้ถูกทดสอบ

- | | | |
|---|-------|--------------------------|
| 2.2.1 สถานที่ตรงนี้เรียกว่าอะไร และบ้านเลขที่อะไร | | ☐ |
| 2.2.2 ที่นี้หมู่บ้าน หรือละแวก/คุ้ม/ย่าน/ถนนอะไร | ..... | ☐ |
| 2.2.3 ที่นี้อำเภอเขต / อะไร | ..... | ☐ |
| 2.2.4 ที่นี้จังหวัดอะไร | ..... | ☐ |
| 2.2.5 ที่นี้ภาคอะไร | ..... | ☐ |

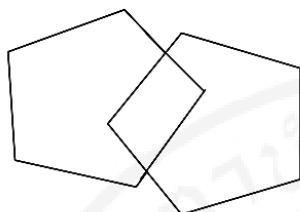
•
•
•
•

11. Visuoconstruction (1 คะแนน)

ข้อนี้เป็นคำสั่ง “จงวาดภาพให้เหมือนภาพตัวอย่าง”



(ในช่องว่างด้านขวาของภาพตัวอย่าง)



คะแนนรวม.....

ชื่อผู้ถูกประเมิน (นาย,นาง,นางสาว).....นามสกุล.....อายุ.....ปี

ลงชื่อผู้ทำการทดสอบ.....วันที่.....เดือน.....พ.ศ.....

จุดตัด (Cut-off point) สำหรับคะแนนที่สงสัยภาวะสมองเสื่อม (Cognitive impairment)

ระดับการศึกษา	คะแนน	
	จุดตัด	เต็ม
ผู้สูงอายุปกติไม่ได้เรียนหนังสือ (อ่านไม่ออก-เขียนไม่ได้)	≤14	23 (ไม่ต้องทำข้อ 4,9,10)
ผู้สูงอายุเรียนระดับประถมศึกษา	≤17	30
ผู้สูงอายุปกติเรียนระดับสูงกว่าประถม	≤22	30

ห้ลับตา

ที่มา: สถาบันเวชศาสตร์ผู้สูงอายุ กรมการแพทย์ กระทรวงสาธารณสุข

APPENDIX L

PERMISSION LETTERS FOR USING THE INSTRUMENTS

1. Modified Thai version of The Western Ontario and McMaster Universities Osteoarthritis Index

WOMAC® Academic License Agreement (2014)

THIS AGREEMENT dated 10th October 2014 (the "Effective Date") is between **NICHOLAS BELLAMY, MD, MSc, DSc, MBA, FRACP** (the "Licensor") with a business address at CONROD, The University of Queensland, Edith Cavell Building, Royal Brisbane and Women's Hospital, Herston, Queensland 4029, Australia, and **UMAPORN HANRUNGRACHARTORN** (the "User") of Mathee place (Room 405), 159 Soi Bun Yu,, Din Daeg ROAD, Sam Sen Nai, Khet Phaya Thai, Bangkok, THAILAND 10400

BACKGROUND

The User wishes to use the WOMAC® modified VA 3.01 Thai for Thailand Osteoarthritis Index (the "Index") in association with the User's Protocol entitled "Factors associated with Exercise Adherence among Women with Osteoarthritis of the Knee", which will involve a maximum of 110 enrolled patients (the "Permitted Sample Size") who are scheduled to make a maximum of 1 visit each (the "Study").

AGREEMENT

For good and valuable consideration, the receipt and sufficiency of which is acknowledged, the parties agree as follows:

1. **Licence.** Subject to the terms and conditions of this agreement, the Licensor grants the User a limited non-exclusive licence (the "Licence") to copy and use the Index only in connection with the Study, and only to the extent necessary for completing the Study.
2. **Non-Commercial Use Only.** The User represents and warrants that the Study is and will remain a Non-Commercial Activity (defined below). The User must not use, exploit, license, print, download or deal with the Index or any results from the use of the Index (or permit any third party to do so) for any other purpose except as expressly permitted by this Agreement or by the Licensor in a signed, written document referring to this Agreement. If the User wishes to use the Index or any results from the use of the Index for commercial or other applications, then upon the User's written request to the Licensor the parties will negotiate in good faith a licence (and associated terms, conditions and fee schedules) for those other applications.

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- (a) **"Commercial Entity"** means a device manufacturer, a pharmaceutical company, a biotechnology company, and all other for-profit companies, partnerships, joint ventures, persons and other entities; and
- (b) **"Non-Commercial Activity"** means an activity that:
 - (i) is not directly or indirectly funded in whole or in part by a Commercial Entity, and
 - (ii) does not involve developing, testing or providing any feedback regarding a Commercial Entity's product or service.
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- (a) each page of the Index and Guide are clearly stamped "CONFIDENTIAL" in at least 20 point font, and
- (b) the User enters into confidentiality agreements with each of the Regulators, requiring them to keep the Index and Guide confidential, and
- (c) the User enforces each of the above confidentiality agreements if one or more of the Regulators fails to keep the Index or Guide confidential.

5. **User's Other Obligations.** The User must:

- (a) not use the Index for more than the Permitted Sample Size;
- (b) not copy, use, modify, exploit, commercialize, resell, license or deal with the Index, or permit any third party to do so except as explicitly permitted by the Licensor in writing;
- (c) not allow any third party to access, view, or otherwise take any benefit from the Index without the prior written consent of the Licensor except as explicitly permitted by the Licensor in writing;
- (d) not use, or permit any third party to use, the Index for the development, validation or evaluation of any health status measurement tool except as explicitly permitted by the Licensor in writing;
- (e) employ and maintain stringent security mechanisms (including physical and electronic mechanisms) to protect the Index from unauthorised access, viewing, use, copying, downloading, printing and exploitation;
- (f) not translate or use translated versions of the Index except as explicitly permitted by the Licensor in writing; and
- (g) use the Index only in a manner consistent with all applicable laws and regulations.

6. **Guides.** Licensor will provide the User with one reference copy of the latest version of the Guide. The User will obtain all Guides from the Licensor and will not copy any or all of a Guide.

7. **Fees & Payment.** Within 30 days after receiving the Licensor's invoice, the User will pay the Licensor USD\$192.00 for the Licence, plus USD\$87.00 per copy of the Guide, plus USD\$120.00 for shipping and handling, plus applicable taxes on each of the foregoing amounts (collectively, the "Fees"). Copies of the WOMAC® materials licensed under this Agreement will be dispatched to the User upon payment in full of the Fees. The User will also pay the Licensor simple interest on all overdue amounts at a rate of 18% per year, calculated from the date payment was due until the date payment (including accrued interest thereon) is made in full. All Fees are non-refundable.
8. **Intellectual property.** As between Licensor and the User and the Authorised Users, Licensor owns all right, title and interest in the Index and the Guide and all modifications, customizations and additions thereto, and all intellectual property rights therein.
9. **IP Notices.** The User will never remove or obscure any trade-mark or copyright notice appearing on the Index. The User will display all trade-mark and copyright notices in association with the Index, as and how directed by the Licensor from time-to-time.
10. **Audits.** From time-to-time upon Licensor's request, User will permit and facilitate the Licensor or his representatives during normal business hours to inspect or audit the User's records, activities and use of the Index to confirm compliance with this agreement.
11. **Term & Termination.** The term of this agreement will terminate after the data collection for the Study has ended, or 10th October 2015, whichever is earlier. Either party may terminate the agreement immediately if the other party breaches any obligation in this agreement and does not remedy the breach within 10 days after receiving written notice of the breach. Upon termination the User will delete all copies of the Index in the User's possession or control, cease all use and exploitation of the Index, and cause the Authorised Users to do the same.
12. **Confidentiality.** The User will, and will cause its directors, officers, employees, agents and Authorised Users to, keep the Confidential Information strictly confidential and not disclose it to anyone unless Licensor consents or unless the User is required by law or court order to do so and first gives the Licensor notice of the proposed disclosure and a reasonable opportunity to prevent it. In this agreement, "Confidential Information" means the Index and the Guide and all information, data and financial information relating to the business, commercial strategies, pricing (including the fees in this agreement), personnel, products or services of Licensor, but excludes any information that was lawfully in User's possession before receiving it from Licensor, or that is or becomes generally available to, or accessible by, the public through no fault of User.
13. **Representations/Disclaimer.** The Licensor represents and warrants that to the best of his knowledge he has the right to grant the Licence. EXCEPT FOR THE FOREGOING, THE INDEX AND THE GUIDE ARE PROVIDED ON AN "AS IS" AND "AS AVAILABLE" BASIS, AND ARE USED AT THE USER'S AND AUTHORISED USERS' SOLE RISK. LICENSOR DISCLAIMS AND WILL NOT BE BOUND BY ANY EXPRESS, IMPLIED, STATUTORY OR OTHER REPRESENTATION, WARRANTY, CONDITION OR GUARANTEE IN RESPECT OF THE INDEX OR THE GUIDE.
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THE USE OF THE INDEX OR THE GUIDE, EVEN IF LICENSOR IS EXPRESSLY ADVISED OF THE POSSIBILITY OF SUCH LOSS, INJURY OR DAMAGES AND EVEN IF SUCH DAMAGES ARE FORESEEABLE. NOTWITHSTANDING ANYTHING IN THIS AGREEMENT, THE LICENSOR'S MAXIMUM LIABILITY (IF ANY) TO USER UNDER THIS AGREEMENT OR OTHERWISE IN CONNECTION WITH THE INDEX AND THE GUIDE WILL UNDER NO CIRCUMSTANCES EXCEED THE AMOUNTS PAID TO THE LICENSOR UNDER THIS AGREEMENT.

15. **Governing law.** This agreement will be governed by and construed in accordance with the laws in effect in British Columbia, Canada. The parties attorn irrevocably to the exclusive jurisdiction of the British Columbia courts, provided that either party may apply to a court of competent jurisdiction for interim protection or equitable relief such as an interlocutory or interim injunction.
16. **General. Independent Contractors:** The parties are independent contractors. **Time:** Time is of the essence in this agreement. **Waiver:** No waiver, delay, or failure to act by Licensor regarding any particular default or omission will prejudice or impair any of Licensor's rights or remedies regarding that or any subsequent default or omission that are not expressly waived in writing. Time will continue to be of the essence following all such waivers, delays, and failures to act. **Further Assurances:** The parties will execute and deliver to each other any further instruments, and do any further acts, that may be required to give full effect to the intent expressed in this agreement. **Entire Agreement:** This agreement supersedes all prior agreements of the parties regarding the subject matter of this agreement, and constitutes the whole agreement with respect to that subject matter. **Purchase Order:** The terms and conditions of any purchase order issued by or for the User in connection with this Agreement or the Index will be of no force or effect, notwithstanding anything to the contrary in those terms and conditions or in the purchase order, and notwithstanding the Licensor's acceptance of any payment issued by or for the User under that purchase order. The Licensor may delay the dispatch of the Index and Guide licensed under this Agreement until those terms and conditions have been removed from the purchase order or overridden to the Licensor's satisfaction. **Assignment and Sublicensing:** The User may not assign or sublicense this agreement or the Licence or any of its rights hereunder without Licensor's prior written consent, which may be withheld without cause. **Amendments:** All amendments to this agreement must be in writing and signed by the parties' duly authorized representatives. **Enurement:** This agreement will enure to the benefit of and be binding upon the parties and their lawful successors and permitted assigns.

The parties executed this agreement as of the Effective Date:

NICHOLAS BELLAMY



UMAPORN HANRUNGCHAROTORN

By: Umaporn Hanrungcharotorn
Authorised Signatory

Its: Assistant Professor
Title of Authorised Signatory

ADDENDUM (1)

THIS ADDENDUM, made effective 29th January 2015 (the "**Effective Date**") is between **UMAPORN HANRUNGCHAROTORN** (the "**User**"), and **NICHOLAS BELLAMY, MD, MSC, DSC, MBA, FRACP** (the "**Licensor**").

BACKGROUND

- A. The Licensor and User are parties to a WOMAC 3.1® Index Academic License Agreement (2014) dated 10th October 2014 (the "**Agreement**").
- B. The User wishes to amend the Agreement as described below.

AGREEMENT

For good and valuable consideration, the receipt and sufficiency of which the parties acknowledge, the parties agree as follows:

Amendment. The Agreement is amended as follows:

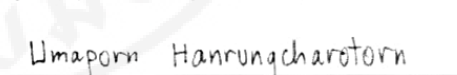
- (a) The User's protocol title is changed from "Factors associating with exercise adherence among women with knee osteoarthritis" to "Factors influencing physical activity among women with osteoarthritis of the knee".
 - (b) The "**Permitted Sample Size**" is changed to a maximum of 242 enrolled patients
 - (c) The "**Fees**" are increased by an additional USD\$ 231.00 for the Licence, plus applicable taxes on the foregoing amount. The original Fees were due within 30 days after receiving the Licensor's invoice for those Fees, and the additional Fees will be due within 30 days after receiving the Licensor invoice for those additional Fees.
2. **Ratification.** The Agreement, as amended by this Addendum, is ratified and continues in full force and effect.
3. **Counterparts.** This Addendum may be executed in counterparts, each of which when executed will be deemed to be an original, and together will constitute one and the same instrument.

The parties executed this Addendum effective as of the Effective Date.

NICHOLAS BELLAMY



UMAPORN HANRUNGCHAROTON



2. Catastrophizing Subscale of the Revised Coping Strategies Questionnaire

From: Francis Keefe, Ph.D. <francis.keefe@duke.edu>
Sent: 6/9/2014 18:06
To: umaporn hanrungcharotorn;
CC: wanpenpin@yahoo.com;

You have my permission to use the measure.
I believe it has been translated into Thai language.

Frank

From: Francis Keefe, Ph.D. <francis.keefe@duke.edu>
Sent: 6/9/2014 18:08
To: umaporn hanrungcharotorn;
C.C.: wanpenpin@yahoo.com;

I think Nada is aware of a Thai version of the CSQ so you might try contacting her at
: nada.lukkahatai@unlv.edu

From: Nada.Lukkahatai@unlv.edu
Sent: 12/9/2014 1:19
To: umaporn hanrungcharotorn;
2 สิ่งที่น่าสนใจ

สวัสดีค่ะ คุณอุมาพร
ส่งเครื่องมือ CSQ ฉบับภาษาไทย และ คุณสมบัติเครื่องมือมาตามแนบนะคะ
เครื่องมือดีพิมพ์ใน dissertation ซึ่งแนบมาพร้อมกับเครื่องมือ สำหรับใช้ในการอ้างอิงค่ะ

นาดา

(See attached file: CSQ questionnaire Thai.pdf)(See attached file: psychometric properties of Thai CSQ.pdf)(See attached file: Lukkahatai's dissertation.pdf)

Nada Lukkahatai PhD, RN
Assistant Professor
School of Nursing
University of Nevada, Las Vegas
4505 Maryland Parkway, Box 453018
Las Vegas, Nevada 89154-3018
Phone: (702) 895-3527
E-mail: nada.lukkahatai@unlv.edu

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3. Modified Fear-Avoidance Beliefs Questionnaire about Physical Activity

On 11 Sep 2014, at 14:59, <auhuma@gmail.com> <auhuma@gmail.com> wrote:

Dear Professor Gordon Waddell

Subject: Asking for permission to use Fear-Avoidance Beliefs Questionnaire (FABQ)

I write to ask permission to use FABQ. Before giving the details, I would like to introduce myself. My name is Umaporn Hanrungracharotorn. I am a lecturer in Faculty of Nursing, Naresuan University, Thailand. Now, I am studying in the Doctor of Philosophy in Nursing Program, Mahidol University, Thailand. I am developing the dissertation in the topic "Factors Associated with Physical Activity among Women with Osteoarthritis of the Knee" under supervising of Assistant Professor Dr. Wanpen Pinyopasakul. Aims of study are to identify the determinants of physical activity in older women with osteoarthritis of the knee. The possible determinants will comprise pain, functional limitation, fear-avoidance belief, and social support. I plan to use a cross-sectional study. It is estimated 110 cases for this study.

In my study, I would like to use FABQ physical activity subscale. If you give me permission, the FABQ will be translated from English language into Thai language. It will back-translated into original version also. To accordance to osteoarthritis context the term 'back pain' will be changed into 'knee pain'. In addition, the examples of physical activity will be changed from 'bending, lifting, walking, or driving' into 'running, walking, kneeling, and driving'. Then, I will examine face validity and reliability in 30 osteoarthritis patients.

I would be much appreciated if you permit me to use your instrument and translate this into Thai. I look forward to hearing from you soon and shall thank you in advance for your kind attention.

Respectfully yours,
Assistant Professor Umaporn Hanrungracharotorn
Ph.D. Student
Community Nursing Department,
Faculty of Nursing, Naresuan University,
99 Mu 9 Tumbol Thapho, Amphur Muang,
Phitsanulok, Thailand 65000
Telephone: +66 5596 6647
E-mail: umapornh@nu.ac.th

CC: Assistant Professor Dr. Wanpen Pinyopasakul
Medical Nursing Department, Faculty of Nursing, Mahidol University
2 Prannok Road, Bangkoknoi, Bangkok 10700
Telephone: +66 84123 7336
E-mail: nswpi@mahidol.ac.th

From: auhuma@gmail.com

Sent: December 7, 2014 10:11 AM

To: gordon.waddell@virgin.net

Subject: Outcome of translation and back-translation Fear-Avoidance Beliefs
Questionnaire (FABQ) in Thai study

Dear Professor Gordon Waddell,

I had sent you my e-mail, but no have any your response. I am uncertain whether you receive my email. Please, I send you my e-mail again.

Referring to your suggestions in my correspondence with you previously, my colleagues and I have translated FABQ from English into Thai language. To accommodate to knee osteoarthritis (OA), we replaced the word 'back pain' with 'knee pain'. In addition, we found one article which modified FABQ to be compatible for the patients with knee OA by replacing the examples of 'bending, lifting, walking, or driving' with 'running, walking, kneeling, and driving' - so I will use these terms in my study, while doing no changes in each question. Then, we did a back translation with two bilinguals to keep the meaning of each item of original FABQ (see attached file). After that, I sent the Thai version of FABQ to 5 experts to assess content validity. The result of content validity is good (CVI = 0.9-1). Therefore, I would like to inform you about the results of this translation process and content validity. In addition, reliability will be examined with 30 Thai women with knee OA. All of these processes are to ensure the accuracy of the questions which will make FABQ applicable in my study.

I look forward to hearing from you soon. If it is possible, I would like to know your response within 10 December 2014 because I will set my proposal testing on 25 December 2014. I will inform your permission to the committee.

Thank you so much for your kind permission and suggestion. I wish to take this opportunity to wish you a peaceful holiday in this X-mas.

Respectfully yours,

Assistant Professor Umaporn Hanrungharotorn

Ph.D. Student
Community Nursing Department,
Faculty of Nursing, Naresuan University,
99 Mu 9 Tumbol Thapho, Amphur Muang,
Phitsanulok, Thailand 65000
Telephone: +66 5596 6647
E-mail: umapornh@nu.ac.th

From: Gordon Waddell

Sent: December 8, 2014 4:41 PM

To: auhuma@gmail.com

Re: Outcome of translation and back-translation Fear-Avoidance Beliefs
Questionnaire (FABQ) in Thai study

Hi

Sorry for delay in replying but I was away. All sounds good. Many congratulations
and best wishes with your research

gordon

4. Revised Thai version of The Multidimensional Scale of Perceived Social Support (rMSPSS)

From: Zimet, Gregory D <gzimet@iu.edu>

Sent: .31/7/2014 19:53

To: umaporn hanrungcharotorn;

C.C.: wanpen.pin@mahidol.ac.th; wanpenpin@yahoo.com;

Dear Professor Umaporn Hanrungcharotorn,

You have my permission to use the Thai version of my scale, the MSPSS, in your dissertation research. I have attached a copy of the original English version of the scale, which includes scoring information on the 2nd page. Also attached is a document listing several articles that have reported on the psychometric properties of the MSPSS.

I hope your dissertation research goes well.

Yours sincerely,
Greg Zimet

Gregory D. Zimet, PhD
Professor of Pediatrics & Clinical Psychology
Section of Adolescent Medicine
Indiana University School of Medicine
Health Information & Translational Sciences
410 W. 10th Street, HS 1001
Indianapolis, IN 46202
USA
Phone: +1-317-274-8812
Fax: +1-317-274-0133
e-mail: gzimet@iu.edu
<http://pediatrics.iu.edu/center-hpv-research/about-us/>
<http://pediatrics.iu.edu/sections-and-faculty/adolescent-medicine/our-team/faculty/bio-zimet/>

From: TINAKON WONGPAKARAN <tinakon.w@cmu.ac.th>

Sent: 4/8/2014 13:41

To: Umaporn hanrungcharotorn;

เรียน ผศ. วันเพ็ญ ภิญโญภาสกุล

ผมมีความยินดีครับและได้ส่งเรื่องต่อให้ รศ ณหทัย วงศ์ปการันย์.พญ.เพื่อทราบแล้วครับ

อ ทินกร

ศาสตราจารย์ นายแพทย์ ทินกร วงศ์ปการันย์

หน่วยจิตบำบัด ภาควิชาจิตเวชศาสตร์ คณะแพทยศาสตร์

มหาวิทยาลัยเชียงใหม่ จ เชียงใหม่ .50200

Tinakon Wongpakaran, MD, FRCPsychT

Professor of Psychiatry

Psychotherapy Unit, Department of Psychiatry,

Faculty of Medicine, Chiang Mai University,

Chiang Mai, Kingdom of Thailand. 50200

tinakon@gmail.com, tinakon.w@cmu.ac.th,

Tel: 66-53-945422 to 4 ext 117, Fax: 66-53-289219

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มหาวิทยาลัยเชียงใหม่ ๕๐๒๐๐

๘ ธันวาคม ๒๕๕๗

เรื่อง อนุญาตให้ใช้เครื่องมือวิจัย

เรียน รองคณบดีฝ่ายวิชาการ

สิ่งที่ส่งมาด้วย ๑.แบบสอบถามความรู้สึกลากหลายมิติเกี่ยวกับความช่วยเหลือทางสังคม (ฉบับปรับปรุงภาษาไทย) จำนวน ๑ ฉบับ

ตามที่นางสาวอุมาพร ห่านรุ่งขโรทร นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาการพยาบาล คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี จะทำโครงการวิจัย เรื่อง "FACTORS ASSOCIATED WITH EXERCISE ADHERENCE AMONG WOMEN WITH OSTEOARTHRITIS OF THE KNEE" โดยได้ขอความอนุเคราะห์ให้ใช้เครื่องมือวิจัย คือแบบสอบถามความรู้สึกลากหลายมิติเกี่ยวกับความช่วยเหลือทางสังคม (ฉบับปรับปรุงภาษาไทย) ของ รศ.พญ.ณัททัย วงศ์ปการันย์ มาใช้ในโครงการวิจัย ความแจ้งแล้วนั้น

ในการนี้ข้าพเจ้า รศ.พญ.ณัททัย วงศ์ปการันย์ พิจารณาแล้วไม่ขัดข้อง อนุญาตให้ใช้เครื่องมือในการทำโครงการวิจัยดังกล่าว ทั้งนี้ได้แนบบแบบสอบถามดังกล่าวมาด้วย ส่วนค่าคุณสมบัติทางจิตมิติของเครื่องมือสามารถศึกษาได้ที่เอกสารอ้างอิงด้านล่างของแบบสอบถาม

จึงเรียนมาเพื่อทราบและดำเนินการต่อไป

ขอแสดงความนับถือ

(รองศาสตราจารย์ แพทย์หญิง ณัททัย วงศ์ปการันย์)
รองศาสตราจารย์ประจำภาควิชาจิตเวชศาสตร์

ภาควิชาจิตเวชศาสตร์ คณะแพทยศาสตร์

โทร. ๐ ๕๓๙๔ ๕๔๒๒

โทรสาร ๐ ๕๓๙๔ ๕๔๒๖

5. Short form International Physical Activity Questionnaire (IPAQ)

From: Barbara Ainsworth
Sent: October, 11, 2014 2:35 AM
Subject: RE: Asking for Permission to use IPAQ

Umaporn,

Since the IPAQ is the public domain and free to use, no permission is needed.

Best wishes on your research,
Barb

Barbara E. Ainsworth, Ph.D., MPH

Regents' Professor, Exercise Science and Health Promotion
(formerly Exercise and Wellness)

Associate Director, Health Promotion Faculties

School of Nutrition and Health Promotion

College of Health Solutions

550 North 3rd Street | Phoenix, AZ 85004

ASU Mail Code 3020

Office Ph: 602.827-2291 | Cell Ph: 480-208-5877 | Barbara.Ainsworth@asu.edu

APPENDIX M

LIST OF CONTENT VALIDITY EXPERTS

1. Miss Naruporn Chaiprakit, M.D.
Department of Rehabilitation Medicine,
Golden Jubilee Medical Center, Mahidol University
2. Assistant Professor Dr. Artit Laoruengthana, M.D.
Department of Orthopedic and Rehabilitation Medicine,
Faculty of Medicine, Naresuan University
3. Assistant Professor Dr. Sontaya Seelamad, Ph.D. (Behavioral Medicine and Psychology)
Department of Sport Science,
Faculty of Physical Education, Srinakharinwirot University
4. Assistant Professor Dr. Rungnapa Panitrat, Ph.D. (Nursing)
Department of Mental Health and Psychiatric Nursing,
Faculty of Nursing, Mahidol University
5. Assistant Professor Dr. Nantawan Suwannaroop, Ph.D. (Nursing)
Department of Public Health Nursing,
Faculty of Nursing, Mahidol University

APPENDIX N

LIST OF INSTRUMENT TRANSLATORS

1. Translating English into Thai Version

1.1 Miss Umaporn Hanruncharotorn

Doctoral student in the Doctor of Philosophy Program in Nursing (International and Collaborative with Foreign University Program), Collaboration between Faculty of Nursing and Faculty of Medicine and Ramathibodi Hospital, Mahidol University

1.2 Miss Ladda Saleema, R.N.

Doctoral student in the Doctor of Philosophy Program in Nursing (International and Collaborative with Foreign University Program), Collaboration between Faculty of Nursing and Faculty of Medicine and Ramathibodi Hospital, Mahidol University

2. Translating Thai into English Version

2.1 Assistant Professor Roongsri Sangkaewsri

Department of Mental Health and Psychiatric Nursing,
Faculty of Nursing, Naresuan University

2.2 Miss Praphaisri Kaewwichian, B.A. (Major of English),

Certificate (Teaching of English)

Phichit Pittayakom School, Phichit province, Thailand.

APPENDIX O

Demographics Characteristics of the Participants Categorized by Levels of Physical Activity (n = 242)

Demographics characteristics	Number (%)	
	Low physical activity (n = 146)	Moderate to high physical activity (n = 96)
Age	(min-max = 50-83, M = 64.7, SD = 8.0)	(min-max = 51-83, M = 65.7, SD = 8.2)
< 60 years	73 (70.6)	62 (64.6)
≥ 60 years	43 (29.4)	34 (35.4)
Body Mass Index	(min-max = 17.35-42.98, M = 27.05, SD = 4.26)	(min-max = 18.18-37.91, M = 26.02, SD = 3.8)
< 25 kg/m ²	48 (32.9)	46 (47.9)
≥ 25 kg/m ²	98 (67.1)	50 (52.1)
Marital status		
Single	14 (9.6)	12 (12.5)
Married	89 (61.0)	51 (53.1)
Widowed/ Divorced/ Separated	43 (29.5)	33 (34.4)
Education		
Uneducated	8 (5.5)	4 (4.2)
Elementary school	74 (50.7)	53 (55.2)
High school, vocational certificate, and diploma	38 (26.0)	25 (26.0)
Bachelor and above	26 (17.8)	14 (14.6)

Demographics Characteristics of the Participants Categorized by Levels of Physical Activity (cont.)

Demographics characteristics	Number (%)	
	Low physical activity (n = 146)	Moderate to high physical activity (n = 96)
Occupational status		
Being unemployed	81 (55.5)	41 (42.7)
Being workers	65 (44.5)	55 (57.3)
- Agriculture	3 (2.1)	7 (7.3)
- Unskilled labor	10 (6.9)	10 (10.4)
- Self-employed	19 (13.0)	16 (16.7)
- Officer and university workers	10 (6.9)	7 (7.3)
- Government officers	23 (15.8)	15 (15.6)
Monthly income		
< 2,500 Bahts/month	24 (16.4)	9 (9.4)
≥ 2,500 Bahts/month	122 (83.6)	87 (90.6)
Living status		
Living alone	6 (4.1)	6 (6.3)
Living with others	140 (95.9)	90 (93.7)

APPENDIX P

Clinical Characteristics of the Participants Categorized by Levels of Physical Activity (n = 242)

Clinical Characteristics	Number (%)	
	Low physical activity (n = 146)	Moderate to high physical activity (n = 96)
Site of Osteoarthritis (OA) of the knee		
Unilateral	67 (45.9)	42 (43.8)
Bilateral	79 (54.1)	54 (56.2)
Duration of knee OA		
	(min-max = 0.1-30.0, M = 3.2, SD = 3.6)	(min-max = 0.1-15.0, M = 3.8, SD = 3.5)
< 5 years	115 (78.8)	65 (67.7)
≥ 5 years	31 (21.2)	31 (32.3)
Knee stiffness		
	(min-max = 0-18, M = 4.6, SD = 5.4)	(min-max = 0-18, M = 4.5, SD = 5.2)
OA managements (answers more than 1 item)		
Pharmacology	129 (88.4)	92 (95.8)
Non-pharmacology	33 (22.6)	13 (13.5)
Number of falling in a previous year		
None	113 (77.4)	63 (65.6)
Fall	(min-max = 1-5, M = 1.7, SD = 1.1)	(min-max = 1-5, M = 2.1, SD = 1.3)
- Single fall	20 (13.7)	15 (15.6)
- Multiple falls	13 (8.9)	18 (18.8)

Clinical Characteristics of the Participants Categorized by Levels of Physical Activity (cont.)

Clinical Characteristics	Number (%)	
	Low physical activity (n = 146)	Moderate to high physical activity (n = 96)
Number of comorbidity (answers more than 1 item)		
Without comorbidity	32 (21.9)	20 (20.8)
With some comorbidity	(min-max = 1-5, M = 2.1, SD = 0.9)	(min-max = 1-4, M = 2.1, SD = 0.8)
- Hypertension	84 (57.5)	62 (64.6)
- Dyslipidemia	74 (50.7)	48 (50.0)
- Diabetes	29 (19.9)	25 (26.0)
- Others (e.g. asthma, heart disease, stroke, cancer, thyroid diseases)	25 (17.1)	15 (15.6)
Exercise (30 minutes, 3 days/week)		
- Yes	15 (10.3)	40 (41.7)
- No	131 (89.7)	56 (58.3)

APPENDIX Q

Characteristics of the Independent Variables Categorized by Levels of Physical Activity (n = 242)

Variables	Possible score	Actual range	M (SD)	
			Low physical activity (n = 146)	Moderate to high physical activity (n = 96)
Age (years)	-	50 - 83	64.72 (8.02)	65.67 (8.22)
Body Mass Index (kg/m ²)	-	17.35 - 42.98	27.05 (4.26)	26.02 (3.82)
Knee pain	0 - 50	0 - 46	13.17 (10.71)	12.73 (10.02)
Functional limitation	0 - 150	0 - 119	48.77 (29.82)	40.73 (16.95)
Social support	1 - 7	1.25 - 7.00	5.13 (1.06)	5.24 (1.21)
Pain catastrophizing	0 - 36	0 - 35	8.18 (8.02)	8.66 (8.65)
Pain-related fear	0 - 24	0 - 24	13.16 (6.49)	10.52 (5.85)

APPENDIX R

Osteoarthritis Symptoms of the Participants Assessed by Thai version of Western Ontario and McMaster Universities Osteoarthritis Index (n = 242)

Subscale	Have	No Have	M	SD
Pain				
Pain during walking	195 (80.6%)	47 (19.4%)	3.47	2.61
Pain during climbing up and down the stairs	159 (65.7%)	83 (34.3%)	2.66	2.84
Nocturnal Pain	138 (57.0%)	104 (43.0%)	2.59	2.88
Pain during rest	106 (43.7%)	136 (56.2%)	1.51	2.15
Pain during standing	158 (65.3%)	84 (34.7%)	2.78	2.78
Stiffness				
Morning stiffness	124 (51.3%)	118 (48.7%)	2.57	3.03
Daytime stiffness	115 (47.5%)	127 (52.5%)	1.96	2.53
Function				
Descending stairs	201 (83.1%)	41 (16.9%)	3.40	2.41
Ascending stairs	218 (90.1%)	24 (9.9%)	4.17	2.61
Rising from sitting	199 (82.2%)	43 (17.8%)	3.32	2.58
Standing	170 (70.2%)	72 (29.8%)	2.69	2.54
Walking on flat	165 (68.2%)	77 (31.8%)	2.34	2.32
Getting in or out of car	219 (90.5%)	23 (9.5%)	4.21	2.80
Going shopping	190 (78.5%)	52 (21.5%)	3.48	2.80
Putting on pants	195 (80.6%)	47 (19.4%)	4.22	3.38
Rising from bed	179 (74.0%)	63 (26.0%)	2.92	2.63
Putting off pants	185 (76.4%)	57 (23.6%)	3.62	3.24
Take a bath	89 (36.8%)	153 (63.2%)	1.23	2.15
Sitting	136 (56.2%)	106 (43.8%)	1.90	2.24
Using a toilet	159 (65.7%)	83 (34.3%)	2.51	2.56
Heavy domestic duties	194 (80.2%)	48 (19.8%)	3.71	2.89
Light domestic duties	132 (54.5%)	110 (45.5%)	1.84	2.28

APPENDIX S

Characteristics of independent variables categorized by the site of osteoarthritis of the knee (n = 242)

Independent variables	Unilateral knee OA (n = 109)		Bilateral knee OA (n = 133)	
	M	SD	M	SD
Age	63.72	7.47	66.22	8.44
Body Mass Index	26.37	4.10	26.48	4.13
Knee pain	11.39	10.53	14.31	10.19
Functional limitation	39.98	27.95	50.17	29.01
Pain catastrophizing	6.70	7.66	9.74	8.49
Pain-related fear	11.20	6.28	12.86	6.36
Social support	5.12	1.15	5.21	1.11

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