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# UNIVERSITY OF SOUTHAMPTON

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Volume [X] of [Y]

**A qualitative study exploring influences on physical activity for  
musculoskeletal health among Thai surgical nurses**

by

**Patcharin Chaisurin**

Thesis for the degree of Doctorate in Clinical Practice

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UNIVERSITY OF SOUTHAMPTON

## **ABSTRACT**

FACULTY OF HEALTH SCIENCE

Nursing

Thesis for the degree of Doctorate in Clinical Practice

### **A QUALITATIVE STUDY EXPLORING INFLUENCES ON PHYSICAL ACTIVITY FOR MUSCULOSKELETAL HEALTH AMONG THAI SURGICAL NURSES**

Patcharin Chaisurin

Work-related musculoskeletal disorders (WMSDs) constitute a major problem in many countries, with substantial costs and impact on quality of life. Professional nurses represent a large group regularly affected by WMSDs; surgical nurses are more likely to have musculoskeletal disorders than those working in other hospital areas. In relation to WMSDs, the evidence indicates that participation in physical activity may have a preventative effect; however, the concept of physical activity for musculoskeletal health remains immature and poorly defined. In addition, the factors influencing engagement in physical activity amongst Thai surgical nurses may be more complex than previously acknowledged. Therefore, this study aims to explore the concept of physical activity for musculoskeletal health and assess the maturity of the concept, and to explore the range of factors likely to influence physical activity participation amongst Thai surgical nurses.

As part of the concept analysis, the preconditions, characteristics, outcomes and consequences of the concept were explored. An in-depth exploration of the factors influencing physical activity amongst Thai surgical nurses was undertaken, utilising semi-structured interviews with 20 Thai surgical nurses. Interviews were transcribed verbatim and analysed using thematic analysis. It has been found that the major factors influencing physical activity participation amongst the study group involved perceived health benefits, leisure time for exercise, environmental constraints, and occupational factors. The data elicited from interviews aligns with the findings from the concept analysis, in which the

participants with musculoskeletal injury undertook physical activity in order to promote recovery from their health problems, and as a strategy to be as healthy as possible. Interestingly, environmental constraints, including hot weather and air pollution, had a more powerful influence on physical activity amongst this group of Thai surgical nurses than previously acknowledged. In addition, these constraints impacted on the governmental and organisational policy regarding “a weekly physical exercise session”. Therefore, improved environments to provide attractive and convenient places for physical activity might increase Thai surgical nurses' engagement in physical activity.

The results of this study can be used to make a recommendation for future research and further physical activity interventions among this group of Thai surgical nurses.

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# Academic Thesis: Declaration Of Authorship

I, Patcharin Chaisurin, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

## A QUALITATIVE STUDY EXPLORING INFLUENCES ON PHYSICAL ACTIVITY FOR MUSCULOSKELETAL HEALTH AMONG THAI SURGICAL NURSES

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed: .....

Date: July 2019



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# Definitions and Abbreviations

## Definitions

**Work-related musculoskeletal disorders** are a group of pathologies include tendinopathy and related conditions (tenosynovitis, epicondylitis and bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica) as well as less easily standardised conditions such as back pain, and other regional pain syndromes (e.g., shoulder, neck, hip, knee, leg, and foot) not attributable to known pathology, resulting from work-related risk factors.

**Thai surgical nurses** are nurses working in hospital surgical departments in Thailand.

**Physical activity** is any bodily movement produced by skeletal muscles that results in energy expenditure, which can be arranged into three categories: travelling between destinations, at leisure time, and at work.

**Exercise** is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of one or more components of physical fitness.

## Abbreviations

|       |  |
|-------|--|
| PA    | Physical activity  |
| WMSDs | Work-related musculoskeletal disorders                     |
| LBP   | Lower back pain  |
| RN    | Registered nurse is a bachelor degree prepared staff nurse |



# Chapter 1 Introduction

This chapter provides my interest and background in this subject area, which influenced my decision to carry out this research project, followed by the context of the study in a regional hospital in Thailand. Finally, the structure of the thesis is introduced.

## 1.1 My interest and background

My intention in studying abroad is to enhance my academic potential by pursuing a degree. The subject area that I am interested is work-related musculoskeletal disorders (WMSDs), which focuses on injuries of the muscles, nerves, tendons, ligaments, joints, cartilage, and discs resulting from work activities, among Thai surgical nurses.

My background is a surgical nurse, and I have been working as an Assistant Professor in the department of surgical nursing, Faculty of Nursing, Chiang Mai University, Thailand for 7 years. I worked in the surgical department, Maharaj Nakorn Chiang Mai Hospital for 4 years. Concerning my education background, I graduated with a Master of Nursing Science, Occupational Health Nursing, and a bachelor's degree of Nursing Science from the Faculty of Nursing, Chiang Mai University, Thailand.

Whilst undertaking the master's programme, I became interested in work-related musculoskeletal disorders (WMSDs) because these are major problems in many countries and many professions, with substantial costs and impact on quality of life (Punnett and Wegman 2004; Health and Safety Executive 2016). They are also reported to be a major cause of working days lost, increased work limitation and may impact on other responsibilities (Aptel et al. 2002). Broadly, they cause more disability than any other group of disorders (Badley et al. 1994). This contributes to costs for the individual, the organisation and society as a whole (Winkel and Mathiassen 1994). My master's dissertation was about protective behaviours and musculoskeletal disorders among sewing machine operators in the garment industry. Since then, I have retained an area of research interest in work-related musculoskeletal disorders. Also, I have continued to study work-related musculoskeletal disorders among professional nurses. This is because there have been many studies demonstrating that professional nurses represent a large group that is regularly affected by occupational musculoskeletal disorders; surgical nurses are more likely to have musculoskeletal disorders than those

## Chapter 1

working in other hospital areas (Sinsongsook et al. 2005; Arsalani 2014; Attar 2014).

Within my previous study, addressing work-related musculoskeletal disorders (Chaisurin et al. 2012), conducted with 212 Thai surgical nurses who had been working in surgical wards, providing nursing care for pre- and post-operative patients. These nurses are required to spend long periods in a standing position and are often obliged to adopt uncomfortable postures when providing care for surgical patients (e.g. taking baths, helping patients to eat), and undertake specific manual handling techniques (perhaps use of slide sheets, hoists and standing aids). They had not been diagnosed with systemic musculoskeletal disorders (e.g. rheumatoid arthritis, bone diseases, and myasthenia gravis).

A Standardised Nordic questionnaire was translated into the Thai language and used to identify areas of the body causing musculoskeletal problems.

Respondents were asked if they have had any musculoskeletal trouble (e.g. ache, pain, or discomfort) in the last 12 months and last 7 days. Additional questions captured further detail and relevant issues, such as its functional impact at home and work (change of job or duties), duration of the problem, and assessment by a health professional. The findings of this study showed that 69.30 per cent of nurses in the study sample had experienced some form of musculoskeletal disorders in the previous 12 months, and 84.90 per cent during the previous 7 days before the data was collected. And it was also found that non-exercise was significantly associated with the occurrence and the severity of musculoskeletal disorders in terms of their effect on activities (Chaisurin et al. 2012). As my previous research results show, more than 50.00 per cent of surgical nurses in the study sample did not undertake exercise (58.50 per cent), 33.50 per cent exercised less than 3 times a week, and only 8.00 per cent undertook exercise more than 3 times a week (Chaisurin et al. 2012). Therefore, enhancing exercise or physical activity among Thai surgical nurses may be beneficial in preventing or reducing work-related musculoskeletal injuries.

However, in spite of numerous studies which support a correlation between physical activity and preventing or reducing musculoskeletal disorders (Vuori 2001; Proper et al. 2003; Rogers 2003; Morken et al. 2007), the concept of physical activity for musculoskeletal health has not been fully examined.

Therefore, analysis of the maturity (or clarity of the scientific concept) of physical activity for musculoskeletal health was a part of the proposed research. As part of this process, the preconditions, characteristics, outcomes and consequences of the concept were explored. In addition, the factors relevant to engagement in

physical activity for musculoskeletal health among Thai surgical nurses were explored in order to generate a baseline understanding in a hitherto unresearched area.

## **1.2 Conducting the study in a regional hospital in Thailand**

In research and research writing, providing the context of the study is necessary; situating the work and helping to make the content and meaning accessible. Without context, information may be misinterpreted. This work addresses significant gaps in my previous study which focused on physical activity participation in the management of work-related musculoskeletal disorders among Thai surgical nurses. Even though the factors influencing physical activity participation among Thai surgical nurses might be similar to nurses in other countries, there may well be contextual influences. Hence, detailed contextual information allows readers to gain a better understanding of the findings, and to integrate them with previous research findings. Therefore, the following sections offer a detailed summary about Thailand and the Thai health care system.

### **1.2.1 Thailand: relevant geopolitical and demographic data**

Thailand, a developing country, is categorised as an ‘upper-income country’ by the World Bank (World Bank 2016). It is located in Southeast Asia, adjoining Laos and Burma (Myanmar) to the north, Cambodia and the Gulf of Thailand to the east, Burma and the Andaman Sea to the west, and Malaysia to the south. Its total area is approximately 513,119 square kilometres. Thailand temperatures from March through to May range from an average high of 95°F (35°C) to lows near 70°F (21°C). Temperatures from November through to January moderate rather dramatically with daily highs averaging in the mid 70's (20°C). (Manisan 1995). The capital and largest city is Bangkok. The country is usually classified into 4 geographical regions: central, northern, north-eastern and southern (Thai National Statistic Office 2016).



**Figure 1-1 Geographic location of Thailand**

(Source: [www.worldatlas.com](http://www.worldatlas.com))

In 2015, the estimated Thai population was around 67.96 million people (World Bank 2016). The vast majority of the Thai population is ethnically Thai (95.40 per cent). The remainder consists of Chinese and other ethnic groups (4.10 per cent). The primary religion is Buddhism, which is practised by around 93.40 per cent of the Thai population, while 5.20 per cent are Muslim and 1.40 per cent are Christian and other religions. The majority of the population (67.50 per cent) is of working age (15–59 years old) (Thai National Statistic Office 2016). There are four major dialects of the Thai language, corresponding to the southern, northern, north-eastern, and central Thai (Ruangrit et al. 2008). However, the country's official language is the central Thai (Thai National Statistic Office 2016).

### 1.2.2 The current health care system in Thailand

The Ministry of Public Health (MoPH) is the core agency responsible for the health system and its quality, efficiency and equality; overseeing national health policy and also operating most government health facilities (Ministry of Public Health 2018b). Health care services, both public sector and private sector services, are made available throughout the country. However, the public sector is the main service provider (Ministry of Public Health 2018a).

To enhance health care services in the country, in 2001, the 'Thirty Bath Universal Health Care Coverage Policy' was introduced to provide health care and financial protection for all Thai citizens. The policy provides healthcare coverage through three programmes: the civil service welfare system for civil servants and their families, social security for private employees, and the universal coverage scheme

theoretically available to all other Thai nationals. It is intended to enhance health care accessibility to different levels of care by using the referral system.

In 2010, there were 1,002 public hospitals and 316 registered private hospitals in Thailand. Hospitals in the public sector can be classified into three types, namely, regional hospitals – each with more than 500 beds, general hospitals – each with 200–500 beds, covering all provincial areas and community hospitals – each with between 10–150 beds located in all district towns across the country. At the regional level, there are 25 regional hospitals, 48 specialised hospitals and 6 medical school hospitals. At the provincial level, in urban areas, there are 131 general hospitals. Finally, at the district level, in rural areas, there are 734 community hospitals and 9,768 sub-district health centres providing care in rural areas. Those hospitals usually provide a service to the local population. However, the community hospitals are generally limited to providing primary care, so the patients who are in need of more advanced or specialised care need to be referred to general or regional hospitals (Bureau of Policy and Strategy 2011).

Registered nurses are the majority of the health personnel in Thailand's health care system (Ministry of Public Health 2018a). Most of them are female and hold a bachelor's degree in nursing and midwifery (Thailand Nursing and Midwifery Council 2018). According to the Thailand Nursing and Midwifery Council (2018), the number of registered nurses has tended to increase every year. In 2015, the number of registered nurses was 183,551. However, the transitions in epidemiology and demography accompanied by government policy increased the demand for health workers. Therefore, nurse production was in line with requirements and the plan to increase the number of nurses to meet the demand has been incorporated into the National Policy for Nursing Development (Thailand Nursing and Midwifery Council 2018).

### **1.2.3 Thai nurses**

Thai nurses work in different settings depending on their contracts; such as at private hospitals, university-affiliate hospitals under the Ministry of Education, hospitals at a regional or provincial level, community hospitals, health care centres, or specialised hospitals under the Ministry of Public Health. According to the Bureau of Policy and Strategy (2011), approximately 75 per cent of nurses work at the hospitals under the auspices of the Ministry of Public Health. Their responsibilities include nursing care and primary care for both the sick and well, including provision of midwifery services. The nursing process is used as a tool

## Chapter 1

for initiating and performing nursing care to meet the needs of patients (Nursing and Midwifery Council 2016). Shift duration is 8 hours – 3 shifts per day; the morning shift is from 8.00 am. to 4.00 pm. The afternoon shift runs between 4.00 pm. and 12.00 pm. and the night shift is from 12.00 pm. to 8.00 am. The number of staff working in each shift varies, depending on workload, hospital size and type of nursing service.

Regarding the nature of their jobs, Thai registered nurses (RNs) self-reported work-related conditions or illnesses as well as accidents, they were particularly affected by occupational musculoskeletal disorders, this group represented two thirds of the nurses in the study sample (Sawaengde et al. 2010). Nurses who work in hospital surgical departments were more likely to have musculoskeletal disorders than nurses working in other departments (Arsalani 2014; Attar 2014; Sinsongsook et al. 2005).

Physical activity and exercise are often recommended for preventing and reducing work-related musculoskeletal disorders (Vuori 2001; Proper et al. 2003; Rogers 2003; Morken et al. 2007). However, in spite of numerous studies which support a correlation between physical activity and a reduction in musculoskeletal disorders (Vuori 2001; Proper et al. 2003; Rogers 2003; Morken et al. 2007), the concept of physical activity for musculoskeletal health has not been fully examined. Therefore, it would be helpful to explore the concept of physical activity for musculoskeletal health, to assess the maturity of the concept of physical activity for musculoskeletal health, and to understand the factors which may influence engagement in physical activity for musculoskeletal health among Thai surgical nurses.

### 1.3 Structure of the thesis

This thesis comprises six chapters. Chapter one provides the introduction, which reflects why this research topic was of interest to the author and nursing studies. Chapter two presents the literature review which elaborates on work-related musculoskeletal disorders and physical activity or exercise behaviour among surgical nurses, and the factors related to their physical activity or exercise engagement, or lack of engagement. The review elicits the degree to which current literature addresses itself to physical activity or exercise engagement in musculoskeletal disorders amongst health professionals. Gaps in knowledge are identified, followed by the justification for conducting the research. A clear statement of the research questions and objectives are presented. Chapter three

addresses the epistemological and ontological perspectives underpinning the study, justifying the methodology and approaches used in this research. Chapter four presents the findings from interviews with twenty Thai surgical nurses who were recruited to be research participants. The research findings are categorised into two main areas: i) participants' definitions and types of physical activity and ii) the factors influencing physical activity. Chapter five presents a discussion of the research findings in relation to each specific area: i) the concept of physical activity, and ii) the factors influencing physical activity. As part of this chapter the data is compared with previous research findings and the concept analysis findings. The study's limitations and recommendations for future research and practice are also presented in this chapter. Chapter six consists of a summary of the research study, together with a personal reflection.

## 1.4 Chapter summary

This chapter has addressed the background and significance of the research project. Because the research participants are surgical nurses working in a Thai hospital, the context of the study is provided, including general information about Thailand, Thai health care system, and Thai nurses. Finally, the layout of the thesis is introduced.

The next chapter provides the literature review which elaborates on work-related musculoskeletal disorders and physical activity participation among health professionals which might be related and relevant to surgical nurses, and the factors related to their exercise or physical activity engagement or lack of engagement.



# Chapter 2 Literature review

## Introduction

This chapter provides the literature review conducted to elaborate on work-related musculoskeletal disorders and physical activity participation among health professionals, and the factors related to their physical activity engagement or lack of engagement. The review elicited the degree to which current literature addresses itself to physical activity engagement amongst surgical nurses.

The chapter begins with details of the literature search strategy, followed by findings which are arranged into seven categories: i) work-related musculoskeletal disorders (WMSDs), ii) physical activity or exercise iii) the relationships between physical activity and musculoskeletal disorders, iv) the relationships between physical activity and work-related outcomes, v) physical activity participation, vi) models of health belief and health behavior, and vii) the factors related to physical activity participation, among surgical nurses. A critical appraisal is presented. Finally, gaps in knowledge are identified, followed by the research aims and research questions.

### 2.1 Search strategy

To obtain literature that was relevant to the research topic, several approaches were used. Initially, electronic databases were accessed. Electronic databases were searched via the DelphiS database, which is accessed through the University of Southampton's online library, and which includes all relevant study databases such as CINAHL, AMED, MEDLINE, Science Citation Index, Social Sciences Citation Index, PsycINFO and Science Direct. Moreover, references, citations and other relevant literature from 'Google scholar' were manually searched, in order to seek seminal works as well as a wide range of key papers in the field. Additionally, to expand the search and avoid limitation through depending on specific search terms, the reference list of all possible articles and key authors was searched for further references. Grey literature that was made available to the public, such as reports, sports journals and magazines, conference papers, and government or organization documents, were also included. A systematic literature search is illustrated as follows.

## 2.1.1 Systematic search procedures

### Stage 1: Identify key words

The relevant literature was scrutinised for evidence of surgical nurses' engagement in physical activity in the management of work-related musculoskeletal disorders. A wide range of search terms were informed by the research questions and used to identify relevant studies. The supervision session was helpful in assisting the researcher in considering key words and terms and in then generating a list of relevant search terms. Identical search terms were subsequently combined into the PICO tool (see Table 2-1). The reason for choosing the PICO is because this tool showed a greater number of hits with greater sensitivity. It has been recommended in undertaking a fully comprehensive search (Methley et al. 2014).

**Table 2-1 The search terms used in the PICO search**

| PICO tool        | Search terms   |
|------------------|--|
| P -population    | nurse* OR<br>healthcare profession* OR<br>health profession* OR<br>“professional health” OR<br>"professional healthcare" OR<br>“health care staff” OR<br>podiatrist OR<br>physiotherapist OR<br>“physical therapist” OR<br>“occupational therapist”                  |
| I - intervention | “physical activity” OR exercis* OR<br>“exercise behaviour” OR<br>“exercise behavior” OR<br>“physical leisure activity” OR<br>sport OR “physical fitness” OR<br>“active-sedentary” OR<br>“active sedenrasm” OR<br>“sedentary behaviour” OR<br>“sedentary behavior” OR |

| PICO tool      | Search terms   |
|----------------|--|
|                | “cardiovascular work out” OR<br>“cardiovascular exercise” OR<br>“weight loss work out” OR<br>“home work out” OR<br>“home exercise” OR<br>“exercise VDO/DVD” OR<br>“Wii Fit”  |
| C – comparison | n/a  |
| O – outcome    | “musculoskeletal disorders” OR<br>“musculoskeletal pain” OR<br>“musculoskeletal injury” OR<br>“musculoskeletal aches” OR<br>“musculoskeletal discomfort” OR<br>“neck pain” OR<br>“shoulder pain” OR<br>“back pain” OR<br>“hip pain” OR<br>“knee pain” OR<br>“leg pain” |

## Stage 2: Searching the literature

The search was performed via the DelphiS database, which was demonstrated to the researcher by the University of Southampton's librarian. The DelphiS database is accessed through the University of Southampton's online library, and which includes all relevant study databases such as CINAHL, AMED, MEDLINE, Science Citation Index, Social Sciences Citation Index, PsycINFO and Science Direct. All of these databases are useful in locating relevant papers and clinical systematic reviews. A wide range of search terms mentioned in stage 1 was applied via the DelphiS database as below (see Table 2-2).

**Table 2-2 Number of articles retrieved from electronic databases**

| Search ID | Keywords  | Options                         | Retrieved papers |
|-----------|---|---------------------------------|------------------|
| S1        | nurse* OR<br>healthcare profession* OR<br>health profession* OR<br>"professional health" OR<br>"professional healthcare" OR<br>"health care staff"<br>podiatrist OR<br>physiotherapist OR<br>"physical therapist" OR<br>"occupational therapist"  | Search modes-<br>Boolean/phrase | 3,160,386        |
| S2        | "physical activity" OR<br>exercis* OR<br>"exercise behaviour" OR<br>"exercise behavior" OR<br>"physical leisure activity" OR<br>sport OR<br>"physical fitness" OR<br>"active-sedentary" OR<br>"active sedenrarism" OR<br>"sedentary behaviour" OR<br>"sedentary behavior"<br>"cardiovascular work out"<br>OR<br>"cardiovascular exercise" OR<br>"weight loss work out" OR<br>"home work out" OR<br>"home exercise" OR<br>"exercise VDO/DVD" OR<br>"Wii Fit" | Search modes-<br>Boolean/phrase | 8,292,958        |

| Search ID | Keywords   | Options   | Retrieved papers |
|-----------|--|---|------------------|
| S3        | “musculoskeletal disorders” OR<br>“musculoskeletal pain” OR<br>“musculoskeletal aches” OR<br>“musculoskeletal injury” OR<br>“musculoskeletal discomfort” OR<br>“neck pain” OR<br>“shoulder pain” OR<br>“back pain” OR<br>“hip pain” OR<br>“knee pain” OR<br>“leg pain” | Search modes- Boolean/phrase                                | 482,089          |
| S4        | S1 AND S2 AND S3   | Search modes- Boolean/phrase                                | 6,009            |
| S5        | S1 AND S2 AND S3   | Limiters- Full text; available @ Southampton; peer reviewed | 3,730            |
| S6        | S1 AND S2 AND S3   | Date published: 2006–2018                                   | 3,245            |
| S7        | S1 AND S2 AND S3   | Narrow by Language: – English                               | 3,180            |

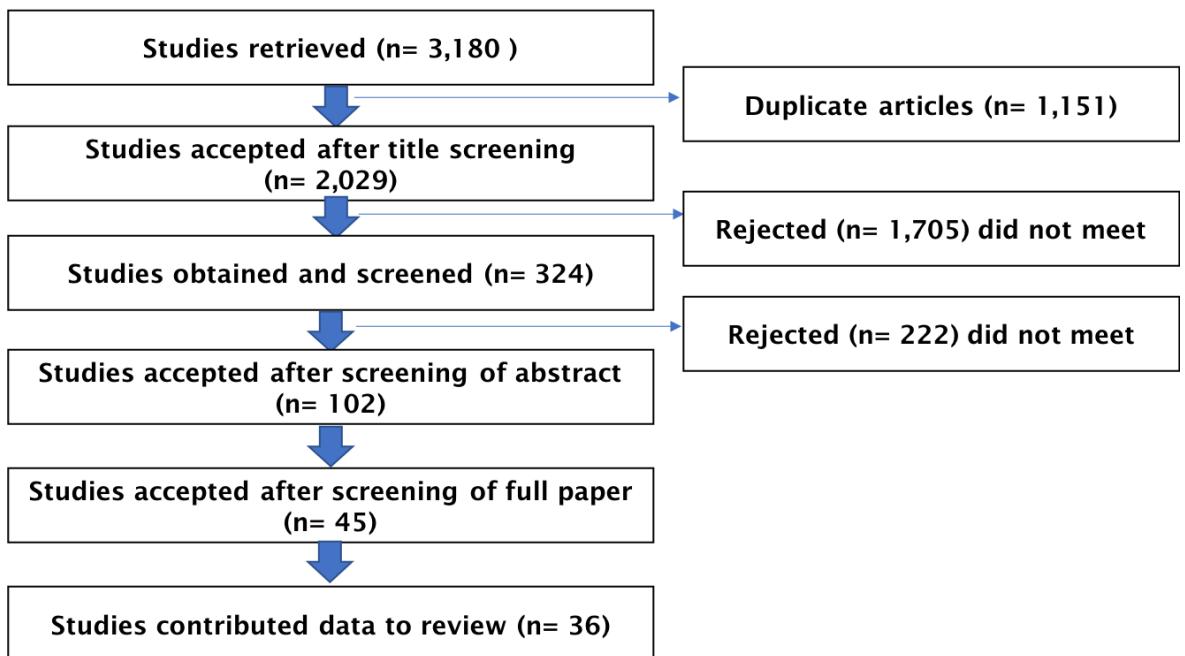
### Stage 3: Screening the literature

- 1) Once the formal search was completed, title screening was performed to identify relevant articles; invalid titles and duplications were excluded.
- 2) Screening of abstracts was conducted. Inclusion and exclusion criteria were used in order to identify literature that is directly relevant to the field (see Table 2–3).

**Table 2-3 Inclusion and exclusion criteria for evidence recruitment**

| <b>Inclusion criteria</b>  | <b>Rationale</b>   |
|--|--|
| Nurses, surgical nurses, registered nurses, professional nurses, licensed nurses.<br>All healthcare professions.                     | Data elicited from a group of healthcare professionals might be related and relevant to surgical nurses.   |
| Work-related musculoskeletal disorders (WMSDs), which focuses on injuries resulting from work activities or working conditions.      | This will be related to workplace risk factors.<br>All systemic musculoskeletal disorders (e.g. rheumatoid arthritis, bone diseases, myasthenia gravis, etc.) were excluded.   |
| Physical activity, exercise, work out, physical fitness, sports activities, yoga, Tai Chi, home exercise, physical leisure activity. | All of which is defining any bodily movement produced by skeletal muscles that results in energy expenditure.  |
| Publication year was limited to between 2006 and 2018.   | To retrieve the most recent literature.  |
| Peer reviewed articles and peer reviewed journals.   | To retrieve strong evidence in the literature.   |
| English and Thai language.   | This is aiming to include Thai literature in the literature review, however, there is no Thai language paper available in international databases.<br>All non-Thai and non-English articles were rejected due to translation limitation. |

3) Screening of full papers was performed. In total, thirty-seven studies were selected for this literature review. The number of final selected articles from electronic databases is presented in Figure 2-1.



**Figure 2-1 Flowchart used to identify studies**

Of thirty-six studies, twenty-two focussed on work-related musculoskeletal disorders and physical activity. The remaining fourteen papers addressed the factors related to physical activity participation. A summary of all the papers is shown in Appendix A.

#### **Stage 4: A further exploration for relevant studies**

- 1) Citation tracking: the reference list of all possible articles was searched for further possible sources.
- 2) Manual reference searching: articles obtained from hand searches, text books available at the library of University of Southampton, and key articles recommended by experts with extensive knowledge or experience in the area of study, were included. Also, grey literature databases including reports (e.g., annual, research, technical, project, etc.), sports journals and magazines, and government or organisation documents were included. Available and accessible official literature from Thailand, Thai Databases, Thai organisations' websites (e.g., Thai National Statistic Office, Thai Nursing and Midwifery Council), and international websites (e.g., GOV.UK) were searched for further results.
- 3) Search of contacting authors: finally, authors of the included studies were searched for further results that may be pertinent to the literature.

## **2.1.2 Quality assessment of included studies**

To critically appraise the quality of papers identified in the search, several tools were reviewed. The Critical Appraisal Skills Programme (CASP) was selected for use as a main tool. The reason for that decision is because the CASP is a standardised and simple guideline to help with critical appraisal. This tool is applicable for all types (both quantitative and qualitative study) of the included studies. An example of critical appraisal processes using the CASP is shown in Appendix B.

## 2.2 Work-related musculoskeletal disorders (WMSDs)

### 2.2.1 Background

Work-related musculoskeletal disorders are a group of pathologies or disorders of muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels. The clinical syndromes commonly reported from work-related musculoskeletal disorders include tendon inflammation and related conditions (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthritis as well as myalgia, lower back pain, and other regional pain syndromes (Punnett and Wegman 2004). Work-related musculoskeletal disorders develop over time. They can be episodic or chronic in duration and can also result from injury sustained in a work-related accident. Additionally, they can progress from mild to severe disorders (Health and Safety Executive 2016).

Work-related musculoskeletal disorders are associated with workplace ergonomic risk factors and workplace psychosocial risk factors (NIOSH 1997; Health and Safety Executive 2016). Workplace ergonomic risk factors play a crucial role in the development of musculoskeletal disorders (NIOSH 1997), including fixed or constrained body positions, continual repetition of movements, force concentrated on small parts of the body, such as the hand or wrist and a pace of work that does not allow sufficient recovery between movements (Health and Safety Executive 2016). In addition, workplace psychosocial risk factors are another important predictor in the development of musculoskeletal disorders (NIOSH 1997) such as organisational culture, the health and safety climate and human factors may create the conditions for work-related musculoskeletal disorders to occur. Generally, none of these factors acts separately to cause work-related musculoskeletal disorders. They more commonly occur as a result of a combination and interaction among them (Health and Safety Executive 2016).

Work-related musculoskeletal disorders are seldom life threatening but they impair the quality of life of a large proportion of the adult population (Health and Safety Executive 2016). These disorders are reported to be a major cause of working days lost, increase work limitation and may impact on another responsibility (Aptel et al. 2002). Broadly, they cause more disability than any other group of disorders (Badley et al. 1994). According to Health and Safety Executive (2016), in Great Britain, work-related musculoskeletal disorders are

health conditions or disabilities that burden employers and employees, accounting for 41.00 per cent of all work related ill-health. In 2015/16, an estimated 8.8 million working days were lost due to these disorders, an average of 16 days lost for each case (Health and Safety Executive 2016). This contributes to costs for the individual, the organisation and society as a whole (Winkel and Mathiassen 1994).

Occupations which have statistically significantly higher rates of work related musculoskeletal disorders are agriculture, forestry and fishing, construction, transportation and storage, and human health and social work activities (Health and Safety Executive 2016).

## **2.2.2 Work-related musculoskeletal disorders (WMSDs) among surgical nurses**

Within human health and social work activities, professional nurses represent the largest occupational group in the health care sector regularly affected by work-related musculoskeletal disorders (Health and Safety Executive 2016). This situation is generalizable or applicable to the situation in Thailand. While there might be some differences between the context of Thailand and other countries, the case for healthcare activities remains similar enough to make the data relevant.

Considering studies in Asia, a cross-sectional study by Yasobant and Rajkumar (2014) assessed work-related musculoskeletal disorders among health care professionals in a tertiary care hospital in India. Different combinations of validated and standardized questionnaires were used for collecting data. The results showed that among health care professionals, nurses are the group at highest risk of such work-related musculoskeletal disorders. However, as the questionnaires used are self-reported, recall bias and underreporting may skew the results.

Smith et al. (2003) and Smith et al. (2004) used the internationally accepted “Standardized Nordic Questionnaire” to assess musculoskeletal disorders (MSDs) among nursing professionals in Japan (n=305, 84% response rate) and China (n=180, 84.1% response rate), respectively. It was revealed that MSDs are common among the nurses in the study sample. The overall prevalence of MSDs among the Japanese nurses was 78%, and was 70% among Chinese nurses. Even though the sample size of both studies is considered to be small, and the results regarding

MSDs among these groups of nurses are not generalizable, as the authors acknowledged the high prevalence of MSDs represents an important occupational issue for this Asian demographic.

Regarding a study conducted in Thailand, a Standardised Nordic questionnaire was also used to assess musculoskeletal disorders among Thai nurses (n= 212). 69.30% of nurses in the study sample self-reported experiencing some form of musculoskeletal trouble (e.g. ache, pain, or discomfort) in the previous 12 months, and 84.90% during the previous 7 days before the data was collected (Chaisurin et al. 2012). Another study using evidence from the Thai nurses' cohort study (TNCS) demonstrated that 47.80 % of 17,686 registered nurses self-reported experience of having/had problems involving muscles, bones and joints during the previous 12 months. The limitation in this study acknowledged by the authors was the instrument used was developed for several research purposes, not focussed only on the aspect of musculoskeletal disorders, some information associating MSDs such as its functional impact and duration of the problem, were not available (Thinkhamrop and Laohasiriwong 2015). However, amongst both studies, the results showed a large number of musculoskeletal disorders among Thai nurses, and this is similar to the situation of high prevalence of MSDs among nurses in other countries.

Thinkhamrop and Laohasiriwong (2015) also found that nurses who engaged in clinical activities were more likely to develop musculoskeletal disorders than other types of nurses (e.g. research nurses and administrative nurses). Moreover, Smith et al. (2003) found that surgical nurses were at the greatest risk of suffering from musculoskeletal disorders, being 2.7 times more likely than those who work in other departments to experience MSDs. This study finding does not differ from those of other countries. For example, a study among Turkish nurses that conducted 120 nursing staff from four large general hospitals showed a correlation between working specific departments and musculoskeletal complaints. The nurses working in the surgery department have more chronic musculoskeletal complaints than the nurses working in other departments ( $p < .05$ ) (Tezel 2005). Also, a study among nurses from four different hospital departments in Saudi Arabia (n= 200) found that working in the surgical department was a greater risk factor for lower back pain compared with those working in other departments. The finding showed 91.00% of surgical nurses in the study sample reported work-related musculoskeletal disorders (Attar 2014).

From the review, it is recognised that the increased incidence of musculoskeletal disorders may be related to the working conditions of surgical nurses. However, most of the studies are cross-sectional in design, prevalence of MSDs was measured by using a Standardised Nordic Questionnaire during the previous 12 months and the past week. There is the possibility of incorrect symptom recall, particularly the past 12-month time period.

### **2.2.2.1 Occupational risk factors for musculoskeletal disorders among surgical nurses**

Work place violence, including physical and non-physical work place violence, has been reported as the strongest statistically significant factor associated with musculoskeletal disorders among registered nurses (Thinkhamrop and Laohasiriwong 2015). Regarding surgical nurses, occupational risk factors for musculoskeletal disorders are also associated with workplace ergonomic risk factors and workplace psychosocial risk factors (Chaisurin et al. 2012).

Ergonomic risks are the more obvious factors which are associated with musculoskeletal disorders, such as work environment, manual handling of patients, heavy lifting of patients, repetitive work, and strenuous tasks in general (NIOSH 1997; Alexopoulos et al. 2003; Fonseca and Fernandes 2010). Nurses in hospital surgical departments were more likely to be working in a dynamic and challenging environment, taking a significant role in life-saving surgical procedures and providing care for surgical patients (Brannagan 2015). They also need or are required to spend long periods in a standing position and are often obliged to adopt uncomfortable postures, undertake strenuous activity and engage in manual handling of patients, especially those who are postoperative (Attar 2014). A possible explanation may be that most of the operative patients cannot take care of themselves, especially those who are one to two days post-operation, so these groups of patients require help from nurses or healthcare workers, to maintain hygiene (such as taking baths), changing body positions, and ambulation. These activities involve manual handling and are more likely to be required of nurses in surgical, rather than other, hospital departments (Tezel 2005; Attar 2014); they are activities which are also seen as work-related risk factors associated with, and resulting in, musculoskeletal disorders.

In addition, psychosocial factors are another important predictor in the development of musculoskeletal disorders (NIOSH 1997). Psychosocial factors, such as high physical job demands (e.g., working too many hours; having too much work to do), high patient stressors (e.g., mistreatment by patients and their

families) and high staffing demands (e.g., not having enough staff to cover shifts), have been shown to be frequently experienced by nurses (Sliter et al. 2014). All of these factors can cause occupational stress and contribute to musculoskeletal disorders among nurses. This phenomenon is illuminated by the 'biopsychosocial model' of job stress (Melin and Lundberg 1997), which highlights that job stress can evoke physiological responses, including increased muscle tension, elevated blood pressure, elevated cortisol and catecholamine levels. These responses can lead to increased risk of musculoskeletal disorders. Smith et al. (2004) showed that excessive mental pressure at work incurred a tenfold risk increase in musculoskeletal disorders among nurses in mainland China. Regarding Thai surgical nurses, psychosocial factors, including high physical job demands and low social support at work, were also significantly associated with musculoskeletal disorders (Chaisurin et al. 2012). Therefore, psychosocial factors are among the important risk factors contributing to musculoskeletal disorders among surgical nurses.

### **2.2.2.2 Musculoskeletal disorders among surgical nurses**

According to a study in Thailand, addressing work-related musculoskeletal disorders among surgical nurses (Chaisurin et al. 2012), a Standardised Nordic questionnaire was translated into the Thai language and used to identify areas of the body causing musculoskeletal problems. Musculoskeletal disorders which are commonly reported by surgical nurses include shoulder, neck, back, hip and knee conditions (e.g. ache, pain, or discomfort): this group of distinct disorders was associated with the surgical nurses' occupational risk factors (Chaisurin et al. 2012). Within this study, the sample size (212 Thai surgical nurses) was too small. This can increase the chance of assuming as true a false premise, which decreases the power of the study. Therefore, the results of this study into musculoskeletal disorders among this group of Thai surgical nurses is not generalizable to the wider population of surgical nurses. However, the link between healthcare activities and musculoskeletal disorders among Thai surgical nurses can be supported by the available data as discussed in the following sections.

*Neck and shoulder pain* among nurses is associated with doing repetitive tasks, lifting, moving, or transferring patients (Smith et al. 2003; Smith et al. 2004). According to Thanes, et al. (2005) the prevalence rate of persistent shoulder pain among nursing personnel in the preceding 12 months was 20.30 per cent and it was significantly associated with transporting patients by wheelchair and lifting

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objects between 10 – 25 kilograms. A study of musculoskeletal disorders amongst nurses in China showed that musculoskeletal disorders of the neck represented 42.80 per cent and disorders of the shoulder 38.90 per cent (Smith et al., 2004). In addition, a study of nurses in Japan showed that 46.60 per cent and 27.90 per cent of this group reported shoulder pain and neck pain respectively (Smith et al. 2003). A study in Thailand revealed that shoulder and neck disorders were the source of the highest prevalence of musculoskeletal complaints in the previous 12 months; shoulder problems being reported by 63.30 per cent and neck problems by 57.20 per cent of surgical nurses in the study sample (Chaisurin et al. 2012).

*Back pain* is also a commonly reported condition among nurses (Koehoorn et al. 2006; Shawashi et al. 2015) because the nature of their work involves manual handling tasks, long periods of standing and walking, and these can lead to back pain (Smith et al. 2003). This is supported by Anderson et al. (2017a) who link the effects of prolonged hours standing at work on musculoskeletal disorders of the lower back. According to Alexopoulos et al. (2003), lower back pain was the most prevalent musculoskeletal complaint, reported by 75.00 per cent of nurses in Greece. Similarly, a study conducted in Jordan showed that more than three quarters of the nurses studied suffered back pain during their work (Shawashi et al. 2015). A study by Koehoorn et al. (2006) of care workers, (most of them nurses), found that over half (53.00 per cent) of this group reported back pain. A study of surgical nurses in Thailand, elicited that lower back and upper back complaints in the previous 12 months were reported by 50.00 per cent and 47.20 per cent of the subjects respectively (Chaisurin et al. 2012).

These most prevalent conditions experienced by surgical nurses are neck, shoulder, and back pain. Possible causes for these conditions may be illuminated by their work activities regarding the need for manual handling of post-operative patients (Tezel 2005; Attar 2014). Pompeii et al. (2009) showed that the majority of patient handling injuries among hospital workers resulted in back pain (65%), shoulder and neck pain (16%). Although, the use of mechanical lifting equipment such as slide sheets or hoists might reduce or prevent musculoskeletal injuries due to lifting or transferring patients, but musculoskeletal injuries resulting from repositioning or turning patients, pulling patients up in bed, or catching falling patients, may not have been prevented by the use of such equipment (Pompeii et al. 2009).

*Upper leg or hip, knee or lower leg and foot or ankle disorders* among nurses are associated with standing and walking for long periods in their work (Smith et al. 2003). From a narrative review, it also clearly identified that prolonged occupational standing has a negative impact on the lower extremity and feet (Anderson et al. 2017b). Engels et al. (1996) studied the nursing profession in the Netherlands, they showed that of their subjects (10.20 per cent) had upper leg or hip complaints (6.90 per cent) knee or lower leg complaints and (3.70 per cent) foot or ankle complaints. Chaisurin et al. (2012) found that the hip and knee were also the sites commonly reported as problem areas among Thai surgical nurses.

Further to this previous study, the researchers suggested that the occupational health team, responsible for employee health in the hospital, should have the authority to influence prevention and severity reduction of musculoskeletal disorders by promotion of exercise activities and provision of social support for nurses in order to achieve a good quality of life and efficiently work practices.

The following sections explore the literature relating to physical activity or exercise and its potential impact on work-related musculoskeletal problems.

## 2.3 Physical activity or Exercise

### 2.3.1 Background

Caspersen et al. (1985) defines physical activity as any bodily movement produced by skeletal muscles that results in energy expenditure. In adults aged 18–64, physical activity in daily life can be categorized in a variety of ways. The simplest categorization identifies the physical activity that occurs when travelling between destinations (e.g. walking or cycling), at leisure time, and at work. Leisure time physical activity can be further sub-divided into categories such as sports, games, household chores (e.g. gardening, cleaning, home repair), conditioning exercises, and other (World Health Organization 2016). Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of one or more components of physical fitness (Caspersen et al. 1985; World Health Organization 2016).

According to the Global recommendations on physical activity for health, adults aged 18–64 should try to be active daily. They should do at least 150 minutes of moderate aerobic activity, such as cycling or fast walking, throughout the week,

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or 75 minutes of vigorous aerobic activity, such as running or a game of singles tennis, throughout the week. Combinations of moderate and vigorous aerobic activity can be performed to meet this recommendation. For example, two 30-minute runs plus 30 minutes of fast walking equates to 150 minutes of moderate aerobic activity. Aerobic activity should be performed in bouts of at least 10 minutes' duration. In addition, muscle-strengthening activities such as lifting weights, working with resistance bands, push-ups or sit-ups should be done involving major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms) on two or more days a week (NHS 2016; World Health Organization 2016). However, there is also conflicting evidence which shows that brief but intense interval exercise (3 minutes of intense intermittent exercise per week) has similar health benefits to traditional exercise activities and durations (Gillen et al. 2016).

For older adults (over 65s, or those aged 50–64 with chronic conditions such as arthritis), the recommendation is the same, with balance exercises also recommended. For older adults who have physical impairments or functional limitations, the recommendations can be applied by adjustments for each individual based on their exercise capacity and specific health risks or limitations (World Health Organization 2016).

Children and youths (aged 5–17) should do at least 60 minutes of physical activity every day. This can include either moderate-intensity aerobic activity or vigorous-intensity activity (although the latter should be included on at least three days each week). Muscle-strengthening activities (such as gymnastics) and bone-strengthening activities (such as running or skipping rope) are also recommended on at least three days a week (World Health Organization 2016).

For pre-school children (aged 3–5) it is recommended that they should try to be physically active throughout the day. While pregnant and post-partum women should do at least 150 minutes of moderate aerobic activity throughout the week (Thompson and Eijsvogels 2018).

Therefore, no matter what the age, everyone should try to be physically active. The benefits of physical activity are presented as follows.

### **2.3.2 Benefits of physical activity or exercise on health**

Regular exercise is very important to individuals' health. There has been strong evidence demonstrating that individuals who are more active have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2

diabetes, metabolic syndrome, colon and breast cancer, and depression. Moreover, they are more likely to have a reduced risk of a hip or vertebral fracture and achieve weight maintenance and have a healthier body mass and composition. They also have a higher level of cardiorespiratory and muscular fitness (World Health Organization 2016; Thompson and Eijsvogels 2018). Conversely, lack of exercise was examined as the primary cause of most chronic diseases (Booth et al. 2012). In children, physical activity has been shown to improve educational attainment (C3 Collaborating for Health 2011). More detail on how physical activity improves health is described in the following section.

### **2.3.2.1 Improved physical health and quality of life**

Regular exercise helps reduce the risk of premature death from coronary heart disease, high blood pressure, high cholesterol, diabetes, and colon and breast cancers by up to 30 per cent (C3 Collaborating for Health 2011; NHS 2016). It increases high-density lipoprotein (HDL, or 'good' cholesterol) while decreasing triglycerides. This keeps blood flowing smoothly by lowering the build-up of plaque in arteries. Overall, it increases resistance to various diseases, and improves physical fitness and quality of life (Centers for Disease Control and Prevention 2015).

### **2.3.2.2 Improved psychological well-being**

Regular exercise improves mood and reduces the likelihood of depression and anxiety. Regular exercise can also help to accelerate learning by increasing cognitive processes (e.g. memory functioning) (C3 Collaborating for Health 2011; Centers for Disease Control and Prevention 2015). It stimulates various brain chemicals (endorphins) that usually leave one feeling happier and more relaxed. Moreover, it can boost self-confidence and self-esteem by being physically toned and fit (Centers for Disease Control and Prevention 2015).

### **2.3.2.3 Increased energy levels**

Physical activity delivers oxygen and nutrients to tissues. It helps the cardiovascular system work more efficiently by circulating blood through the heart and blood vessels. If the heart and lungs work more efficiently, energy levels will be increased (Centers for Disease Control and Prevention 2015).

### **2.3.2.4 Weight control**

Physical activity plays a critical role in controlling weight due to the calories burned. If people burn more calories than they take in, they will lose weight (Centers for Disease Control and Prevention 2015). For example, 60 kg individuals who are walking briskly will burn about 300 kcal an hour, so it can assist with weight loss (C3 Collaborating for Health 2011). However, physical activity alone is not an effective weight loss strategy for most people, because of the huge volume of exercise required to expend sufficient calories to lose weight, but physical activity slows the rate of weight regain, contributes to weight loss with caloric restriction and prevents weight gain after weight loss (Thompson and Eijsvogels 2018).

### **2.3.2.5 Promoting better sleep**

Exercise is perceived as helpful in promoting sleep and suggests that regular exercise may be useful in improving sleep quality and reducing daytime sleepiness (O'Connor and Youngstedt 1995). Sleep is brought on by chemicals released in body which are by-products of glycolysis during exercise (Hereford 2016). Glycolysis is the breakdown of carbohydrates using stored sugar-glycogen in muscle tissue as fuel (Costill 1988). If people burn more sugar through exercise or physical activity, they will sleep better and more deeply. In addition, regular exercise also improves the transition between the cycles and phases of sleep and they become smoother and more regular (Hereford 2016).

### **2.3.2.6 Protecting bones, joints and muscles**

Engaging in the habit of regular exercise has also been found to protect bones, joints and muscles (Centers for Disease Control and Prevention 2015). There is evidence of beneficial effects of exercise therapy in patients with osteoarthritis of the knee or hip, which shows that patients who do exercise report less disability and pain associated with bones, joints and muscles than inactive patients (van Baar et al. 1999). Regular exercise reduces the risk of fractures by improving bone density (by increasing bone mineral density and content) and joint mobility (by stimulating the production of synovial fluid). Physical activity also decreases the risk of falling by improving muscle strength and balance (Centers for Disease Control and Prevention 2015). Therefore, improved bone, joints and muscle health can help people to perform activities of daily living and improves their quality of life.



**Figure 2-2 A summary on the health benefits of physical activity**

(Source: [www.gov.uk](http://www.gov.uk))

### **2.3.3 Benefits of physical activity on work-related outcomes among surgical nurses**

Work-related musculoskeletal disorders are health conditions or disabilities that burden employers and employees. In the United Kingdom, during 2015-2016, an estimated 41.00 per cent of all work-related ill-health was attributed to work-related musculoskeletal disorders. Approximately, 8.8 million working days were lost due to these disorders, an average of 16 days lost for each case (Health and Safety Executive 2016). Regular physical activity has been shown to have a positive impact on health, especially on prevention of work-related musculoskeletal disorders among nurses (Yuan et al. 2009; Szeto et al. 2013; Chen et al. 2014a; Chiou et al. 2014; de Freitas-Swerts and Robazzi 2014; Mynarski et al. 2014). While an insufficient level of physical activity may increase the risk of having musculoskeletal disorders (Vieira et al. 2008), many of which are responsible for presenteeism and/or absenteeism due to sickness.

Absenteeism is defined as one's absence from work, while presenteeism is defined as lost productivity due to an illness of some form (National Medical Systems 2012). One cross-sectional study examined a detailed breakdown of costs (absenteeism, presenteeism, and medical/pharmaceutical expenses), of the employees in four pharmaceutical companies in Japan (Nagata et al. 2018). In this study, the sample size was 12,350 employees which was large and the overall response rate was high (61.7%). The result showed that presenteeism is costing organizations more than its counterpart, absenteeism. Estimated monetary value due to presenteeism (64%) is 6 times higher than absenteeism (11%). However, this study was conducted using a self-administered questionnaire, undertaken just once. It is not possible to capture changes over time, venue or variability, and the assessment of the evidence at different times might be different. From this limitation, the authors acknowledged that the season of the survey (in summer) might affect the prevalence of seasonal conditions (e.g. hay fever and influenza), that should be considered in interpretation of the result. The absenteeism and presenteeism measure were also self-reported with possibility of recall bias (Nagata et al. 2018).

There are many causes of absenteeism and presenteeism, including depression and mental illness symptoms, toxic workplace cultures, and physiological health issues (Starling Minds 2019). According to a study by Nagata et al. (2018), mental health conditions and musculoskeletal disorders are reported as the most frequent reasons of absenteeism and presenteeism among the Japanese

employees in the study. This aligns with the Health and Safety Executive (2016) report, in which musculoskeletal disorders are amongst the leading causes of disability worldwide, and are correlated with an increase in the number of sick days one takes. Therefore, one can see the global nature of these occurrences which seem to cross borders, linguistic barriers and cultures, and is also applicable to the situation in Thailand. Hence, increasing musculoskeletal disorders among Thai nurses is also connected to an increase in people who miss work due to ill health (absenteeism) and/or a decrease in productivity at work due to working while sick (presenteeism).

One retrospective cohort study investigated this issue from the record of sickness absence (in the period 1981–1996) and early retirement on health grounds (in the period 1972–1996) in construction workers in Ireland (Brenner and Ahern 2000). The results showed that over 677,000 working days were lost due to sickness absence, and over 24,000 potential years of working lives were lost due to early retirement on health grounds. Musculoskeletal and cardiovascular diseases – diseases in which physical activity has a significant preventive role – are among the main causes of absenteeism, permanent disability, and early retirement. The authors suggested that modification of lifestyle, such as doing regular physical activity, is a crucial element of preventing the complex set of events. However, this study considered sickness absence and permanent disability in only medical diagnostic categories. Psychosocial exposure (e.g. workplace bullying, low job satisfaction, and low supervisor support) – which is often reported as the leading cause of absenteeism and presenteeism (Starling Minds 2019) – were not considered in this study. This might be bias to the study results.

Some previous studies have shown a relationship between physical activity and major work-related outcomes such as vitality, work performance, presenteeism, and absenteeism (Schultz and Edington 2007; Lahti et al. 2010). One study used the Helsinki Health Study questionnaire surveys to examine the association between leisure-time physical activity and absenteeism among employees of Helsinki City (n=6465, 79% women). This study determined that vigorous physical activity significantly reduces absenteeism due to sickness. However, information on the diagnoses for sickness absence was not investigated in this study. In addition, information on physical activity was based on self-reports that may have affected the exact estimation of the true physical activity level (Lahti et al. 2010). Another one reviewed the link between employee health and on-the-job productivity (presenteeism), and showed that regular physical activity has a

positive impact on work productivity, while obesity and sedentary lifestyle are related to presenteeism (Schultz and Edington 2007).

It is recognised that a sedentary lifestyle among surgical nurses can be expected to lead to increased risk of health conditions and disabilities. These adverse effects may constitute a great concern for employers or health care managers or occupational health staff, because they can result in reduced productivity, increased health care costs, and decreased quality of life among surgical nurses. Employers or health care managers need to encourage nurses to engage in physical activity in order to improve their musculoskeletal fitness, health status, and overall quality of life. Following from this, there are likely to be benefits to individual nurses and patients, wards and services, as well as the wider and national health economy.

#### **2.3.4 Physical activity or exercise participation among surgical nurses**

Within cross-sectional studies, physical inactivity has been widely reported among nurses in many countries such as United Kingdom, Thailand, Taiwan and South Africa (Naidoo and Coopoo 2007; Chaisurin et al. 2012; Chiou et al. 2014). Evidence points to low levels of physical activity among nurses.

For example, the results of a descriptive study of nurses from a hospital in South Africa found that 80% of the nurses did not exercise at all, and lower back pain was prevalent in 40% of the sample (Naidoo and Coopoo 2007). Similarly, a study among hospital staff in Taiwan found that nurses had worse health behaviours than other health professionals; including low levels of physical activity and less participation in health promotion activities (Chiou et al. 2014).

Blake and Harrison (2013) found that nurses do not meet the recommended levels of physical activity required for health benefits, which is 30 minutes, 5 days a week. A study of Thai surgical nurses in a tertiary care hospital, found that more than 50.00 per cent of subjects did not undertake any exercise (58.50 per cent), 33.50 per cent exercised less than 3 times a week and only 8.00 per cent undertook exercise more than 3 times a week. It was also found that non-exercise was significantly associated with the occurrence and the severity of musculoskeletal disorders, in terms of their effect on activities and absenteeism due to sickness during the preceding 12 months (Chaisurin et al. 2012).

Considering a qualitative descriptive study by Phiri et al. (2014) who conducted 12 focus groups with nursing staff working in 22 hospitals in the Cape Town Metropole (n=103). It was found that musculoskeletal pain was the main occupational health-related concern among nurses in the study. However, they reported having insufficient time to undertake regular physical activity due to long working hours and being overtired from work. This group of nurses also suggested an alternative way of adopting physical activity for them in the form of aerobic classes and a gym in the health care facility. From that viewpoint, the way in which supporting or enhancing physical activity participation among Thai surgical nurses, with the aim of preventing and reducing musculoskeletal disorders, as well as enhancing work place effectiveness, might be needed.

Enhancing physical activity participation among surgical nurses might not be easy or straightforward. An important step in enabling surgical nurses to undertake physical activity is to understand the factors influencing their physical activity participation. There might be a huge variety of factors influencing surgical nurses' decisions to undertake physical activity or not undertake any type of physical activity. Regarding Conner and Norman (2005) there are variety of influences and behaviours in relation to health, it seems to be complex and multifactorial. An individual's value and belief system has been shown to have a significant impact on the identification and evaluation of individual risk factors, as well as the readiness to take action (Badley et al. 1994; Conner and Norman 2005). It might be expected that the ways in which Thai surgical nurses give meaning and definition to physical activity or exercise behaviour are based on their beliefs and expectations.

Even with numerous studies supporting a correlation between physical activity and reduced musculoskeletal disorders incidence, duration, severity, recurrence, and healing time (Vuori 2001; Proper et al. 2003; Rogers 2003; Morken et al. 2007; Naidoo and Coopoo 2007; Yuan et al. 2009; Szeto et al. 2013; Chen et al. 2014a; Chiou et al. 2014; de Freitas-Swerts and Robazzi 2014; Mynarski et al. 2014; Abolfotouh et al. 2015), we are not sure how the achievement of these activity goals fit with the beliefs of a group of Thai surgical nurses. Therefore, understanding this complexity and the defined stages in changing health behaviour, and the influences on physical activity behaviour among Thai surgical nurses might be crucial.

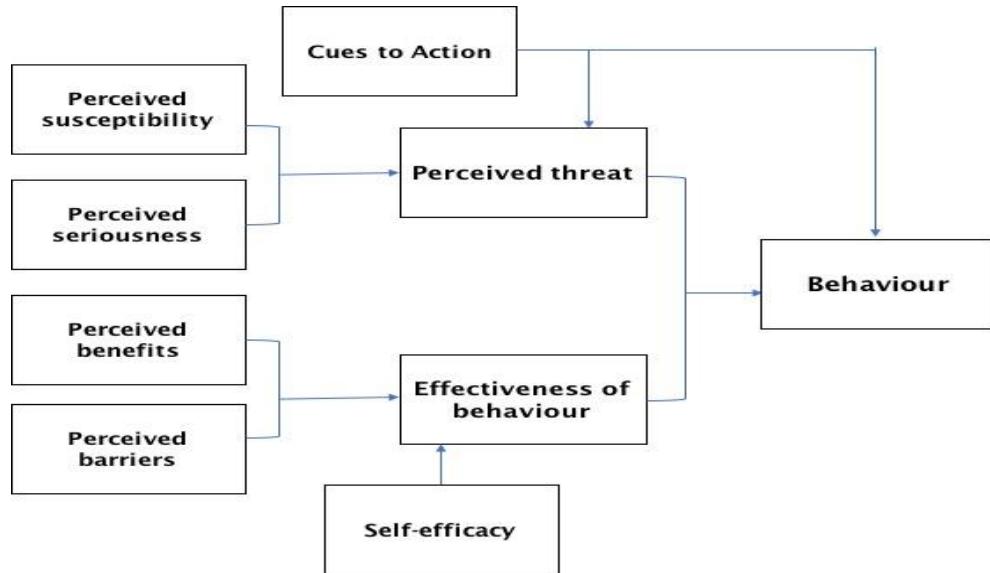
## 2.4 Models of health belief and health behaviour

A wide range of variables, from different models, have been proposed with a view to understanding the phenomenon of health behaviours. The main purposes of the models were to provide information about behaviour and determine relations between key variables that are necessary to explain and predict behaviour (Badley et al. 1994; Conner and Norman 2005).

The Health Belief Model [HBM], a cognitive-behavioural model, constitutes one of the oldest models of health behaviour, established in the 1950s. The model attempts to explain and predict individual participation in programs for preventive and health-promoting behaviours (Rosenstock 1990; Abraham and Sheeran 2005).

According to the HBM, the likelihood of performing specific health behaviour is related to people's conviction that they are threatened with certain diseases, their evaluation of the severity of these diseases, and to the conviction that the target health behaviour allows averting the risk of developing the diseases (Rosenstock 1990).

In the original version of the model, the key variables were denominated as perceived susceptibility, perceived severity, and perceived benefits. Additional variables were perceived barriers – the costs or obstacles to the target behaviour perceived by the individual. In addition, the model proposed that cues to action can activate health behaviour when appropriate beliefs are held (Abraham and Sheeran 2005). These cues may be internal or external, such as individual perception of illnesses, social influence, and health education campaigns (Becker and Maiman 1975; Abraham and Sheeran 2005). More recent formulations of the HBM have included self-efficacy as a key factor. Self-efficacy is a confidence in individual's ability to take action, and it is influenced by mediating variables and in turn by influences and expectations (Weinstein 1993). Mediating factors which assume the form of demographic, structural, and social variables, have also been explored in applying the HBM. Mediating variables are believed to indirectly affect behaviour by influencing an individual's perceptions of susceptibility, severity, benefits, and barriers (Rosenstock 1990).



**Figure 2-3 The Health Belief Model**

The HBM is a typical model for describing some of the factors required in the process of achieving positive changes in health behaviour. However, it is somewhat limited in the way that it tends to focus on why individuals do not change their health behaviour and is viewed as a linear progression with a start and end point rather than a cycle.

Another model of health behaviour, namely, the transtheoretical model (TTM), is considered to be one of the most popular models. According to the TTM, individuals may move through the cycle several times before they change their behaviour getting on and off at any stage, it is not just a one-off decision (Sutton 2005; Upton and Thirlaway 2013). Identifying where individuals are in which stage of change may result in more effective intervention to help individuals to become more physically active (Upton and Thirlaway 2013).

This model is based on a cycle of 5 stages, pre-contemplation, contemplation, preparation, action, and maintenance (Sutton 2005; Upton and Thirlaway 2013) (see Table 2-4). Different types of psychological support are more likely to be effective at different stages. While individuals are in the pre-contemplation stage, they may need education about the health risks of inactivity and the value of being physically active and motivational interventions to encourage them to move into the contemplation stage. Individuals who are in the contemplation or preparation stage may need to build self-efficacy for adopting healthy lifestyle changes and overcoming challenges. Some who are in the action or maintenance stage will need support to stay motivated by increasing self-efficacy and self-regulation. They need to be provided with the tools necessary for maintaining positive behaviour changes (Upton and Thirlaway 2013).

**Table 2-4 The stages of change in relation to achieving the recommendations for physical activity**

| <b>Stage of change</b>   | <b>Behavioural and motivational characteristics</b>  |
|--------------------------|--|
| <b>Pre-contemplation</b> | Individuals are sedentary and do not see or understand the value of introducing physical activity into their daily routine.  |
| <b>Contemplation</b>     | Individuals are still sedentary, but have started to think about how a sedentary lifestyle is negatively affecting their health within half a year.  |
| <b>Preparation</b>       | Individuals are no longer than half a year sedentary. They begin to engage in some form of physical activity, but there is no consistency or commitment in this stage.                           |
| <b>Action</b>            | Individuals are carrying out the plan created during the preparation stage, but undertaken for no longer than half a year. This is the least stable stage and relapse is likely                  |
| <b>Maintenance</b>       | Individuals have progressed from the action stage into the maintenance stage, where they are maintaining new healthy behaviour changes for longer than half a year. This is unlikely to relapse. |

Being physically active is an ongoing process. Individuals who are maintaining patterns of past behaviours are often referred to as habits (Upton and Thirlaway 2013). Therefore, among surgical nurses, there is a need to design different strategies suited to the stages of physical activity adoption and supported by government and organisation policies and environmental changes. This might help to encourage active living and discourage sedentary habits among them.

In this recent study, in order to explore and understand the factors influencing engagement in physical activity among surgical nurses, the models of health belief and health behaviour have been used to clarify the beliefs that act as incentives and barriers to undertake physical activity among surgical nurses.

## **2.5 The relationships between physical activity and musculoskeletal disorders among surgical nurses**

There were twenty-two selected studies in relation to work-related musculoskeletal disorders and physical activity among nurses. There are eleven

cross-sectional studies and nine experimental studies. There is only one cohort study and one systematic review. The selected papers are different levels of the hierarchy of evidence, based on the methodological quality of their design, validity, and applicability. A summary of the papers is shown in Appendix A. All selected studies were used to discuss the relationships between physical activity and musculoskeletal disorders among nurses that might be relevant to surgical nurses.

In relation to the cross-sectional studies, Reed et al. (2014) used a self-administered survey incorporating the Nordic Musculoskeletal Questionnaire (NMQ) to evaluate the prevalence of MSDs in nurses, with a good response rate of 73%. They found that foot and ankle MSDs were the most prevalent conditions experienced by nurses during the preceding 7 days, while during the preceding 12 months, lower-back problem was the most prevalent condition among them.

A subsequent study by Mynarski et al. (2014) applied the Nordic Musculoskeletal Questionnaire to assess musculoskeletal pain and the International Physical Activity Questionnaire (IPAQ) to assess the level of physical activity among nurses. It was found that over 70% of the examined nurses reported musculoskeletal complaints, mostly related with lower back pain. Mynarski et al. (2014) concluded that taking up at least moderate to vigorous physical recreational activity (MVPA) reduces the risk of musculoskeletal disorders.

Abolfotouh et al. (2015) also used a self-administered modified Nordic questionnaire to evaluate the prevalence, consequences and predictors of low back pain (LBP) among nurses. The findings of this study broadly confirm the high levels of back pain in nursing, with a one-year prevalence of LBP of 54.3 % for LBP of at least one day. The authors suggested that preventive measures, such as sports activity programmes, should be taken to reduce the risk of lower back pain among nurses.

While, the evaluation of musculoskeletal disorder among nurses by Vieira et al. (2008) used a body map on which the nurses rated their perceived discomfort by the end of the shift on a 10-point severity scale from 'no discomfort' (1) to 'very uncomfortable' (10). This study found that 38% of the nurses reported having some musculoskeletal pain. From those, the pain was in the low back in 72% of the nurses. Additionally, the participants who were smokers, overweight, and did not exercised regularly were more likely to have had lower back disorders during their working life. Nevertheless, the sample size in this study is too small with only 47 nurses, so future studies using bigger samples are suggested.

## Chapter 2

The studies by Chiou et al. (2014) and Naidoo and Coopoo (2007) used different questionnaires developed by the researchers to examine health behaviours among nurses. Chiou et al. (2014) used a structured questionnaire that was developed specifically for their study. The questionnaire was distributed to 98,817 full-time staff members working in 100 hospitals across Taiwan, and 73,391 (74.3%) questionnaires were returned. The study sample included 4,202 physicians, 31,639 nurses, 2,315 pharmacists, 8,161 other health professionals, and 13,079 administrative personnel. While Naidoo and Coopoo (2007) used the Health and Physical Activity questionnaire which was designed by Corbin and Lindsey (1985). The questionnaire was considered as a standardized tool which could help to promote the validity and reliability of data. One hundred and seven nurses participated in this study and completed this health questionnaire. Both studies demonstrated that the nurses in the study sample had low levels of health behaviours and fitness profiles (Naidoo and Coopoo 2007; Chiou et al. 2014), and a high incidence of back pain (Naidoo and Coopoo 2007). These two studies also identified a need for workplace health promotion programmes for the nurses. While Naidoo and Coopoo (2007) did not mention limitations and potential biases to the study, Chiou et al. (2014) acknowledged that the use of the specific questionnaire limits comparisons with other studies, and the results may not be generalisable.

Also, a cross-sectional study by Fonseca and Fernandes (2010) identified factors associated to musculoskeletal disorders in nursing workers. The questionnaires used were developed by the authors. It was found that poor level of physical activity showed an association with MSDs in low back region. However, in this study, the authors did not assert the direction of the association between physical fitness and MSDs.

Sliter et al. (2014) used an online survey to assessed nurses' job-related experiences and health and individual outcomes. This online questionnaire was distributed to 434 RNs, and only 152 responded (34.7%), it indicates that there may have been a selection bias. In this study, the authors highlighted that physical activities may have a direct positive effect on psychological health and through the reduction of the negative effects of stressors which are associated with musculoskeletal disorders.

Landry et al. (2008) who conducted a self-administered survey with health professionals working in a Kuwait hospital: physicians, nurses, laboratory technicians, physical therapists, pharmacists, radiology technicians, and analgesic

technicians. 60% (n=344) of the health professionals responded. The authors demonstrated that physical activity or exercise was not found to be significantly associated with lower back pain. They also discussed the limitations of the cross-sectional nature of the data collection and the difficulty in establishing the temporal sequence and causality of the identified associations.

The cross-sectional study carried out by Freimann et al. (2013) explored the prevalence of musculoskeletal pain amongst 221 female nurses (response rate 57%). It was revealed that stressful physical activity was significantly associated with lower back pain. Stressful physical activity in this study was related to stressful occupational activities. This echoes the report by Howard et al. (2013) which showed that women who had exceeded physical activity guidelines ( $\geq 300$  minutes/week) had a higher percentage of physical activity-related musculoskeletal injuries compared to those who merely met or did not meet the physical activity guidelines.

Considering the nine experimental studies, there are five studies which focused on physical activity interventions in promoting/improving physical fitness to reduce musculoskeletal disorders (Warming et al. 2008; Yuan et al. 2009; Williams et al. 2011; Szeto et al. 2013; Chen et al. 2014a). While the others focused on interventions aimed at reducing anxiety/stress and musculoskeletal disorders (Mehrabi et al. 2012; de Freitas-Swerts and Robazzi 2014; Freitas et al. 2014a; Chen et al. 2016b).

Regarding physical activity interventions in promoting/improving physical fitness and musculoskeletal health Yuan et al. (2009) concluded that an exercise intervention consisting of treadmill exercise has a significant improvement on physical fitness among nurses in the study (1-week to 3-month post-intervention follow-ups). However, change in the participant's musculoskeletal disorders was not evaluated in this study. The authors acknowledged that longitudinal studies to monitor and understand the efficacy of this intervention programme could be performed in further studies.

Szeto et al. (2013) found that a multifaceted ergonomic intervention programme, including a daily exercise programme, had positive short- and long-term outcomes on musculoskeletal symptoms among community nurses, and as identified by Freimann et al. (2015) that an exercise programme has been reported to improve cervical and lumbar range of motion and reduce pain intensity in the neck and lower back among nurses. However, the sample size in the Szeto et al. (2013) study is small with only 10 and 38 subjects for

asymptomatic and symptomatic groups respectively. The power of the study is 71.56 per cent; hence, the generalisations of the study results need to be addressed with caution.

Warming et al. (2008) also evaluated the effects of physical fitness training (aerobic fitness and strength training) among a hospital nursing staff, and found that physical fitness training seems to have an influence in minimising low back pain (LBP) consequences. The authors suggested that physical training could be an additional concept in reducing LBP (or at least the consequences of LBP) among nursing personnel. However, a major limitation to this study acknowledged by the authors is the high withdrawal rate (45%). Thus, the results need to be tested in future studies before final conclusions can be drawn. In substantiation of this, Chen et al. (2014a) examined the effectiveness of a stretching exercise programme (SEP) on low back pain (LBP) among nurses in Taiwan (n= 127). They concluded that SEP is an effective and safe non-pharmacological intervention for the management of LBP. This study followed up the participants at 6 months and looked ahead to a more extended 1-to 2-year longitudinal follow-up. However, there was a problem of time limits among the nurses and it was costly. The authors recommended developing DVDs and online learning materials to help nurses practice stretching exercise at any time.

A quasi-experimental study by Williams et al. (2011) who evaluated the Nurses Living Fit Program's effect (NLF) on BMI in nurse participants, found that NLF group participants had a greater mean reduction in BMI and waist circumference than contrast group participants. Ideally, weight reduction in overweight or obese people is assumed to reduce the incidence of musculoskeletal symptoms, in particular symptoms of the lower extremity (Viester et al. 2013).

In relation to physical activity in reducing anxiety or stress which, is suggested, as a causal factor related to musculoskeletal disorders explained by the 'biopsychosocial model' of job stress (Melin and Lundberg 1997; Alexopoulos et al. 2003) (see also Section 2.2.2.1). One experimental study conducted with Taiwan nurses (n= 50 and 49 of the experimental and control groups) demonstrated that a releasing exercise program (REP) consisting of warm-up exercises, muscle tension-releasing exercises, and mood adjustment (50-min, 3 times a week, for 24 weeks) was effective in reducing anxiety and enhanced self-confidence in exercise capability. However, there was a certain degree of inconsistency in following the exercise regime due to irregular working hours of the nurses (Chen et al. 2016b).

A study conducted with 34 female nurses working in ICU in Iran demonstrated that 8-weeks of yoga exercises could make significant positive changes to stress coping strategies among this group of nurses. However, the long-term effect of these exercises is unknown. Also, the limitations of this study is conducted on women and nurses of only one hospital and that cannot be generalized for the whole population (Mehrabi et al. 2012).

Whereas, Freitas et al. (2014b) found that a workplace physical activity (WPA: 5 days a week, lasting 10 minutes, during a period of 3 months) did not lead to beneficial effects on occupational stress and psychological variables. However, after the intervention, participants reported reduced perceptions of bodily pain and less feelings of fatigue at work. This data analysis included only 21 nurses that is considered to be a small sample size. Moreover, the lack of randomization or a control group (without WPA) made it hard to analyse the results (Freitas et al. 2014b).

Another one study carried out by de Freitas-Swerts and Robazzi (2014) also found that workplace exercise (twice a week, for 15 minutes, during a period of 10 weeks) was not significantly associated with reducing work stress among administrative workers (n= 30). However, there was a significant reduction in musculoskeletal pain. The authors suggested repeating the study with a larger number of participants and focus on the physical and psychological issues of the subjects.

Within the experimental studies, the findings align well with the systematic review by Tullar et al. (2010), in which exercise interventions were shown to have positive health benefits, especially in reducing musculoskeletal symptoms. Also, a Cohort study by Henwood et al. (2012) highlighted that nurses who chose to prioritise physical activity into their lifestyle project had health outcomes than those who did not. This has important implications for workforce planners and administrators concerned about the well-being of nursing individuals and the nursing workforce.

In conclusion, most of the selected studies have shown that physical activity or exercise is beneficial in preventing and/or reducing musculoskeletal disorders among nurses, while no-exercise may increase the risk of having musculoskeletal disorders. These studies identified a need for physical activity intervention strategies, incorporating both the organisational aspects of work and adaptations in physical environment, in order to promote and improve the health-related

physical fitness of nurses and for reducing musculoskeletal disorders among them.

### **2.5.1 Summary and developing thoughts**

In examining the cross-sectional studies, it can be seen that the instruments or questionnaires used to gather data were different. Some of them did not include a description of how the instruments or questionnaires were formulated, it is possible that they were formulated by the researchers rather than the participants. This could have indeed resulted in failure to elicit whole areas and issues of importance. In addition, the studies were based on cross-sectional surveys, rather than on observations at various time points. These surveys provided a snapshot of the relationships between physical activity and musculoskeletal disorders among nurses at a given point in time and lacked the ability to capture changes over time, venue or variability. Therefore, it is not possible to establish the true cause and effect relationship.

From the experimental studies, although most of them were longitudinal, but there are differences in study parameters such as the choice of populations, types of exercises, and study duration. The above-mentioned studies included various groups of health care professionals such as hospital nurses, community nurses, physicians, pharmacists, and administrative workers. According to Chen et al. (2016a) and Chen et al. (2014a), exercise sessions in the studies were 50 mins, whereas those of Yuan et al. (2009) were 20-30 minutes, and Yoga classes of Mehrabi et al. (2012) were 60 mins. Mehrabi et al. (2012), Szeto et al. (2013), and Yuan et al. (2009) conducted non-randomized trials, with 1-week to 3-month post-intervention follow-ups, and measurements were done at only two time points (before and after, but not mid-study), which only allowed them to analyse short-term effects. Hence, from this review, it cannot be concluded that physical activity or exercise has a preventative effect on musculoskeletal disorders among a group of surgical nurses.

Additionally, there was the evidence shown that physical activity can be a cause of musculoskeletal injuries. Therefore, the concept of physical activity for musculoskeletal health has not been fully examined.

## 2.6 The factors influencing physical activity or exercise participation among surgical nurses

In relation to the factors influencing the decision of surgical nurses to engage in physical activity or exercise, or not to engage in exercise, fourteen academic papers, including ten cross-sectional studies, two articles, and two qualitative studies, were selected for the review. Each study was described in terms of the factors which are considered to influence physical activity or exercise among nurses, study type and design, findings, and summary of conclusions drawn from the study (see Appendix A). From the review, the factors influencing physical activity among nurses, and which might be related and relevant to surgical nurses, include personal issues, perceived benefits of and barriers to exercise, perceived self-efficacy, social support and exercise facility, motivation, and occupational issues. Evidence for each factor is discussed in the following sections.

**Table 2-5 Papers selected for the critical review of studies investigating factors that influence physical activity participation among surgical nurses**

| Personal factors             | Perceived benefits of and barriers to exercise, and perceived self-efficacy | Social support and exercise facility | Motivation                   | Occupational issues                                     |
|------------------------------|---|--------------------------------------|------------------------------|---|
| Kaewthumanukul et al. (2006) | Kaewthumanukul et al. (2006)  | Kaewthumanukul et al. (2006)         | Kaewthumanukul et al. (2006) | Persson and Mårtensson (2006)                           |
| Almajwal (2015)              | Esposito and Fitzpatrick (2011)   | Cowell (2014)                        | Sherwood and Jeffery (2000)) | Zhao et al. (2011)                                      |
| Bakhshi et al. (2015)        | Kolbe-Alexander et al. (2014)   | Persson and Mårtensson (2006)        |                              | da Costa Fernandas et al. 2013; Peplonska et al. (2014) |
| James et al. (2013)          | Almajwal (2015)   | Yancey et al. (2013)                 |                              | (McPherson et al. 2011)                                 |
|                              | Bakhshi et al. (2015)   | Sherwood and Jeffery (2000))         |                              | (Kolbe-Alexander et al. 2015)                           |
|                              | Hensel (2011)   |                                      |                              |   |

## 2.6.1 Personal factors

Four selected studies were in relation to personal factors which influence physical activity participation among nurses (Kaewthummanukul et al. 2006; James et al. 2013; Almajwal 2015; Bakhshi et al. 2015).

Kaewthummanukul et al. (2006) identified a relationship between exercise participation and a set of predictive factors among 970 Thai female nurses. They used a structured questionnaire and found that educational level was a significant predictor of physical activity participation among the participants. Those nurses who had completed a higher degree displayed less exercise participation, an outcome associated with low motivation. Also, being married was positively related to exercise participation among this group, probably as a result of social support from family members.

Almajwal (2015) conducted a study with 362 non-Saudi female nurses using questionnaires to assess the relationship between physical activity and barriers. The content of the questionnaire is detailed and justified but how the questions were formulated is not described. It was found that nurses with higher levels of education were less physically active than those who had completed undergraduate diplomas. A possible explanation may be that nurses with a higher degree have a greater likelihood of occupying sedentary roles (passive jobs), such as nurse managers and senior nurse roles and therefore expend less energy on physical activity and were significantly more likely to be overweight or obese. Also relevant may be the more time-demanding nature of their senior positions. However, in this study, being married was reported as a barrier to undertaking physical activity among the nurses. The nurses who were married were more likely to spend time in taking care of family and home chores as well as employment associated responsibilities; therefore, they displayed lower levels of leisure time physical activity and were more overweight or obese than unmarried nurses (Almajwal 2015).

Nevertheless, there has been a cross-sectional study by Bakhshi et al. (2015) demonstrating that being overweight or obese was positively associated with nurses' physical activity, indicating that they perceived their health to be threatened. It may be that the perceived benefit of exercise to their health status can play an important role in acknowledging the need to undertake physical activity. The authors highlighted the need for training on physical activity-related counselling, including awareness of the latest recommendations and strategies to promote physical activity.

A subsequent study by James et al. (2013) identified the relationship between urban sprawl, physical activity and BMI among 136,592 nurses living in the USA. They conducted a multilevel cross-sectional analysis and found that women who lived in denser counties with more accessible street designs had lower BMIs and were more physically active. It may be that living in a denser area was associated with more walking and then lower BMI. However, a study limitation acknowledged by the authors is the participants were asked to report on recreational physical activities such as walking for exercise or walking to work, but other types of transportation-related physical activity, such as walking or bicycling to do errands, were underreported. This could have an effect on the results.

## **2.6.2 Perceived benefits of and barriers to exercise, and perceived self-efficacy**

Six selected studies have demonstrated that perceptions of the benefits of, and barriers to, exercise are important in determining physical activity participation among nurses (Kaewthummanukul et al. 2006; Esposito and Fitzpatrick 2011; Hensel 2011; Kolbe-Alexander et al. 2014; Almajwal 2015; Bakhshi et al. 2015).

A descriptive survey among 112 registered nurses in the USA (Esposito and Fitzpatrick 2011) indicated that nurses who believed in the benefits of exercise were more likely to embrace exercise behaviour and teach healthy behaviours to their patients. The authors do discuss the implication of nurses' beliefs on the benefits of exercise and suggest that structured classes, health fairs, and motivational signage might have a direct impact on nurses' patient teaching of exercise and might be important influences in nurses' recommendations of exercise. Also, Bakhshi et al. (2015) conducted a study with 623 registered nurses in the UK, and highlight that the perceived benefits of exercise in health status can play an important role in planning his or her future exercise programmes.

However, Hensel (2011) investigated the relationship between self-concept and regular physical activity in a random sample of 679 Midwestern nurses. It was found that even though these nurses would be expected to perceive health benefits of physical activity, the nurse reported practicing regular physical activity only sometimes. In this study, a problem using questionnaires acknowledged by the authors is poor return and incompleteness. A questionnaire sent to 450 Midwestern nurses were returned 132 participants (29.30%). One survey was missing more than 90% of the data and was excluded from analysis. This could have an effect on the validity of the results.

## Chapter 2

Regarding perceived barriers to exercise Kolbe-Alexander et al. (2014) conducted twelve focus groups with nurses and hospital management staff working in public hospitals in the Western Cape, South Africa. They found that a lack of time was the main barrier to regular physical activity among the participants affecting their decision to exercise. However, this study included interviews with not only a group of nurses, but also a group of hospital management staff.

Whilst, Almajwal (2015) conducted a cross-sectional study among nurses and found that the main barrier to physical activity among nurses in the study sample was weather (88.30 per cent) followed by a lack of transportation (82.60 per cent). The author suggested that environmental barriers should be addressed in order to promote physical activity engagement among nurses. These barriers concur with those identified by Upton and Thirlaway (2013), in which an unsupportive environment is now increasingly recognised to play role in the low levels of physical activity in many countries. Regarding Thailand its climate is characterised by a hot, humid environment almost throughout the year, combining with the phenomenon of air pollution due to seasonal crop burning. This may contribute to the reported lack of physical activity in relation to unsupportive environments among Thai surgical nurses. Therefore, the influence of environments on physical activity among Thai surgical nurses will be further explored in the current study.

A study by Kaewthumanukul et al. (2006) also highlighted that perceived barriers to exercise are negatively associated with physical activity participation among Thai female nurses, which affect a person's perceived ability to exercise. The authors also found that the level of exercise participation in the study sample was associated with perceived self-efficacy in combination with the other factors, including education level and social support.

### **2.6.3 Social support and exercise facility**

Social support is one of the most important factors which influences people's decisions to engage in exercise, or not to engage in exercise. Kaewthumanukul et al. (2006) found that social support from family members, friends, acquaintances or co-workers was positively associated with physical activity participation among Thai female hospital nurses.

Similarly, a qualitative study by Persson and Mårtensson (2006) who carried out interviews, questionnaires, self-observation and observation by an outsider with 27 nurses working night shift. They concluded that social interaction with

colleagues, at work, was a significant influence on exercise habits among this group of nurses. Their colleagues had an important role both as conversation partners and role models. The authors also recommend that factors with a positive influence among colleagues should be clarified and utilised. However, this study only focused on a group of nurses working night shift, it is possible that the results would have been different in other groups of nurses.

According to the reports of Cowell (2014) and Yancey et al. (2013), there is suggestion of an alternative way of adopting exercise among nurses such as classroom physical activity (Cowell 2014), group exercise breaks at certain times of the day, as well as suitable places to exercise (Yancey et al. 2013), in order to address barriers to exercise and encourage healthy lifestyles.

However, a review of the determinants of exercise behaviour by Sherwood and Jeffery (2000) demonstrated that some individuals prefer physical activity occurring away from the workplace, which could be performed on one's own rather than in a group or class. A possible explanation may be that physical activity on one's own can be undertaken anywhere and anytime, and access to exercise facilities may not affect their exercise behaviour. For example, some individuals prefer exercises such as walking or bicycling to work. Additionally, some individuals prefer home exercise with a personal trainer, using home exercise equipment such as stationary bikes, treadmills, ellipticals, and even exercise videos or fitness magazines. Therefore, they can exercise at any time when they want.

Sherwood and Jeffery (2000) also demonstrated the association between exercise facilities and physical activity level. For example, environmental resources or suitable places to exercise (i.e. walking/biking paths, safe streets) that are conducive to do physical activity, cost of exercise which affects a person's perceived capacity to do exercise. The authors suggested that strategies for improving access to physical activity facilities are needed.

#### **2.6.4 Motivation**

Motivation plays an essential role in exercising. Kaewthummanukul et al. (2006) examined the predictors of exercise participation among Thai female nurses and found that motivation did explain the variability in exercise participation.

A review by Sherwood and Jeffery (2000) demonstrated that personal motivation in exercise participation depends on several factors such as health, appearance,

enjoyment, social interaction, stress relief, challenge, skill development, achievement, and personal satisfaction. Women reported being more motivated to exercise by social factors (e.g. friends joining) and release of tension, whereas men reported being more motivated to exercise by fitness and health. The authors suggest one strategy for promoting physical activity is to emphasize the wide range of benefits associated with a physically active lifestyle and to tailor this message for different subgroups of the population. Following from this, as the nursing profession is female-dominated, physical activity programs might be designed to assist with mood management and stress levels for them.

### **2.6.5 Occupational factors**

One of the most important factors related to determinants of physical activity participation among nurses was occupational factors. Irregular working hours and night work are often reported as unfavourable influences on exercise behaviour among nurses.

Persson and Mårtensson (2006) demonstrated that working night shifts is a negative influence on exercise behaviour among nurses. Nurses, when working night shifts, are likely to have difficulties in exercise participation due to feeling too tired after work, or needing time to rest or sleep on the days following a night shift. Equally, night shift nurses may sometimes give priority to doing something else, instead of exercising, during the day time. Nevertheless, there were some nurses working night shifts that reported their working hours had a positive influence on exercise behaviour. For example, night work sometimes afforded a degree of flexibility in which to do physical activity or exercise, for example in the participants' spare time, or during day time hours that did not conflict with family commitments. Some of the nurses reported that night work gave them the opportunity to get exercise by cycling to work.

Zhao et al. (2011) investigated the association between shift work and unhealthy weight: a cross-sectional analysis from the nurses and midwives' e-cohort study. It was found that female nurses and midwives working night shift were more likely to have a lower level of physical activity compared with day shift workers (1.5 times), and were associated with a higher risk of being overweight/obese.

Also, a cross-sectional study by Peplonska et al. (2014) investigated the associations between the rotating night shift work and physical activity among nurses and midwives (n=354). Peplonska et al. (2014) used a standardized tool (IPAQ questionnaire) which covers all important domains of physical activity.

However, the potential limitation acknowledged by the authors is differences in the year season when interviews could potentially influence outside activities (e.g. recreational or gardening) among the study sample. This study found that rotating night shift work was associated with higher occupational physical activity, but lower leisure time activity among the study sample.

This finding contrasts with a qualitative study in South Africa by Kolbe-Alexander et al. (2015) that found night shift nurses in the study were less likely to spend time on sedentary activities than the day shift nurses, and slightly more time in moderate intensity physical activity. In substantiation of this, McPherson et al. (2011) determined the effect of physical activity and sedentary behaviour on melatonin levels in 118 rotating shift nurses. The authors recorded physical activity and sedentary behaviour among the participants by using activity diaries, and concentrations of urinary 6-sulfatoxymelatonin were analysed for each shift. They concluded that physical activity and energy expended in sedentary behaviour are inversely associated with morning urinary melatonin concentrations. That is perhaps suggesting that peak melatonin during the night shift study period is minimally affected by the patterns of physical activity among the participants. However, as physical activity and sedentary behaviour were recorded by the participants, the potential limitation acknowledged by the authors is errors in recall of physical activity, which would function to bias the results toward the null. The authors suggest to use more precise exposure assessment techniques such as accelerometers in future studies.

Furthermore, long working hours among nurses were also reported affecting their health with regard to a lack of regular physical activity and the tendency towards obesity (da Costa Fernandas et al. 2013). da Costa Fernandas et al. (2013) conducted a multidimensional questionnaire with 3,904 nurses working in nursing care in the eighteen public hospitals, with a good response rate of 82.7%. The authors highlighted the association between professional and total work hours and health-related behaviour patterns in the nurses, especially in the female nurses. They also suggested that a study to assess the impact of long work hours on workers' health is required.

## 2.6.6 Summary and developing thoughts

Despite many studies that have identified the factors which are considered to influence physical activity or exercise behaviour among nurses, there remains a problem of nurses not undertaking exercise, and the prevalence of musculoskeletal disorders among them is still high.

It may be that the research to date has not influenced widespread changes in practice due to the choice of research methods and the particular focus of the research. The majority of the studies were cross-sectional in design and used questionnaires as a tool for assessing the factors influencing physical activity. For example, a study of Thai female nurses which identified a relationship between exercise participation and a set of predictive factors (Kaewthummanukul et al. 2005): it employed questionnaires which were generally focused on the problem areas as viewed by researchers. Also, a study of 362 female nurses in Riyadh, Saudi Arabia which identified the relationship between physical activity, body mass index, shift duty, and selected eating habits (Almajwal 2015). These cross-sectional studies collected data on the whole study population at a single point in time to examine influences on physical activity participation, therefore, it is possible that the participants would provide different answers at different times and under different circumstances. Hence, the assessment of the evidence at different times might be crucial. In addition, as most of the studies reviewed do not describe how the questionnaires were formulated, it is possible that they were influenced by the researchers rather than the participants. That is, the focus of the questions could have been what the researchers thought should be asked rather than what the participants feel is important and this could have indeed resulted in failure to elicit whole areas and issues of importance. Therefore, the choice of using questionnaires may be one reason why the problem of nurses not undertaking exercise still exists.

Although there have been qualitative studies in relation to this area, there is a small number. For example, a study undertaken by Kolbe-Alexander et al. (2015) which determined nurses' lifestyle behaviours, health priorities and barriers to living a healthy lifestyle: this study utilised group interviews to capture a range of opinions among the participants. However, conducting group interviews might have resulted in disadvantages such as the participants not being free to express their opinions in a group environment—especially regarding confidential and sensitive topics. A subsequent study by Persson and Mårtensson (2006) used interviews of twenty-seven nurses working night shift who had been supplied

with positive and negative situations affecting their diet and exercise habits. In this study, the researchers only focused on a group of nurses working night shift, it is possible that the results would have been different in other groups of nurses. Also, the interviews were conducted at one point in time, the data might show changes over time. This is a major move forwards in the current qualitative study that aims to examine influences on physical activity participation among Thai surgical nurses. Making it possible to capture different perspectives and influences which may arise from geographical and temporal factors.

In addition, a qualitative study may provide insight and understanding as to where the problems in this area are. As an individual's value and belief system has been shown to have a significant impact on their health behaviour (Badley et al. 1994; Conner and Norman 2005). Therefore, considering the subjective and unique individual perspectives among Thai surgical nurses might be useful in terms of helping the researcher to gain an insight and understanding into the problem.

## 2.7 Conclusion

This review has elicited the degree to which current literature addresses itself to exercise engagement in musculoskeletal disorders among surgical nurses. In previous studies, there has not been a focus on exercise engagement specifically in musculoskeletal disorders among surgical nurses, hence its inclusion in this study. This review has illustrated work-related musculoskeletal disorders and physical activity participation among nurses, and the factors related to their physical activity or exercise engagement or lack of engagement, which might be related and relevant to surgical nurses. Whilst the selected studies addressed work-related musculoskeletal disorders and physical activity, the concept of physical activity for musculoskeletal health has not been fully examined.

In relation to the factors influencing physical activity, much of the previous work to this area used quantitative research approaches. They were cross-sectional in design and mostly self-reported surveys using questionnaires which focused on the problem area and the intervention objectively and not the participant's subjective experience. Therefore, a qualitative approach may provide insight and understanding as to where the problems are. This methodology will now be explored, described and justified in the context of the aims of the study.

This study aims to explore the concept of physical activity for musculoskeletal health and assess the maturity of the concept, and to explore the range of factors likely to influence physical activity participation among Thai surgical nurses, through a qualitative approach featuring in-depth interviews. The results of this study will provide ***new information*** about the factors relevant to physical activity participation among this group of Thai surgical nurses.

## 2.8 Gaps in knowledge

The literature review highlights that the factors influencing physical activity participation among nurses are likely to be complex and multifactorial. Although there have been many studies of nurses that identified a relationship between physical activity participation and a set of predictive factors, they were cross-sectional in design and mostly self-reported surveys. It might be useful to consider the subjective and unique individual perspectives among surgical nurses, in order to gain an insight and understanding into the phenomenon. An in-depth understanding of the factors influencing physical activity among Thai surgical nurses may help in the planning and implementation of appropriate physical activity interventions in order to prevent or reduce work related musculoskeletal disorders among them.

However, in spite of numerous studies which support a correlation between physical activity and reduced musculoskeletal disorders incidence, duration, severity, recurrence, and healing time (Vuori 2001; Proper et al. 2003; Rogers 2003; Morken et al. 2007), there was some evidence shown that physical activity can be a cause of musculoskeletal injuries. Therefore, the concept of physical activity for musculoskeletal health has not been fully examined. It would be helpful to explore the concept of physical activity for musculoskeletal health and assess the maturity of the concept.

## 2.9 Research aims

Regarding my previous work and the literature review, the problem of Thai surgical nurses not undertaking physical activity still exists and non-exercise was significantly associated with the occurrence and the severity of musculoskeletal disorders (Chaisurin et al. 2012). Hence, this doctoral study aims to explore the concept of physical activity for musculoskeletal health, and to explore and understand the factors which influence engagement in physical activity among Thai surgical nurses.

1. To explore the concept of physical activity for musculoskeletal health, and assess the maturity of the concept.
2. To explore the factors which influence engagement in physical activity among Thai surgical nurses in order to generate a baseline understanding in a hitherto unresearched area.

## 2.10 Research questions

Based on the stated research aims, the study research questions are:

1. Is physical activity for musculoskeletal health a mature concept?
2. Is physical activity for musculoskeletal health comparable to the concepts of physical activity for diabetes management and cardiovascular health?
3. What are the factors which influence engagement in physical activity among Thai surgical nurses?

## 2.11 Chapter summary

Within this second chapter, search strategy and research evidence concerning work-related musculoskeletal disorders and physical activity participation among surgical nurses has been reviewed. The systematic search strategy has been reported to demonstrate how relevant research evidence was identified and addressed. A Gap in the evidence base was identified and this informed the generation and development of the research questions and subsequent research aims.

The next chapter will justify and discuss the research methodology and approach which was used to answer the research questions.



# Chapter 3 Methodology and methods

## Introduction

The purpose of this chapter is to provide a justification for the selection of the research methodology. Therefore, a detailed description of the research paradigm, methods and approach will be presented and discussed. This is because the coherence of the research paradigm, research design, and methods can assure the validity of research findings (Lincoln et al. 2011). In addition, an appropriate methodology and methods is important in being able to effectively address and answer the underpinning research questions (Broom and Willis 2007), therefore, leading to better quality research (Polit and Beck 2008). This chapter is divided into five main areas: i) research philosophy, ii) research paradigm and design, iii) methodology and methods, and procedures employed for both the collection of data and the analysis of the data, iv) ethical consideration, and v) a chapter summary.

### 3.1 Research philosophy

A research philosophy may be described as a belief system about the nature of the world, and ultimately, when applied in the research setting, a guide to the researcher in fundamental ontological and epistemological ways (Guba and Lincoln 1994).

A system of belief, known as a paradigm, can guide the researcher toward the selection of certain methods (Rubin and Rubin 2012). Health researchers have tended to embrace one particular research paradigm which they consider to be appropriate to the aims of the research and to answering their research questions (Broom and Willis 2007). Epistemology and ontology reflect the stance of the researcher and underpin the entire research process whilst also governing the particular theoretical perspective selected (Manson 2002). For Manson (2002), epistemology is concerned with 'the nature of knowledge' and ontology addresses 'the nature of reality'. One view of knowledge (epistemology) is as a social construction of reality, being ultimately subjective – thus embodied within the interpretivist perspective. In contrast, a view of reality (ontology) as a fixed entity, where objective knowledge can be established through the rigorous application of a specific methodology – is allied to a positivist perspective. Hence, the justification for choosing a particular research model will be explained and discussed in the following section.

## 3.2 Research paradigm and design

There are two distinct research paradigms which have been used for different research purposes; namely qualitative and quantitative (Guba and Lincoln 1994). The quantitative paradigm is recognised as reflecting a positivist paradigm based on the belief that the methods that can be used to control and measure to support a hypothesis (Guba and Lincoln 1994; Burns and Grove 2005).

Quantitative research focuses on objectivity and the quantity of things. It normally takes the form of numbers, and their analysis using statistics involves counting or quantifying these to draw conclusions. A large sample of the population will be involved more than the case with qualitative research. Hence, it often represents the population. However, quantitative research does not study things in a natural setting or discuss the meaning things have for different people as qualitative research does. It cannot always explore the context of the study or experiment. Moreover, quantitative research may give a false impression of homogeneity in a sample (Rahman 2016; Queirós et al. 2017).

Alternatively, the qualitative paradigm or constructivist model focuses on the way people interpret and make sense of their experiences and the world in which they live (Guba and Lincoln 1994; Manson 2002). This paradigm is based on a subjective epistemological stance which focuses on the experiences of people (Guba and Lincoln 1994; Burns and Grove 2005; Creswell 2013) such as pain, caring, and comfort (Burns and Grove 2005). Qualitative research focuses on the quality of things. It is not concerned with numerical representability, but in seeking to elicit an in-depth understanding of a given situation, experience, phenomenon or problem of particular individuals or groups. Therefore, researchers can seek out individuals who fitted selection criteria that may give a heterogeneous sample in research. This type of research often gathers “rich” or “thick” data from small samples. However, small sample size does not make the researchers’ job easier. This is because qualitative data often takes the form of words, narratives and descriptions, which are not easy to analyse, the researcher must undertake constant comparison of these data to identify relevant themes and to make these understandable and accessible for the reader. Moreover, the findings are not generalizable due to small sample sizes and the subjective nature of the research (Badley et al. 1994; Rahman 2016; Queirós et al. 2017).

Within this current study, the researcher needed to look for a research approach that would be suitable for the aim of the study. This study aims to explore Thai surgical nurses’ experiences, feelings, and beliefs toward physical activity

participation. Therefore, considering the subjective and unique individual perspectives among Thai surgical nurses, will reveal insights into and understanding of the factors influencing their physical activity participation. Hence, the study was situated in the interpretivist paradigm, which focuses on why something has happened from an insider's point of view. In addition, the concern of this study was not to provide results that can be generalised to a wider group of Thai surgical nurses, but rather to develop an in-depth understanding of Thai surgical nurses' experiences within a particular setting. Thus, through reading the literature about qualitative approach, the researcher was convinced that this was the approach which has the potential to influence the outcomes of research whatever method is employed.

### **3.3 Development of personal research philosophy**

The philosophical basis of any study needs to be detailed for the reader to understand how both the research approach, methodology and methods are appropriate to the research aims and questions (Koch 1996). In this section, development of personal research philosophy in relation to this study will be identified in the following section.

In this study, the experiences which the researcher gained through preparing for and undertaking this research have influenced her world view and personal research philosophy; leading the researcher to adopt a qualitative methodology in order to best answer the key research questions which flowed from the researcher's previous study.

Within the researcher's previous study, the researcher studied work-related musculoskeletal disorders and related factors among Thai surgical nurses (Chaisurin et al. 2012). Within the findings, the prevalence of musculoskeletal disorders among surgical nurses was very high and the evidence of their exercise participation was low. It was also found that non-exercise was significantly associated with the occurrence and severity of musculoskeletal disorders among the participants. Further to this, the researcher realised that finding a way in which to support or enhance physical activity participation among Thai surgical nurses, with the aim of preventing and reducing musculoskeletal disorders, as well as enhancing work place effectiveness, might be crucial.

However, enhancing physical activity participation among surgical nurses might not be easy or straightforward. An important step in empowering surgical nurses

to undertake physical activity might be to understand the factors influencing their physical activity participation. There might be a huge variety of factors influencing surgical nurses' decisions undertake physical activity or not undertake any type of physical activity. Regarding Conner and Norman (2005) there are variety of influences and behaviours in relation to health, which seem to be complex and multifactorial.

Regarding the literature review the researcher found that much of the previous work was quantitative research, identifying the relationship between physical activity participation and a set of predictive factors among nurses or other health care professionals. As the researcher felt that the factors which influence physical activity among surgical nurses may be more complex than previous studies describe; it might be useful to consider the subjective and unique individual perspectives among surgical nurses, in order to gain an insight and understanding into the phenomenon of interest. Therefore, the researcher was very clearly travelling in the direction towards qualitative research in order to understand the reality of Thai surgical nurses' experiences regarding physical activity participation. The concern is not to provide results that can be generalised to a wider group of Thai surgical nurses, but rather to develop an in-depth understanding of Thai surgical nurses' experiences within a particular setting. Therefore, the paradigm focuses on the subjectivity and relativity of reality, continually pointing out the need to understand how the participants interpret and make sense of their experiences and the world around them, and is a social construction of reality (Guba and Lincoln 1994; Burns and Grove 2005; Creswell 2013). The interpretive paradigm was appropriate for addressing the research aims and questions and the phenomenon of interest.

In conclusion, the influences from the researcher's experience and the literature review have been explored as the influences on the development of her research philosophy or 'world view' of research. These influences led the researcher to choose the research approaches that would be the most appropriate to the research aims and questions.

### **3.4 Justification for the research approach**

For the purposes of this study, the researcher decided that interpretive paradigm is the suitable approach to use for this study. This approach allowed a focus on the subjectivity and relativity of reality, continually pointing out the need to

understand how Thai surgical nurses interpret and make sense of their experiences and the world around them regarding physical activity participation.

The interpretive paradigm has also been described as hermeneutics (Crotty 1998). The name of hermeneutics is derived from Hermes, the Greek messenger of legend who bore knowledge and understanding between the gods and mortals. In the 17<sup>th</sup> century, hermeneutics was introduced as a method of biblical interpretation (Crotty 1998). There are three key assumptions that inform hermeneutics as an approach to interpretation, understanding and knowledge creation.

According to Koch (1999), hermeneutics refers to the shared understanding and knowledge through language. This view involves the Gadamerian metaphor of “*fusion of horizons*” whereby different interpretations of the phenomenon are brought together through dialogue to produce shared understanding and knowledge. Gadamer used Heidegger’s metaphor of the “*hermeneutic circle*” to describe the experience of moving dialectically between the parts and the whole (Koch 1996). This process begins with the researcher attempting to reflect on and analyse the individual parts, such as their own background, understanding or prejudices, to develop self-awareness of their own horizons (Gadamer 1989). Then, the researcher attempts to analyse the text with a more open mind and remaining true to the data of the inquiry when interpretations are made. This process involves repeatedly and cyclically moving between the parts and the whole until the “*fusion of horizons*” occurs or understanding of the phenomenon (Gadamer 1989).

Within this study, the researcher started with reflection on her previous research and the literature on the topic. Then, she carefully considered the prejudices that were revealed in the texts in the form of transcribed interviews which were expressed by the participants, while constantly thinking about how to make meaning of what had been said. Throughout the phase of data analysis, the researcher was consciously aware that she was seeking to identify a fusion of horizons, points where the multiple thoughts and realities of the various participants, herself included, intersected and drew apart. The researcher was also consciously aware of how her own thoughts and ideas about the research phenomenon as a consequence of her immersion in this study, drawing these thoughts into the analytical process, not to occupy a place of supremacy, but to test emerging ideas and develop new insights (see Figure 3.1).



**Figure 3-1 Use of the hermeneutic circle in this study**

In conclusion, the interpretive approach aims to describe what people mean of the experiences through exploring dialogue and the interpretation of that dialogue to reveal feelings and meaning. This approach is an inductive approach in which experience or perception is elicited from the participants (raw data) not the researcher's perspective. However, the researcher is considered as the research tool (Thomas 2003).

This approach aligns well with the researcher's belief whereby the researcher requires processes to be taken to minimise any potential bias which could be introduced by the researcher. The researcher is a former employee in the study setting and as such is an insider, where her personal ideas may have influence on both the situation and the reporting of the investigation. Therefore, the interpretive approach allowed the researcher to achieve a holistic perspective of the participants. However, the researcher's experience and knowledge added value to the research process.

The next step was to consider the most appropriate research methods for the purposes of the study. Further to this, the process of data collection and data analysis will be described.

### 3.5 Research methods

A research method is a strategy of inquiry which includes research design and data collection (Burns and Grove 2005). Within qualitative research, there are several types of qualitative approaches, such as grounded theory,

phenomenology, case study, ethnography, narrative and pragmatic approaches. This suggests that there are many facets associated with the form of social enquiry and there is no one form of investigation to fit all situations. For example, researchers interested in looking for individual 'stories' might adopt narrative research; those seeking to access individual experiences and the context of those experiences may deploy phenomenology; those seeking to process actions, or interactions may use grounded theory; cultural themes may be explored via ethnography; or those seeking a detailed description of particular cases might utilise case study research; and those adjusting the research method used to answer the research questions might adopt a pragmatic approach (Creswell 2013).

This study aims to explore the factors influencing physical activity among Thai surgical nurses, in order to generate a baseline understanding in a hitherto unresearched area. Also, this would help in the planning and implementation of appropriate physical activity interventions in order to prevent or reduce musculoskeletal disorders among them. Therefore, a qualitative approach exploring influences on physical activity for musculoskeletal health among Thai surgical nurses was considered to be the appropriate study design.

However, before the researcher travelled to that point, she felt that it might be useful to consolidate her understanding of the concept of physical activity for musculoskeletal health. Because the concept of physical activity for musculoskeletal health had not been fully explored, the concept analysis would help to better define, clarify and specify the meanings of the terms 'musculoskeletal disorders' and 'physical activity'. In addition, this would assist the researcher's understanding of the problem area and provide a foundation for her further research in this area.

### 3.6 Concept analysis

**Concept analysis** is a method that can contribute to a body of knowledge specifically about concepts. In this study, since one of the research questions pertains to explore the concept of physical activity for musculoskeletal health, and assess the maturity of the concept physical activity for musculoskeletal health, concept analysis has been employed.

### 3.6.1 Overview of concept analysis

**Concepts** are the fundamental building blocks of scientific knowledge or theoretical frameworks for any discipline. The utilisation of poorly understood concepts in research and theory development will result in uncertain reliability and validity (Botes 2002).

**Concept analysis** is associated with the research design of philosophical inquiry that involves attempting to identify the meaning of concepts (Burns and Grove 2005). Walker and Avant (2005) define concept analysis as a procedure to identify unique characteristics of each concept and provide researchers with a precise operational definition of that concept. Concept analysis also refines ambiguous concepts within a theory, then, it can provide a more fundamental and more in-depth understanding of the underlying attributes or characteristics of that concept. Morse et al. (1996) define the concept analysis process as the use of various techniques to explore the description of a concept from literature. She points to a process of inquiry that explores concepts for their level of development as revealed by their internal structure, use, representativeness and relations to other concepts.

In nursing research, three approaches to concept analysis have developed through paradigmatic evolution, including i) Wilsonian-derived methods (Walker and Avant 2005), ii) Pragmatic utility method (Morse 2000), and iii) Evolutionary method (Rodgers 2000). Researchers using Wilsonian-derived methods utilise a positivistic research paradigm to determine characteristics of a concept that would be applicable in any circumstance (Weaver and Mitcham 2008). Pragmatic utility utilises a critical theory perspective to determine the characteristics of a concept through critique of the literature to identify similar criteria that demonstrate usefulness for practice (Morse 2000). While within the Evolutionary method, researchers utilise an a constructivist perspective in an interpretive research paradigm to identify attributes of the concept through its frequent use; to promote a foundation for further inquiry into the concept (Rodgers 2000).

This study sought to explore the concept of physical activity for musculoskeletal health and assess the maturity of the concept. Rodgers' (2000) model would be congruent with the research philosophy.

### **3.6.2 Rationale for selecting Rodgers' evolutionary concept analysis**

The researcher believes that the concept of physical activity for musculoskeletal health has evolved through contextual influences; therefore, Rodgers' approach would be congruent with the development of the topic to date. Additionally, this approach would assist the researcher's understanding of the problem area and provide a foundation for her further research in this area. Finally, the dynamic and contextual nature of this approach is congruent with the largely accepted perspective in nursing (commonly associated with the interpretive perspective) that humans are ever changing and interact with the environment to establish their health (Rodgers 2000).

### **3.6.3 Rodgers' evolutionary concept analysis**

There are various stages of conceptual analysis following Rodgers' (2000) model. Wilson's original concept analysis had eleven stages (Wilson 1963). However, Rodgers (2000) modified them into six stages, which have been employed in this study. Rodgers' model of conceptual analysis is intended to identify the characteristics of a concept by comparing it with its related concepts- having used different cases to analyse comparative conceptual maturity. The stages in Rogers (2000) model of conceptual analysis are discussed below.

#### **Step 1: Identify the name and concept of interest and associated expressions.**

In this study, in order to better define, clarify and specify the meanings of the terms 'physical activity', a concept analysis of 'physical activity for musculoskeletal health' has been undertaken. The aim of this concept analysis is to explore the concept of physical activity and to assess the maturity of the concept of physical activity for musculoskeletal health.

#### **Step 2: Identify and select the appropriate setting for data collection**

Rodgers (2000) defines the setting of an evolutionary concept analysis as the time period to be explored and the type of disciplinary literature to be included. Electronic databases were searched via the DelphiS database, which is accessed through the University of Southampton's online library, and which includes all relevant study databases such as CINAHL, AMED, MEDLINE, Science Citation Index, Social Sciences Citation Index, PsycINFO and Science Direct. Publication year was limited between 2006 –2018 in order to retrieve the most recent

## Chapter 3

literature. The key words in the search were identified from reading the literature in relation to physical activity for musculoskeletal health:

| Title   | Boolean operator | Subject   |
|---|------------------|---|
| “physical activity” OR<br>“exercise” OR “sport” OR<br>“work out” OR “sedentary” OR<br>“leisure time activity” OR<br>“home exercise” OR<br>“physical fitness” OR “Wii Fit” | AND              | “musculoskeletal disorders” OR<br>“musculoskeletal pain” OR<br>“musculoskeletal injury” OR<br>“musculoskeletal aches” OR<br>“musculoskeletal fatigue” OR<br>“musculoskeletal problem” OR<br>“fatigue” OR “discomfort” |

Moreover, references, citations and other relevant literature from ‘Google scholar’ were manually searched, in order to seek seminal works as well as a wide range of key papers in the field. Additionally, to expand the search and avoid limitation through depending on specific search terms, the reference list of all possible articles and key authors was searched for further references. Grey literature that was made available to the public, such as published books, dictionaries, thesauruses, reports, sports journals and magazines, conference papers, and government or organization documents, were also used to gather information in relation to the concept.

Only studies published in the English language were included for review. Ongoing work is not included in the review as the author recognises that the peer review process is an effective process for screening the quality of research and its relevance to practice.

### **Step 3: Collect the data**

Twenty-two articles were included based on the inclusion criteria. Of these, eighteen articles were considered well recognized and well cited and also included in the analysis. Thirty- two grey literature sources were included based on the latter search strategy. Of the 125 total articles reviewed in the literature search, 53 articles were excluded and 72 were included for analysis.

#### **Step 4: Analyse data regarding the above characteristics of the concept**

Rodgers' (2000) evolutionary method of concept analysis includes a review of each of the articles retrieved from the literature for the purpose of identifying the attributes of the concept, along with surrogate terms, references, antecedents, and consequences. An inductive process of analysis began with a review of the 72 documents collected. The texts were read and re-read in order to classify the data into relevant categories systematically.

#### **Step 5: Identify concepts that are related to the concept of interest, and conduct interdisciplinary and temporal comparisons**

Related concepts are concepts that have some relationship with the concept, but do not have the same set of attributes as the concept (Rodgers, 2000). In this study, the following criteria were applied to the chosen related concepts: 1) the term is considered a concept – has a set of attributes as the concept of physical activity for musculoskeletal health, and 2) the related concepts have some relationship with the concept of physical activity for musculoskeletal health. Utilising this approach, the related concepts of “physical activity for diabetes management” and “physical activity for cardiovascular health” were selected.

The analysis begins with an overview of the concept of physical activity. Following this, the concept of physical activity for musculoskeletal health is considered and the comparable cases of “physical activity for diabetes management” and “physical activity for cardiovascular health” are also examined. These cases are compared with the case of “physical activity for musculoskeletal health”.

To evaluate the relative maturity (or clarity of the scientific concept) of physical activity for musculoskeletal health its preconditions, characteristics, outcomes and consequences are explored and compared to the preconditions, characteristics, outcomes and consequences of the specific comparable cases. This information is presented using comparative conceptual maturity matrices.

#### **Step 6: Identify hypotheses and implications for further development**

The concept analysis findings will be used as a background to and to help explain the attitudes, reasons and behaviour regarding physical activity participation of the research participants, as well as to verify particular details that the participants have supplied in the interviews.

### 3.6.3.1 The concept of physical activity for health

#### 3.6.3.1.1 Physical activity

"Physical activity", "exercise," and "physical fitness" are terms that describe different concepts. However, the concepts are often confused with one another, and the terms are sometimes used interchangeably (Caspersen et al. 1985).

Caspersen et al. (1985) defines physical activity as any bodily movement produced by skeletal muscles that results in energy expenditure. In adults aged 18–64, physical activity in daily life can be categorized in a variety of ways. The simplest categorization identifies the physical activity that occurs when travelling between destinations (e.g. walking or cycling), at leisure time, and at work. Leisure time physical activity can be further sub-divided into categories such as sports, games, household chores (e.g. gardening, cleaning, home repair), conditioning exercises, and other (World Health Organization 2016). Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of one or more components of physical fitness (Caspersen et al. 1985; World Health Organization 2016).

According to the Global recommendations on physical activity for health, adults aged 18–64 should try to be active daily. They should do at least 150 minutes of moderate aerobic activity, such as cycling or fast walking, throughout the week, or 75 minutes of vigorous aerobic activity, such as running or a game of singles tennis, throughout the week. Combinations of moderate and vigorous aerobic activity can be performed to meet this recommendation. For example, two 30-minute runs plus 30 minutes of fast walking equates to 150 minutes of moderate aerobic activity. Aerobic activity should be performed in bouts of at least 10 minutes' duration. In addition, muscle-strengthening activities such as lifting weights, working with resistance bands, push-ups or sit-ups should be done involving major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms) on two or more days a week (NHS 2016; World Health Organization 2016). However, there is also conflicting evidence which shows that brief but intense interval exercise (3 minutes of intense intermittent exercise per week) has similar health benefits to traditional exercise activities and durations (Gillen et al. 2016).

For older adults (over 65s, or those aged 50–64 with chronic conditions such as arthritis), the recommendation is the same, with balance exercises also recommended. For older adults who have physical impairments or functional

limitations, the recommendations can be applied by adjustments for each individual based on their exercise capacity and specific health risks or limitations (World Health Organization 2016).

Children and youths (aged 5–17) should do at least 60 minutes of physical activity every day. This can include either moderate-intensity aerobic activity or vigorous-intensity activity (although the latter should be included on at least three days each week). Muscle-strengthening activities (such as gymnastics) and bone-strengthening activities (such as running or skipping rope) are also recommended on at least three days a week (World Health Organization 2016).

For pre-school children (aged 3–5) should try to be physically active throughout the day. While pregnancy and post-partum women should do at least 150 minutes of moderate aerobic activity throughout the week (Thompson and Eijsvogels 2018).

There has been strong evidence demonstrating that all physical activity positively contributes to overall health and well-being. Physical activity or exercise reduces the risk of hypertension, coronary heart disease, stroke, diabetes and some cancers. It also assists with the improvement of cardiorespiratory and muscular fitness, and bone health (World Health Organization 2016).

The following sections illustrate the concept of “physical activity for musculoskeletal health”, “physical activity for diabetes management” and “physical activity for cardiovascular health”.

### **3.6.3.1.2 Physical activity for musculoskeletal health**

Musculoskeletal health includes positive dimensions of health-related fitness as well as negative dimensions, such as functional disorders and degenerative diseases of the musculoskeletal system. According to Bouchard et al. (1993) health-related musculoskeletal fitness includes the following components (a) muscles – mass, strength, power, and endurance; (b) bones – bone mineral density (BMD); in grams per square centimetres; accounts for about 80 per cent of bone strength in normal populations) and also other determinants of bone strength (e.g., bone mineral content (BMC; in grams), geometry, and internal architecture) would be valid parameters; (c) joints – range of motion or flexibility; and (d) integrated functions (including motor components) – coordination, balance, speed of movement, and agility.

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Musculoskeletal injuries result from the damage of joints, bones, muscles and surrounding tissues (Arthritis Research UK 2017) which are usually due to a strenuous activity and/or repetitive activity (Hootman et al. 2002). They include major traumatic episodes such as broken bones or whiplash; injuries during intense physical exertion; or the common sprains, strains and falls that can happen in everyday life. Equally damaging can be gradual damage caused by long term overuse leading to abnormal wear of muscles and joints (Arthritis Research UK 2017). Injuries impair musculoskeletal health due to the pain and lost physical function. Injuries may also cause long-term pain and disability due to a number of factors. Musculoskeletal pain, and the fear of further injury, can lead people to reduce their physical activity, causing loss of muscle strength leading to further degenerative diseases. Together, these factors can result in a cycle of recurrent injury and long term damage to joints which manifests as irreversible osteoarthritis, with resultant pain and disability (Arthritis Research UK 2017).

Physical activity can positively influence musculoskeletal health that is related to functional capabilities and the risk of degenerative diseases. Engaging in the habit of regular physical activity has been found to protect bones, joints and muscles (Centers for Disease Control and Prevention 2015). A wide range of physical activities, including swimming, walking, cycling and running, have been shown to be beneficial in reducing overall risk of musculoskeletal pain and disability (Hart et al. 1999; Manninen et al. 2001; Rogers et al. 2002; Kim et al. 2013). Physical activity has also been proposed as a therapy to reduce the incidence of musculoskeletal disorders, such as mechanical low back pain, neck and shoulder pain, osteoporosis and related fractures. Regular physical activity reduces the risk of fractures by improving bone density and mobility, and decreases the risk of falling by improving muscle strength and balance (Centers for Disease Control and Prevention 2015). Older women who were physically active (walking, bicycling, using stairs, and gardening) were found to be less likely to need a hip replacement surgery (Ageberg et al. 2012).

Physical activity can contribute to the rehabilitation of musculoskeletal disorders and recovery from orthopaedic surgery. There is evidence of beneficial effects of physical activity in patients with osteoarthritis of the knee or hip, which shows that patients who do physical activity report less disability and pain associated with bones, joints and muscles than inactive patients (van Baar et al. 1999). Therefore, physical activity is a key public health intervention for everyone in order to enhance musculoskeletal health and functions.

However, physical activity is associated with the potential for musculoskeletal injury – increases in physical activity levels are associated with increased risk of musculoskeletal injuries (Morrow Jr et al. 2012). Howard et al. (2013) reported that women who exceeded physical activity guidelines ( $\geq 300$  minutes/week) had a higher percentage of physical activity-related musculoskeletal injuries compared to those who merely met or did not meet the physical activity guidelines. However, reported physical activity-related musculoskeletal injuries were less likely to require health care provider treatment and resulted in less missed days of work/school.

Moreover, physical activity may cause degenerative musculoskeletal disease, especially osteoarthritis (OA). There has been a systematic review study which revealed that physical activity improves OA symptoms, however, heavy physical activity can potentially lead to increased OA risk (Curtis et al. 2017). The American Academy of Orthopaedic Surgeons guidelines suggest that patients with symptomatic knee OA should engage in quadriceps strengthening and low impact aerobic exercise (Jevsevar 2013). Therefore, physicians should advise OA patients to engage in low to moderate aerobic physical activity in order to improve OA symptoms (Curtis et al. 2017).

Despite the finding that physical activity affects the risk of musculoskeletal injuries, the benefits of being physically active outweigh the potential harm. Hence, it is important for people to engage in safe physical activity in order to improve various aspects of musculoskeletal health and functional capabilities. Choosing to undertake types of physical activity that are appropriate for individual fitness level and health goals is important.

### **3.6.3.1.3 Physical activity for diabetes management**

Diabetes can be classified into 4 categories, namely, type 1 diabetes, type 2 diabetes, gestational diabetes mellitus (GDM), and specific types of diabetes due to other causes (American Diabetes Association 2016). The primary types of diabetes are type 1 and type 2 (Colberg et al. 2016). Type 1 diabetes (5 per cent–10 per cent of cases) results from  $\beta$ -cell destruction, usually leading to absolute insulin deficiency, typically occurring more rapidly in youth than in adults. Type 2 diabetes (90 per cent–95 per cent of cases) results from a progressive insulin secretory defect on the background of insulin resistance. Gestational diabetes mellitus (GDM) is diabetes diagnosed in the second or third trimester of pregnancy that is not previously known to have diabetes (American Diabetes Association 2016).

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Diabetes can diagnose based on plasma glucose criteria—either the fasting plasma glucose (FPG) or the 2-h plasma glucose value after a 75-g oral glucose tolerance test (OGTT) or A1C criteria. These tests are used to screen for and diagnose diabetes and prediabetes. Prediabetes is diagnosed when blood glucose levels are above the normal range but not high enough to be classified as diabetes; affected individuals have a heightened risk of developing type 2 diabetes (American Diabetes Association 2016).

Regular physical activity is a key element in the prevention and management of diabetes which may prevent or delay its onset (American Diabetes Association 2002). Colberg et al. (2016) concluded that physical activity improves blood glucose control in type 2 diabetes by reducing HbA1c, triglycerides, blood pressure and insulin resistance, and also improves cardiorespiratory fitness, muscle strength and insulin sensitivity in type 1 diabetes. Plotnikoff et al. (2006), physical activity behaviour has positive effect on health-related outcomes among patients with type 2 diabetes, regarding reduction in HbA1c levels, cholesterol-ratio, blood pressure, and resting heart rate and BMI. These outcomes can improve body sensitivity to insulin and help manage blood glucose levels and can prevent or delay type 2 diabetes and its complications (Colberg et al. 2016). Moreover, greater physical activity and fitness can reduce symptoms of depression and improve health-related quality of life among them (Colberg et al. 2010).

Although regular physical activity improves blood glucose levels and insulin action in patients with type 1 and type 2 diabetes, the risk of exercise-induced hypoglycemia can be incurred in people who self-administer insulin and who fail to adjust their carbohydrate intake before exercise (Younk et al. 2011). Moreover, transient hyperglycemia can follow intense physical activity due to plasma catecholamine levels rising markedly, driving a major increase in glucose production. In individuals with pre-diabetes (Impaired Fasting Glycemia-IFG), lower fasting blood glucose levels can follow for at least 24 hours after resistance exercise (Colberg et al. 2010). Colberg et al. (2010) suggested that a combination of physical activity and resistance exercise training may be more effective in improving blood glucose control than either alone in those with type 2 diabetes.

In summary, regular physical activity is clearly effective in the prevention of diabetes and is effective in the management of blood sugar levels in both type 1 and type 2 diabetes. Choosing to undertake types of physical activity which are appropriate for individuals is an effective component in diabetes management.

### 3.6.3.1.4 Physical activity for cardiovascular health

Cardiovascular disease (CVD) is a term used to describe all the diseases of heart and blood vessels, including coronary heart disease, heart attack, congestive heart disease and stroke. Other types of cardiovascular disease include heart valve disease and cardiomyopathy (British Heart Foundation 2017).

Cardiovascular disease (CVD) is usually associated with a build-up of fatty material (called atheroma) inside the arteries- known as atherosclerosis (British Heart Foundation 2017). The arteries may become so narrow that they cannot deliver enough oxygen-rich blood to heart. This can cause angina which is a chest pain. The atheroma may cause blood clots in coronary artery which can be associated with the supply of oxygen-rich blood to the heart muscle is suddenly blocked. This is known as a heart attack. If the blood clot blocks an artery that carries blood to the brain, it can cut off the blood supply to part of brain, which is called a stroke (British Heart Foundation 2017; NHS 2017).

The exact cause of cardiovascular disease (CVD) is not clear (NHS, 2017), but there are a number of factors that are associated with developing CVD. These are called "risk factors" for CVD, including, high blood cholesterol, high blood pressure, smoking, being physically inactive, being overweight or obese, excessive alcohol consumption, diabetes and depression. A family history of heart disease, older age and being male also increases the risk of developing CVD. (British Heart Foundation 2017; NHS 2017).

Regular exercise has a positive effect on many of the established risk factors for cardiovascular disease (Lewis 2012). For example, exercise promotes weight reduction and can help reduce blood pressure. Exercise increases the high-density lipoprotein (HDL, or 'good' cholesterol) while decreasing the low-density lipoprotein (LDL, or 'bad' cholesterol), as well as total cholesterol (Myers 2003). This keeps blood flowing smoothly by lowering the build-up of plaque in arteries (Centers for Disease Control and Prevention 2015). In diabetic patients, physical activity improves blood glucose control, and also improves cardiorespiratory fitness (Myers 2003; Colberg et al. 2016). Several systematic reviews have confirmed the benefits of engaging in regular exercise to attenuate or reverse the disease process in patients with cardiovascular disease (Blumenthal et al. 1988; Hambrecht et al. 1993; Franklin et al. 2003; Taylor et al. 2004). Although, there is a transient increase in the risk of having a cardiac-related complication such as a heart attack or serious heart rhythm disorder during exercise. However, this risk is extremely small in patients with existing heart disease – exercise is therefore

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considered to be safe in patients with cardiovascular disease (Myers 2003). Regarding Lanier et al. (2016), increases in physical activity by any level are associated with reduced cardiovascular risk. For instance, a study in 39,372 women aged 45 years or older found that the women who walked 1 to 1.5 hour/week (less than what current guidelines suggest of 150 min/week) experienced a 51 per cent reduction in risk of developing coronary heart disease (CHD) compared with those who did not regularly walk (Lee et al. 2001).

In conclusion, regular physical activity or exercise reduces the risk of cardiovascular disease (CVD) and can reduce the likelihood of dying from heart disease. Therefore, being physically active even light-to-moderate activity is better than none.

### 3.6.3.2 Comparative Concept Maturity Matrices

Three areas of critical enquiry are used to assess the comparative maturity of physical activity for health, including: physical activity for musculoskeletal health, physical activity for diabetes management, and physical activity for cardiovascular health.

1. **Preconditions** of physical activity for health
2. **Characteristics** of physical activity for health
3. **Outcomes and consequences** of physical activity for health

**Table 3-1 Preconditions of physical activity for health**

| Musculoskeletal health   | Diabetes management  | Cardiovascular health  |
|--|--|--|
| <p><b>Immutable Factors</b></p> <p>–Patients with hip osteoarthritis, higher body mass index (BMI) and increased comorbidities were negatively associated with physical activity (Stubbs et al. 2015).</p> <p>–Activity levels tend to decline as people get older, and this group of the population are most at risk of osteoarthritis (Jinks et al. 2010).</p> <p>–Physically active older people are around a third less likely to have impaired walking or</p> | <p><b>Immutable Factors</b></p> <p>–The highest rates of regular physical activity in U.S. adults with diabetes and at risk for developing diabetes were among the youngest (Morrato et al 2007).</p> <p>–Individuals with type 1 diabetes mellitus, higher PA levels were associated with a younger age, being single, and not smoking, while for type 2 diabetes mellitus, a younger age, male gender, and lower body mass index</p> | <p><b>Immutable Factors</b></p> <p>–Gender plays an indirect role in attendance exercise behaviour (Cooper et al. 2002; Sadja et al. 2012).</p> <p>–Women and increased age was a factor associated with nonattendance for cardiac rehabilitation because they are not referred or have poor understanding of the cardiac rehabilitation programme content (Hutchinson et al. 2015).</p> |

| Musculoskeletal health  | Diabetes management  | Cardiovascular health   |
|---|--|---|
| <p>their daily living activities restricted (Ageberg 2012).</p> | <p>were associated with higher physical activity levels (Plotnikoff et al. 2006).</p> <ul style="list-style-type: none"> <li>-Poor health ranked first as a barrier to physical activity in older adults in Germany (Moschny et al. 2011).</li> <li>-Pain and tiredness were the barriers to physical activity in patients with diabetes (Thomas et al. 2004; Mier et al. 2007).</li> <li>-Physical discomfort includes being overweight, being uncomfortable, and sweating was associated with exercise uncomfortable among individuals with type 2 diabetes mellitus (Shultz et al. 2001; Mier et al. 2007).</li> <li>-Coexisting diseases was the barrier to adherence to exercise among patients with type 2 diabetes (Serour et al. 2007; Egan et al. 2013).</li> </ul> | <p>-Being a smoker and having diabetes were predictive of cardiac rehabilitation programme drop-out by male patients with CAD (Worcester et al. 2004).</p> <p>-Being physically inactive at admission was predictive of programme drop-out by female patients with CAD (Worcester et al. 2004).</p> <p>-Significant independent predictors of exercise in patients with metabolic syndrome after an acute coronary syndrome were routine exercise at the time of admission for acute coronary syndrome, younger age, and lower BMI. While, the Caucasian race and gender were not independently associated with their exercise (Abuissa et al. 2005).</p> <p>-Patients with a higher body mass index had a lower level of exercise self-efficacy (Chair et al. 2015).</p> <p>-Home exercisers were more likely to be male and have higher physical functioning. Age and</p> |

| Musculoskeletal health | Diabetes management | Cardiovascular health  |
|------------------------|---------------------|--|
|                        |                     | <p>marital status were independently associated with patient participation in a Phase II CR programme (Dunn et al. 2017).</p> <ul style="list-style-type: none"> <li>-Non-attendees in CR were older (Cooper et al. 2002) and more likely to have atypical symptoms at admission such as inverted T-wave in the electrocardiogram, whereas CR-attendance was associated with chest pain (Nielsen et al. 2008).</li> <li>-Predictors of cardiac rehabilitation participation in older coronary patients included commute time, patient "denial" of severity of illness, and history of depression (Ades et al. 1992; Cooper et al. 2002).</li> <li>-Higher physical fatigue predicts adherence to a 12-week exercise intervention in women with elevated blood pressure (Sadja et al. 2012).</li> </ul> |

| Musculoskeletal health  | Diabetes management  | Cardiovascular health   |
|---|--|---|
| <p><b>Personal Traits</b></p> <p><u>Perceived benefits and barriers to exercise, and perceived self-efficacy</u></p> <p>–Recognising the benefits of physical activity, and that it will not worsen their musculoskeletal condition, but in fact will improve symptom, might be a factor which can affect people's decision about taking part (Hamer et al. 2014).</p> <p>–Many people with osteoarthritis and other musculoskeletal conditions believe that “nothing can be done” to improve their symptoms; and that rest, not activity, is the best way to look after their joints (Jinks et al. 2010).</p> <p>–Cognitive behavioural therapy (CBT) to physiotherapy programmes may be effective for people with whiplash-associated disorder, but not effective in improving exercise</p> | <p><b>Personal Traits</b></p> <p><u>Perceived benefits and barriers to exercise, and perceived self-efficacy</u></p> <p>–Their perceptions and understandings of their diabetes, and an awareness of the need to undertake physical activity were the factors influencing their decision about taking PA (Lawton et al. 2006).</p> <p>–An individual's own decision-making could be a factor influencing regular exercise among adults either at high risk of type 2 diabetes or already diagnosed (Korkiakangas et al. 2009).</p> <p>–Physical activity self-efficacy has been shown to predict PA behaviour in individuals with diabetes (Allen et al. 2008).</p> <p>–Higher PA levels were associated with lower level of perceived disability in patients with type 1 and type 2 diabetes mellitus (Plotnikoff et al. 2006).</p> | <p><b>Personal Traits</b></p> <p><u>Perceived benefits and barriers to exercise, and perceived self-efficacy</u></p> <p>–Perceived self-efficacy, perceived benefits of exercise, and perceived barriers to exercise were significant predictors of exercise adherence among older adults with a cardiac diagnosis (Hellman 1997).</p> <p>–Women with higher self-efficacy (Banman and Sawatzky 2017) and outcome expectations are more likely to be physical active (Blanchard et al. 2015).</p> <p>–Health concerns play an indirect role in attendance behaviour (Cooper et al. 2002).</p> |

| Musculoskeletal health  | Diabetes management  | Cardiovascular health   |
|---|--|---|
| <p>adherence for other chronic musculoskeletal conditions (Jordan et al. 2006).</p> <p><b>Motivation</b></p> <p>-A pedometer acts as positive reinforcement for walking in older adults with osteoarthritis of the knee (Talbot et al. 2003).</p> | <p><b>Motivation</b></p> <p>-Daily activity recording can be used as part of a programme to increase physical activity self-efficacy levels in people with type 2 diabetes (Gleeson-Kreig 2006).</p> <p>-Motivators to physical activity among Mexican Americans with type 2 diabetes included family support and the sense of well-being derived from physical activity (Mier et al. 2007).</p> <p>-Being distracted by something good on television was a barrier to physical activity in patients with diabetes (Thomas et al. 2004; Mier et al. 2007).</p> | <p><b>Motivation</b></p> <p>-Supporting South Asian Taxi Drivers to Exercise through Pedometers (SSTEP) acts as positive reinforcement for increasing daily step counts and reducing risk for cardiovascular disease among South Asian taxi drivers (Gany et al. 2014).</p> |

| Musculoskeletal health  | Diabetes management  | Cardiovascular health   |
|---|--|---|
| <p><u>Mental health</u></p> <p>-Lower mental health was negatively associated with physical activity in patients with hip osteoarthritis (Stubbs et al. 2015).</p>  | <p><u>Mental health</u></p> <p>-Negative emotions such as depression were the barriers to physical activity in patients with diabetes (Thomas et al. 2004; Mier et al. 2007).</p> <p><u>Lack of time for exercise</u></p> <p>-Lack of time was the main barrier to adherence to exercise among patients with type 2 diabetes (Thomas et al. 2004).</p> | <p><u>Mental health</u></p> <p>-Patients who underwent CABG surgery, and did not have a history of depression were more likely to participate in a Phase II exercise (Dunn et al. 2017).</p> <p>-Depression is negatively correlated with women's self-efficacy beliefs related to exercise behaviour (Banman and Sawatzky 2017).</p> |
| <p><b>Physical Environment</b></p> <p><u>Outdoor temperature</u></p> <p>-Outdoor temperature was identified as possible factor that influence physical activity</p> | <p><b>Physical Environment</b></p> <p><u>Outdoor temperature</u></p> <p>-Adverse weather conditions were the barrier to adherence to exercise among patients with</p>  | <p><b>Physical Environment</b></p>  |

| Musculoskeletal health   | Diabetes management  | Cardiovascular health   |
|--|--|---|
| <p>in adults with knee and hip osteoarthritis (Stubbs et al. 2015).</p> <p><b><u>Exercise facilities</u></b></p> <p>-Supplementing a home exercise programme with group exercise may increase overall physical activity levels among adults with chronic musculoskeletal pain (Jordan et al. 2006).</p> <p>-Refresher sessions or providing audiotapes or videotapes of exercises can improve the accuracy of exercise performance among adults with chronic musculoskeletal pain (Jordan et al. 2006)</p> | <p>type 2 diabetes (Mier et al. 2007; Serour et al. 2007).</p> <p>-Poor climatic conditions such as cold, wet and windy were described as a major barrier to physical activity amongst people of Pakistani and Indian origin with Type 2 diabetes (Lawton et al. 2006)</p> <p><b><u>Exercise facilities</u></b></p> <p>-The lack of local exercise facilities was a barrier to physical activity among patients with type 2 diabetes (Thomas et al. 2004).</p> <p>-The main environmental barrier to perform physical activity in patients with type 2 diabetes was the absence of a convenient venue (Van Rooijen et al. 2002).</p> <p>-Lack of transportation, traffic, lack of sidewalks, poor street lighting were environmental barriers to physical activity</p> | <p><b><u>Exercise facilities</u></b></p> <p>-Internet- and mobile-based interventions for physical activity have shown promising results in helping users increase or maintain their level of physical activity in general and specifically in secondary prevention of cardiovascular diseases and cardiac rehabilitation (Antypas and Wangberg 2014).</p> <p>-Exercise DVD improves exercise expectations in cardiovascular outpatients (Vickers et al. 2011).</p> <p>-Home-based programs reduce barriers such as still being able to work and attend the</p> |

| <b>Musculoskeletal health</b>  | <b>Diabetes management</b>   | <b>Cardiovascular health</b>  |
|--|--|---|
| <p>-Self-management programmes on enhancing exercise adherence had improvements in exercise adherence among adults with chronic musculoskeletal pain (Jordan et al. 2006).</p> | <p>among patients with type 2 diabetes (Van Rooijen et al. 2002; Mier et al. 2007).</p>  | <p>cardiac rehabilitation programme (Hutchinson et al. 2015).</p>   |
| <p><b>Economic Factors</b></p> <p>-Unemployment was negatively associated with physical activity in adults with hip osteoarthritis (Stubbs et al. 2015).</p>                   | <p><b>Economic Factors</b></p> <p>-Cost of exercise was reported to influence physical activity among patients with type 2 diabetes (Van Rooijen et al. 2002; Dutton et al. 2005).</p> <p>-The highest rates of regular physical activity in U.S. adults with diabetes and at risk for developing diabetes were among the most educated, and most economically advantaged adults (Morrato et al 2007).</p> <p>-Higher PA levels were associated with higher education and higher income in patients with type 1 and type 2 diabetes mellitus (Plotnikoff et al. 2006).</p> | <p><b>Economic Factors</b></p> <p>-A low socioeconomic status or lower income was a factor associated with nonattendance for cardiac rehabilitation (Cooper et al. 2002; Nielsen et al. 2008).</p> <p>-Being unemployed at the time of hospital admission was predictive of programme drop-out by male patients with CAD (Worcester et al. 2004).</p> <p>-Job status plays an indirect role in attendance behaviour (Cooper et al. 2002).</p> |

| Musculoskeletal health   | Diabetes management  | Cardiovascular health  |
|--|--|--|
| <p><b>Clinical outcomes or Past experiences with activity</b></p> <p>-Pain reduction with exercise programmes can be improved with exercise adherence among adults with chronic musculoskeletal pain (Jordan et al. 2006).</p> <p>-Greater lower limb function and faster gait speed were positively associated with physical activity among adults with knee and hip osteoarthritis (Stubbs et al. 2015).</p> | <p><b>Clinical outcomes or Past experiences with activity</b></p> <p>-Physical activity can engender anxiety among people with Type 2 diabetes. For example, by-products of physical activity such as sweat, increased heart rate and breathlessness, may be perceived as illness states and thus viewed as something to be avoided (Lawton et al. 2006).</p>  | <p><b>Clinical outcomes or Past experiences with activity</b></p> <p>-Having exercised previously was associated with an increased chance of reporting receiving physician recommendation for home-based cardiac rehabilitation exercise (Dunn et al. 2017).</p> |
| <p><b>Sociocultural environment</b></p> <p><u>Cultural attitudes regarding physical activity and exercise</u></p> <p>-Exercise type does not appear to be an important factor in order to improve exercise adherence for chronic musculoskeletal pain in adults (Jordan et al. 2006).</p>  | <p><b>Sociocultural Environment</b></p> <p><u>Cultural attitudes regarding physical activity and exercise</u></p> <p>-Interwoven with cultural norms or cultural taboos were barriers to physical activity amongst people of Pakistani and Indian origin with Type 2 diabetes (Lawton et al. 2006).</p> <p>-A powerful notion in which “family comes first” was a difficulty of incorporating activities among Pakistanis and Indians with</p> | <p><b>Sociocultural environment</b></p> <p><u>Cultural attitudes regarding physical activity and exercise</u></p> <p>-Cardiac rehabilitation needs to be more culturally related and offered in different venues (Hutchinson et al. 2015).</p>                   |

| Musculoskeletal health  | Diabetes management   | Cardiovascular health   |
|---|---|---|
| <p><u>Support from peers, healthcare providers, family</u></p> <p>-Supervised exercise is more effective for improving weekly training frequency in adults with chronic musculoskeletal pain (Jordan et al. 2006).</p> <p>-Individual exercise is more effective than group exercise for improving attendance at exercise classes (Jordan et al. 2006).</p> <p>-Support from spouse was identified as a possible factor that influence physical activity in patients with knee and hip osteoarthritis (Stubbs et al. 2015).</p> | <p>Type 2 diabetes due to people will prioritize their obligations to kin, such as helping out in family businesses and/or with child care, over the pursuit of their own interests and activities (Lawton et al. 2006).</p> <p><u>Support from peers, healthcare providers, family</u></p> <p>-Lack of social support affect motivation to exercise in patients with type 2 diabetes. (Wanko et al. 2004; Mier et al. 2007).</p> <p>-Social support from technology-based strategies and health care providers play an important role in adoption and maintenance of regular PA in individuals with type 2 diabetes (Colberg et al. 2016).</p> <p>-PA counselling or individualized education delivered by health care providers is an essential part to motivate people with type 2</p> | <p><u>Support from peers, healthcare providers, family</u></p> <p>-Interpersonal support for exercise was a significant predictor of exercise adherence (Hellman 1997; Banman and Sawatzky 2017).</p> <p>-Women living alone or being widowed were suggested reduced social support which has been identified as an attendance barrier (Nielsen et al. 2008; Hutchinson et al. 2015).</p> <p>-Increased strength of physician recommendation was the unique predictor of home-based exercise among patients with coronary heart disease (Dunn et al. 2017).</p> |

| <b>Musculoskeletal health</b>  | <b>Diabetes management</b>   | <b>Cardiovascular health</b>   |
|--|--|--|
| <p>-Better social functioning and health-related quality of life were positively associated with physical activity in patients with hip osteoarthritis (Stubbs et al. 2015).</p> | <p>diabetes to exercise (Gleeson-Kreig 2006; Allen et al. 2008).</p> | <p>-Being physically inactive at admission was predictive of programme drop-out by women patients with CAD (Worcester et al. 2004).</p> <p>-Strength of physician referral was associated with patient participation in cardiac rehabilitation exercise (Ades et al. 1992; Hutchinson et al. 2015; Dunn et al. 2017).</p> <p>-Having a college education was associated with an increased chance of reporting receiving a physician referral (Dunn et al. 2017).</p> <p>-Having insurance was associated with participation in a Phase II exercise (Dunn et al. 2017).</p> <p>-Stronger social support was associated with a higher level of exercise self-efficacy (Chair et al. 2015).</p> |

**Table 3-2 Characteristics of physical activity for health**

| Musculoskeletal health  | Diabetes management  | Cardiovascular health   |
|---|--|---|
| <ul style="list-style-type: none"> <li>-Older adults with osteoarthritis of the knee used a pedometer to monitor their daily step count. They were instructed to increase their baseline step count by 10 per cent every four weeks (Talbot et al. 2003).</li> <li>-Older adults with osteoarthritis participating in the exercise programme had increased in exercise adherence, and increased in 6-min distance walk (Hughes et al. 2004).</li> <li>-Engaging in a group rehabilitation programme for chronic hip or knee pain: Enabling Self-management and Coping with Arthritic Pain using exercise (ESCAPE-pain) (Thomas et al. 2017).</li> <li>-Improving weekly training frequency in adults with chronic musculoskeletal pain</li> </ul> | <ul style="list-style-type: none"> <li>-Undertaking physical activity as part of their diabetes care (Lawton et al. 2006).</li> <li>-Taking part in an exercise programme such as doing household chores and walking as ways of exercising (Van Rooijen et al. 2002).</li> <li>-An increase in the level of PA among adults with T2DM receiving PA counselling (Plotnikoff et al. 2011).</li> <li>-Participants receiving PA counselling or individualized education using CGMS feedback had higher self-efficacy scores for sticking to activity or resisting relapse at 8 weeks, indicating more confidence in maintaining a PA programme (Allen et al. 2008).</li> <li>-Higher levels of physical activity in people with type 2 diabetes keeping daily activity records (Gleeson-Kreig 2006).</li> </ul> | <ul style="list-style-type: none"> <li>-Attending an outpatient cardiac rehabilitation programme (Nielsen et al. 2008; Hutchinson et al. 2015).</li> <li>-Participation in home- and hospital-based cardiac rehabilitation exercise (Dunn et al. 2017).</li> <li>-Not participate in routine exercise 1 year after their admission for ACS (Abuissa et al. 2005).</li> <li>-An exercise intervention by a nurse increased physical activity frequency (<math>\geq 3</math> times a week) in middle-aged men (Liira et al. 2014).</li> <li>-Increasing in daily step counts among South Asian taxi drivers who used a pedometer to monitor their daily step count (Gany et al. 2014).</li> </ul> |

| <b>Musculoskeletal health</b>   | <b>Diabetes management</b> | <b>Cardiovascular health</b> |
|---|----------------------------|------------------------------|
| having supervised exercise (Jordan et al. 2006).<br>-Improvements in exercise adherence, levels, performance accuracy, and attendance at exercise classes (Jordan et al. 2006). |                            |                              |

**Table 3-3 Outcomes and consequences of physical activity for health**

| Musculoskeletal health  | Diabetes management   | Cardiovascular health  |
|---|---|--|
| <p><b>Positive influences</b></p> <ul style="list-style-type: none"> <li>-Regular physical activity reduces the risk of fractures by improving bone mineral density and mobility, and decreases the risk of falling by improving muscle strength and balance (Taaffe et al. 2013; Centers for Disease Control and Prevention 2015).</li> <li>-Brisk walking (above 6.14 k/h and heart rate: 82.3 per cent of age-specific maximum) provides sufficient mechanical loading on the bones to maintain bone density and prevent osteoporosis in postmenopausal women (Borer et al. 2007).</li> <li>-Physical activity acts as the primary stimulus for production of synovial fluid; regular physical activity thus ensures healthy joints and contributes to an</li> </ul> | <p><b>Positive influences</b></p> <ul style="list-style-type: none"> <li>-Reduction in HbA1c levels, cholesterol-ratio, blood pressure, resting heart rate and BMI (Plotnikoff et al. 2006).</li> <li>-Blood glucose reductions in response to PA, HbA1c levels and BMI decreased (Allen et al. 2008).</li> <li>-PA improves blood glucose control in type 2 diabetes by reducing HbA1c, triglycerides, blood pressure, and insulin resistance, and also improves cardiorespiratory fitness, muscle strength and insulin sensitivity in type 1 diabetes (Colberg et al. 2016).</li> <li>-Greater PA and fitness can reduce symptoms of depression and improve health-related quality of life in patients with type 2 diabetes (Colberg et al. 2010).</li> </ul> | <p><b>Positive influences</b></p> <ul style="list-style-type: none"> <li>-At the end of the exercise rehabilitation (ER), participants' sedentary time decreased while time spent in light PA increased. There was an increase in steps/day (&gt;1.5 metabolic equivalents) and PA energy expenditure (PAEE) (&gt;1.5 metabolic equivalents) (Ramadi et al. 2015).</li> <li>-Physical activity was significantly associated with lower measures of body mass indices (except height), lower levels of total cholesterol (TC), low density lipoprotein (LDL-C), triglycerides (TG), systolic and diastolic blood pressure (S/DBP), risk factor (TC/HDL ratio), atherogenic index (LDL/HDL ratio), and higher levels of high density lipoprotein (HDL-C) (Naghii et al. 2011a).</li> </ul> |

| Musculoskeletal health   | Diabetes management   | Cardiovascular health   |
|--|---|---|
| <p>improved joint range of motion (Hiwale 2012).</p> <p>–Greater muscle strength and endurance fitness, especially in women, protects against cartilage loss, but also results in a maladaptive enlargement of subchondral bone in both sexes (Foley 2009).</p> <p>–Increased skeletal loading in childhood leads to an increase in peak bone mass independent of current loading (Foley 2009).</p> <p>–Patients with low back pain showed more improvement in disability and pain when they took an active role in physical therapy, both during their visits and at home. In addition, they also had fewer visits, a shorter episode of care, and lower charges (Fritz et al. 2007).</p> <p>–There was a statistically significant reduction in pain among adults with</p> | <p>-All-cause and CV mortality risk was 1.7–6.6 times higher in low-fit compared with high-fit men with type 2 diabetes (Colberg et al. 2010).</p> <p>–Walking at least 2 hours per week was associated with a reduction in the incidence of premature death of 39 per cent–54 per cent from any cause and of 34 per cent–53 per cent from cardiovascular disease among patients with diabetes. Moreover, walking that led to moderate increases in heart and breathing rates was associated with significant reductions in all-cause mortality and cardiovascular-related mortality (Gregg et al. 2003).</p> <p>–Physically inactive men with type 2 diabetes had a 1.7-fold increased risk of premature death compared with physically active men with type 2 diabetes (Wei et al. 2000).</p> | <p>–Increase in exercise tolerance, good (HDL) cholesterol and insulin sensitivity, while reduction in body weight, blood pressure and bad (LDL and total) (Myers 2003).</p> <p>–Reduction in blood pressure and blood glucose (Myers 2003; Young et al. 2014).</p> <p>–Reduction in bad (LDL and total) cholesterol and Increase in good (HDL) cholesterol (Myers 2003; Garelnabi et al. 2010).</p> <p>–An improvement in cardiovascular parameters, such as endothelial function and low-grade inflammation (Hamer et al. 2012; Gondim et al. 2015; Murlasits 2015).</p> <p>–Regular exercise or physical activity has been shown to suppress pro-inflammatory cytokine production, enhance anti-inflammatory mediators</p> |

| Musculoskeletal health   | Diabetes management  | Cardiovascular health  |
|--|--|--|
| <p>chronic musculoskeletal pain when they took self-management programmes on enhancing exercise adherence (Jordan et al 2010).</p> <p>-There was a statistically significant change in disability and pain improvement among patients with chronic low back pain who received the motivation and exercise programme (Friedrich 1998).</p> <p>-Hughes et al. (2004) showed that older adults with osteoarthritis who participated in the exercise program experienced a significant decrease in lower extremity stiffness and pain at 6 months.</p> <p>-Older women who were physically active (walking, bicycling, using stairs, and gardening) were about a third less likely to need a hip replacement over an 11-year period (Ageberg et al. 2012).</p> | <p>-A strong association between changes in physical fitness and reduced rates of death from diabetes (Boulé et al. 2001).</p> | <p>and antioxidant development, and promote fibrinolytic activity. Low-load resistance exercise plays an advantageous role in thrombogenesis by reducing inflammatory processes and potentiating fibrinolytic features (Chen et al. 2014b).</p> <p>-Type, intensity, and duration of exercise is most beneficial to cardiovascular fitness and metabolic optimization (Jakovljevic and Djordjevic 2017).</p> <p>-Physical activity is a protective factor against the effects of psychosocial stress, and might also modify biologic stress responses such as cortisol, inflammatory markers which might have relevance to CVD pathology (Hamer 2012).</p> <p>-Physical activity acts as a protective factor by reducing the risk factors for developing CVD events, such as homocysteine and interleukin -6 and</p> |

| Musculoskeletal health  | Diabetes management | Cardiovascular health   |
|---|---------------------|---|
| <ul style="list-style-type: none"> <li>-Yuan et al. (2009) workplace exercise was associated with a lower risk of musculoskeletal disorders among nurses.</li> <li>-Freitag et al. (2014) found that nursing professionals reported reduced perceptions of bodily pain and feelings of fatigue at work after having participated in a workplace physical activity programme.</li> <li>-Szeto et al. (2013) concluded that the multifaceted ergonomic intervention programme, including a daily exercise programme, had positive short- and long-term outcomes on musculoskeletal symptoms among community nurses.</li> <li>-A home-exercise programme has been reported to improve cervical and lumbar range of motion and reduce pain intensity in the neck and lower back among nurses (Freimann et al. 2015).</li> </ul> |                     | <p>increasing free testosterone and preventing its progression significantly (Naghii et al. 2011b).</p> <ul style="list-style-type: none"> <li>-An energy expenditure of about 1600 kcal (6720 kJ) per week has been found to be effective in halting the progression of coronary artery disease, and an energy expenditure of about 2200 kcal (9240 kJ) per week has been shown to be associated with regression of coronary lesions in patients with heart disease (Hambrecht et al. 1993).</li> <li>-An earlier return to work and improvements in quality of life, such as more self-confidence, lower stress, and less anxiety (Myers 2003).</li> <li>-Exercise-based cardiac rehabilitation significantly reduced the incidence of premature death from cardiovascular disease (Taylor et al. 2004).</li> </ul> |

| Musculoskeletal health   | Diabetes management | Cardiovascular health   |
|--|---------------------|---|
| <p>-Yoga exercises and Tai Chi were found to improve physical and mental health in nurses, reducing work related stress, and may relieve some of the negative consequences of work stressors, including musculoskeletal disorders (Mehrabi et al. 2012).</p> <p>-Research evidence shows that Enabling Self-management and Coping with Arthritic Pain using exercise (ESCAPE-pain): reduces pain, improves physical function, improves mental wellbeing, reduces healthcare and utilisation costs (estimated annual saving of £1,417 per person), creates benefits that can be sustained for up to 30 months after the end of the programme (Thomas et al. 2017).</p> <p>-Walking &gt;6,000 steps/day appears to be the level of walking activity to protect against developing functional limitation in</p> |                     | <p>-There was a graded inverse relation between physical activity and the risk of cardiovascular-related death, with the most active women having a relative risk of 0.67 (95 per cent CI 0.52 to 0.85) compared with the least active group (Oguma and Shinoda-Tagawa 2004).</p> <p>-Low-intensity exercise training has been associated with an improvement in health status among patients with cardiovascular disease (Blumenthal et al. 1988).</p> |

| <b>Musculoskeletal health</b>   | <b>Diabetes management</b> | <b>Cardiovascular health</b> |
|---|----------------------------|------------------------------|
| <p>people with or at risk of knee OA (White et al. 2014).</p> <p>–Routine physical activity can improve musculoskeletal fitness (i.e., muscular strength, muscular endurance, muscular power or flexibility) which is positively associated with functional independence, mobility, glucose homeostasis, bone health, psychological well-being and overall quality of life and is negatively associated with the risk of falls, illness and premature death (Warburton et al. 2001a, b).</p> <p>–People with high levels of muscular strength have fewer functional limitations (Rantanen et al. 1998; Brill et al. 2000) and lower incidences of chronic diseases such as diabetes, stroke, arthritis, coronary artery disease and pulmonary (Rantanen et al. 1998).</p> |                            |                              |

| Musculoskeletal health   | Diabetes management   | Cardiovascular health   |
|--|---|---|
| <p><b>Negative influences</b></p> <p>-Increasing physical activity levels are associated with increased risk of musculoskeletal injuries (Morrow Jr et al. 2012) and osteoarthritis (Curtis et al. 2017).</p> <p>-Overtraining can cause chronic fatigue syndrome and diminish performance (Budgett 1990).</p> | <p><b>Negative influences</b></p> <p>-The risk of exercise-induced hypoglycemia can be incurred in people who use insulin and who fail to adjust their carbohydrate intake before exercise (Younk et al. 2011).</p> <p>-Transient hyperglycemia can follow intense physical activity due to plasma catecholamine levels rising markedly, therefore, driving a major increase in glucose production (Colberg et al. 2010).</p> <p>-Lower fasting blood glucose levels can follow for at least 24 hours after resistance exercise in people with pre-diabetes (Colberg et al. 2010). However, this consequence could be either a positive or negative effect – depending on what the fasting levels were.</p> | <p><b>Negative influences</b></p> <p>-There is the risk of having a cardiac-related complication, such as a heart attack and serious heart rhythm disorder, but it is extremely small (Myers 2003).</p> |

### **3.6.3.3 Maturity of the concept of physical activity for musculoskeletal health**

Examining the conceptual components (the preconditions, characteristics, outcomes and consequences) of physical activity for health, including: physical activity for musculoskeletal health, physical activity for diabetes management, and physical activity for cardiovascular health, elicits significant theme differences (see Table 3-1, Table 3-2, and Table 3-3). Differences are most marked between musculoskeletal health and the other two health conditions.

#### **3.6.3.3.1 Preconditions of physical activity for health**

Examining the preconditions of physical activity for health elicits that the context of family, geographic location, socioeconomic status, culture, and ethnicity are shown to be factors influencing physical activity participation among patients with musculoskeletal disorders, diabetes and cardiovascular disease. These factors can influence physical activity participation in both negative and positive ways, and are seemed to be similar in patients with the three health conditions. The main factors can be classified into 5 categories, including immutable factors and personal traits, physical environment, economic factors, clinical outcomes or past experiences with activity, and sociocultural environment. Regarding immutable factors and personal traits, a decision to be physically active is based in part of personal factors such as age, marital status, educational level, body weight, and existing health conditions (e.g. coexisting diseases, comorbidities, and lower mental health). However, the relationship between gender and physical activity participation in patients with musculoskeletal health was not shown across studies included in this concept analysis, but was evident in diabetes and cardiovascular disease patients. Hence, further research might examine sex differences related to physical activity participation among patients with musculoskeletal health, particularly because women tend to report lower physical activity than men. This effort may lead to improvements in the tailoring of interventions for a specific group of musculoskeletal health.

#### **3.6.3.3.2 Characteristics of physical activity for health**

The characteristics of physical activity participation which are identified across the three health conditions include: participating in the exercise programme, attending the rehabilitation programme, increasing levels and frequency of physical activity, and use of a pedometer to measure the level of physical activity. Regarding exercise or rehabilitation programmes, interventions are different among individuals depending on their health conditions. However, a notable

similarity between them is that those programmes not only involve planned and structured exercise, but also any activities which involve bodily movement in the context of daily, family, and community activities. For example, doing household chores and walking are ways of exercising in patients with diabetes (Van Rooijen et al. 2002). Therefore, practitioners or health care providers can suggest exercise approaches and programmes that are tailored to individual lifestyle, economics, fitness level and health conditions. In addition, feedback mechanisms, such as using pedometers or accelerometers to provide feedback in real time about an individual's level of physical activity, are also important across the three health conditions in terms of reinforcement for increasing in the level of physical activity.

### **3.6.3.3.3 Outcomes and consequences of physical activity for health**

There are a number of positive influences on musculoskeletal health, diabetes management, and cardiovascular health resulting from physical activity participation. The positive effects of physical activity participation identified across the three health conditions are presented as empirical referents (e.g. heart rate, oxygen consumption and laboratory conditions), physical, psychological, and social correlations. Functional capabilities have been reported as increased, and a reduced overall risk of musculoskeletal disorders, with improved blood glucose levels and insulin action in diabetes, and attenuated or reversed disease processes in cardiovascular disease. Moreover, engagement in physical activity can increase psychological well-being and overall quality of life and reduce the risk of illness and premature death in patients with the three health conditions.

However, regarding physical activity for diabetes management and cardiovascular health, the positive effects of physical activity have been highlighted as reducing the risk of premature death and all-cause mortality among patients. For physical activity for musculoskeletal health, the positive effects of physical activity have been mainly focussed on reducing illness and improving quality of life among patients, the outcomes and consequences of physical activity related to reduce risk of death appears comparatively small. Warburton et al. (2001a) and Warburton et al. (2001b) described the benefit of regular physical activity for musculoskeletal health as improving musculoskeletal fitness which is clearly associated with positive health status and overall quality of life. Limited in the data indicated that low level of musculoskeletal fitness is associated with an increased risk of premature mortality (Warburton et al. 2001b). Therefore, a primary goal of reducing the risk of premature death is linked most strongly to physical activity for diabetes management and cardiovascular health.

Thus, while the positive effects of physical activity participation are presented across the three health conditions, the marked difference between outcomes and consequences of physical activity for musculoskeletal health were evident.

### **3.6.3.4 Conceptual maturity of physical activity for musculoskeletal health**

Evaluation of the concept of physical activity for health elicits areas of consensus about the definition of the concept, and therefore a level of conceptual maturity (Morse et al 1996).

Based on the preconditions, characteristics, outcomes and consequences of physical activity for health derived from the literature, the concepts of physical activity for musculoskeletal health, diabetes management and cardiovascular health are mature concepts. Each area has been extensively researched and significant evidence underpins all three concepts each having well documented preconditions, characteristics, outcomes and consequences.

In considering the physical activity for diabetes management and for cardiovascular health, these two concepts are very potent, being strongly linked to reducing the risk of premature death. While, physical activity for musculoskeletal health is linked predominantly to enhanced musculoskeletal health and improving quality of life.

Engagement with intervention approaches which aim to enhance an individual's physical activity participation are likely to be influenced by motivating factors or a specific primary goal relating to the three health conditions. Thus, while for physical activity for diabetes management and cardiovascular health, motivation linked to reduced risk of premature death may be a driver, physical activity for musculoskeletal health is linked more strongly to improved musculoskeletal fitness, health status and overall quality of life. Thus, the potent driver represented in the former two cases is lacking in the latter case.

In summary, this concept analysis describes and discusses an overview of the concept of physical activity for musculoskeletal health and the relative maturity of the concept of physical activity for musculoskeletal health compared to physical activity for diabetes management and physical activity for cardiovascular health.

In considering the physical activity for musculoskeletal health, the concept is linked more strongly to improved musculoskeletal fitness, health status and overall quality of life. While, physical activity for diabetes management and for cardiovascular health, are two very potent concepts, being strongly linked to

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reducing the risk of premature death.

The concept analysis findings were used as a background to and to help explain the attitudes, reasons and behaviour regarding physical activity participation of the research participants, as well as to verify particular details that the participants have supplied in the interviews.

### 3.7 The factors influencing physical activity

The study aims to explore the factors which influence physical activity among Thai surgical nurses in order to generate a baseline understanding in a hitherto unresearched area. An interpretivist paradigm would be appropriate to this research aim and in answering the research question. By seeking to understand the meaning of human actions and experiences, and to elicit accounts of their meaning from the viewpoints of those involved (Fossey et al. 2002), the researcher seeks to explore factors related to physical activity participation among Thai surgical nurses. Hence, the interpretivist paradigm would be helpful in understanding motives, meanings, reasons and other subjective experiences which are related to their physical activity participation.

A qualitative approach was considered to be an appropriate design for this study. A quantitative approach, such as questionnaires, may miss or overlook some important information. Therefore, the qualitative approach featuring in-depth interview allows for a flexible and inductive approach, and is suitable for exploring perceptions and phenomena which are expressed by people who have direct experience of them (Manson 2002). In order to obtain an in-depth understanding of the factors influencing the decision of Thai surgical nurses to engage in physical activity (or not), it is crucial to consider the subjective and unique individual perspectives among the sample respondents: the research seeks to explore their thoughts, feelings, and attitudes toward their engagement with exercise and exercise-related lifestyle choices. Hence, this study design permits an in-depth exploration of Thai surgical nurses' views and insights into their lifestyle or their usual daily routines related to physical activity.

#### 3.7.1 Sampling strategy

Nonprobability sampling refers to a form of sampling strategy commonly used to obtain samples for qualitative studies. It differs from probability sampling in terms of generalizability, which is a key concern in most quantitative studies (Polit and Beck 2008). Qualitative research is more concerned with obtaining in-depth, rich, insightful information, where participants experience a particular issue or problem under study (Creswell 2013). Nonprobability sampling can be divided into two broad types, namely, convenience sampling and purposive sampling (Polit and Beck 2008). The advantages and limitations of two sampling strategies for use in a qualitative study are presented in Table 3-4.

**Table 3-4 Advantages and limitations of convenience sampling and purposive sampling**

| Sampling strategy  | Advantages   | Limitations  |
|--|--|--|
| <b>Convenience sampling</b><br>(Haphazard or Accidental sampling)<br><br>This strategy can be used in both qualitative and quantitative study, but it is frequently used in quantitative study (Etikan et al. 2016). | This strategy can reduce the amount of time necessary to search for appropriate cases (Sharma 2017).<br><br>The potential units or cases are likely to be committed to take part in the study, which can help in improving attendance and greater willingness to provide more insight into the phenomenon being studied (Sharma 2017). | There is likely to be a degree of self-selection bias. For example, the decision to participate in the study may reflect some inherent bias in the characteristics/traits of the participants (Sharma 2017).<br><br>This strategy can either lead to the sample not being representative of the population being studied or exaggerating some particular finding from the study (Sharma 2017). |
| <b>Purposive sampling</b><br>(Judgemental or Theoretical sampling)<br><br>This strategy is typically used in qualitative studies (Etikan et al. 2016).   | This strategy involves identification and selection of people with particular characteristics who will better be able to assist with the relevant research (Etikan et al. 2016).<br><br>Additionally, it allows for identifying phenomena that may require further investigation (Sharma 2017).  | This strategy requires establishing criteria for who will be included in the sample. Therefore, it can be highly prone to researcher bias in terms of a purposive sample has been created based on the judgement of the researcher (Etikan et al. 2016).   |

After considering the advantages and limitations of both sampling strategies, purposive sampling was the sampling strategy of choice for this qualitative study,

using key sampling criteria (Patton 2002). Thai surgical nurses working at the Maharaj Nakorn Chiang Mai Hospital were selected to be participants in this study. There are several reasons for purposively selecting this group. First, the researcher speaks the same local dialect as the participants with regard to the ‘Northern Thai language’ because her hometown is located in Chiang Mai; therefore, she would be able to understand the meaning of words and sentences and the cultural context of the participants. Second, the researcher is familiar with the research setting, as a former employee herself, i.e. as an insider; therefore, the researcher has an already established rapport and communication with individuals working there. This could assist the researcher to explore an in-depth understanding of the experiences of the respondents and the data generated as a result, as well as enrich the interpretation of data.

Criterion-based sampling requires the use of pre-specified criteria to select cases, with the sample having particular features or characteristics which facilitate detailed exploration and understanding of the questions and themes of the research (Ritchie et al. 2003). Inclusion criteria for this study include the key criterion – Thai surgical nurses (both male and female), working at the Maharaj Nakorn Chiang Mai Hospital, Thailand, who must have been working in the hospital’s surgical department for at least one year which aims to provide a wide range of the participants’ work experiences related to physical activity and MSDs, and willing to participate in the study. Exclusion criteria include those unable to provide information for any reason, such as having difficulty participating due to available time or language or communication barriers.

### **3.7.2 Interview methodology**

Interviews can be used to explore the views, experiences, and beliefs of individuals in specific situations which provide a “deeper” understanding of social phenomena (Gill et al. 2008). Interview methods were, therefore, chosen for this study because they are appropriate for obtaining detailed insights into participants’ thoughts, feelings, and attitudes toward exercise engagement.

There are different types of interviews, such as e-mail, face to face, focus group, online focus group, and telephone interviews (Creswell 2013), where every kind of interview will have greater utility in particular situations or events. In this study, face to face interview was considered preferable to other forms of interview. This is because they offer the potential for greater accuracy within this research – that is validity can be roughly checked during face to face interviews

through body language and reactions of the research participants (Rubin and Rubin 2012). Additionally, as the aim of this study is to seek and explore Thai surgical nurses' views, motives, reasons, attitudes, experiences, and beliefs related to exercise behaviour or lifestyle related exercise or physical activity. An individual point of view from the research participants is very important for this study. Therefore, face to face interviews provide the participants with an opportunity to express openly their views, experiences, beliefs, and feeling, while they may not want to talk about some issues in a group environment- especially regarding sensitive topics (Gill et al. 2008). Moreover, face to face interviews will enable the researcher to establish a good rapport and trust by communicating and interacting with the research participants. The researcher could concentrate on each individual during face to face interviews, where there are no time limits and no other people to create any pressure that can sometimes emerge in focus groups. Therefore, this is likely to lead to in-depth and rich descriptions (Rubin and Rubin 2012).

### **3.7.3 The type of interview schedule**

There are three main types of research interviews, including structured, semi-structured and unstructured, which are often used for different purposes (Gill et al. 2008). Hence, it is crucial to consider the type of the interview, which is the main information gathering tool of the research study.

For structured interviews, questions are asked in a set or standardized order, and the interviewer will not deviate from the interview schedule. Consequently, they are easy to replicate, as a fixed set of closed questions are used, and fairly quick to conduct which means that many interviews can take place within a short amount of time. However, the answers generated often lack depth and detail (Gill et al. 2008).

In contrast, unstructured interviews are performed without an interview schedule or if one is used, it will contain open-ended questions that can be asked in any order (Rubin and Rubin 2012). This allows the respondent to talk in some depth, choosing their own words and allows the participant to lead the interview. This helps the researcher develop a real sense of a person's understanding of a situation. It can be time-consuming to conduct an unstructured interview and is best used when no prior assumptions have been made about the direction of the interview (Gill et al. 2008).

Semi-structured interviews are performed with an interview guide that is developed by the interviewer. This is a list of questions and topics that help to define the areas to be explored (Flick 2011). Semi-structured interviews allow the interviewer or interviewee to stray from the interview guide in order to pursue an idea or response in more detail (Britten 1999). This interview method is more flexible than structured interviews and also allows for exploring an in-depth understanding of the phenomenon of interest that the researcher might not previously have possessed (Gill et al. 2008). Hence, semi-structured interviews were used to explore the issues of interest in this current study. The prepared interview schedules were carefully checked by the supervisory team, peer reviewers, and ethical committees. This can ensure that the interview schedules within probes and prompts can facilitate the researcher to achieve the rich and thick data.

### **3.7.4 The analytical approach**

The basic principles of data analysis in qualitative research consist of preparing and organising the data for analysis, then reducing the data into themes through a process of coding and condensing, and finally presenting the data in figures, tables, or text (Creswell 2013). There are several types of qualitative data analysis such as thematic analysis, narrative analysis, and grounded theory analysis.

Grounded theory analysis is used for developing or refining a theory, while narrative analysis is used to understand individual stories (Creswell 2013). Thematic analysis is a flexible method and the most commonly used method of data analysis in qualitative research (Guest et al. 2012). Braun and Clarke (2006) claimed that thematic analysis should be a foundational method for qualitative analysis, as it provides core skills for conducting many other forms of qualitative analysis. It is an effective way of getting 'close' to data and developing some deeper appreciation of the content (Boyatzis 1998) by pinpointing, examining and recording patterns (or "themes") within the data (Braun and Clarke 2006). Themes are patterns across data sets that are important to the description of a phenomenon and are associated with a specific research question (Daly et al. 1998). Most researchers consider thematic analysis to be a useful method in capturing the complexities of meaning within a textual data set (Guest et al. 2012).

This study aims to explore and understand the factors which influence physical activity participation among Thai surgical nurses. Thematic analysis is suitable for

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this study in terms of helping the researcher categorize participants' views, perceptions, feelings and experiences into themes. Themes and codes from the data analysis will allow the supervisory team or peer reviewers to check the accuracy of data and confirm how rigorous the process of data analysis is. A rigorous thematic analysis will produce trustworthy and insightful findings (Braun and Clarke 2006). In this study, exemplars of themes, codes, and quotes are provided (see Table 3-5), so that the data analysis process is transparent to readers of the thesis.

### **3.7.5 Methods**

To elicit factors influencing the nature and form of physical activity amongst Thai surgical nurses, a qualitative methodology featuring an interview approach was used. Thai surgical nurses working at the Maharaj Nakorn Chiang Mai Hospital were selected to be the research participants.

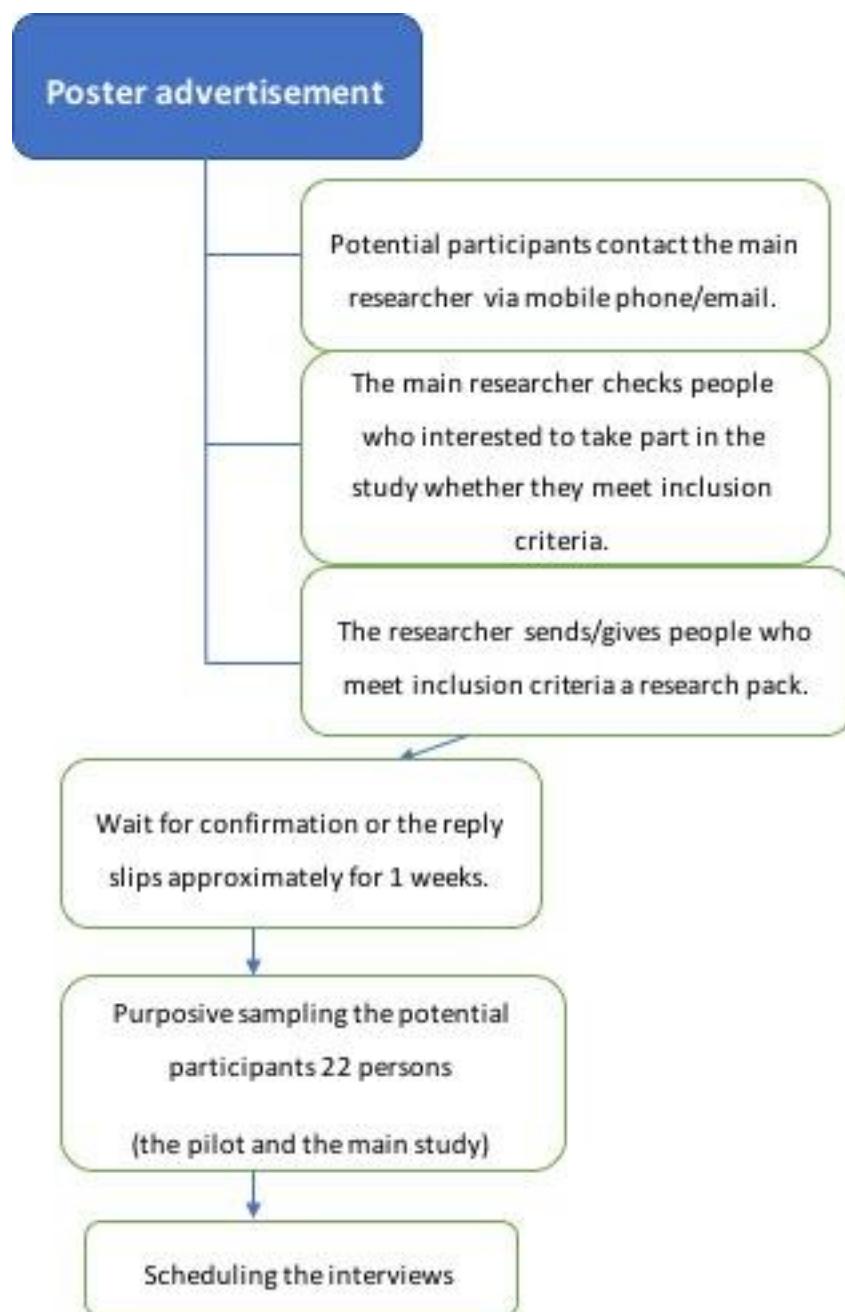
#### **3.7.5.1 Recruitment strategy**

The participants in the pilot study and the main study were primarily recruited through 16 wards of the surgical departments at the Maharaj Nakorn Chiang Mai Hospital, Thailand. Participant recruitment was planned to involve two strategies. First, recruiting participants from the hospital database via the gatekeepers; the senior hospital managers were contacted and requested to provide the number of surgical nurses working in each ward. Second, showing posters advertising this study on the walls of each ward.

The researcher met with the potential participants (both in the pilot study and the main study) at each ward and invited them to take part by showing a poster of this study and explained the objectives of the study and data collection procedures as well as to issue participant information packs. Access arrangements were agreed in advance with the senior hospital managers (via written letter) before any potential participants were approached. This process was followed on permission to undertake the study from the University of Southampton Ethics Committee and Research Ethics Committee, Faculty of Medicine, Chiang Mai University. Participants meeting the inclusion criteria were invited to act as research participants.

The potential participants were given a participant information sheet and an invitation letter. They could contact the researcher via email or telephone as stated in the invitation letter to ask any questions before making a decision. Once

those potential participants willing to participate had read the information packs and returned the reply slips, they were asked to sign a consent form as evidence that they agree to take part and that they understand what would be involved. Interviews were then scheduled at a time and place convenient to both parties. The participants were free to refuse or withdraw from the study at any time without detriment. A flow chart of the sampling strategy is presented in the following section.



**Figure 3-2 A flow chart of the sampling strategy**

### **3.7.5.2 Scheduling the interviews**

Once the potential participants willing to participate had read the information packs, returned the reply slips and signed the consent forms, interviews were scheduled at a convenient time and place within the hospital. The participants were approached individually to arrange appointments for the interviews. The interview times were scheduled during 10.00 a.m. to 06.00 p.m. The venues of these interviews were normally a meeting room, a common room, or the areas that are free from distractions.

### **3.7.5.3 Sample size**

Within the literature there is no consensus or formula for establishing the optimum number of participants in qualitative enquiries (Mason 2010). However, sample size in qualitative studies is often guided by the concept of saturation (Creswell 2013). Mason (2010) found that a large proportion of qualitative studies adhering to specific guidelines for sampling in qualitative research recommend more than 15 participants (BERTAUX's guidelines) and less than 50 (RITCHIE et al.'s guidelines).

In this study, therefore, 22 Thai surgical nurses (2 surgical nurses in the pilot study and 20 surgical nurses in the main study) were recruited to participate in the interviews. Interviews were examined for data saturation to determine the data redundancy.

## **3.7.6 Data collection**

### **3.7.6.1 Research tools**

The semi-structured interview used in this study was informed and guided by the literature review, research questions and research aims, but was sufficiently unstructured to allow for the discovery of unanticipated ideas and themes. Prompts were prepared in advance, where possible, and used to assist progress in the interview as well as to clarify further any key issues.

The interviews were lasted between 1 and 2 hours. All interviews were recorded using a voice recorder, with the permission of the participants and transcribed verbatim. The interviews were conducted in the Thai language and transcribed by the researcher.

### 3.7.6.2 Pilot study

In this research, a pilot study was conducted with 2 Thai surgical nurses, in order to improve the clarity and validity of the interview questions and schedule. This also helps to improve the interview technique of the researcher in the second or subsequent interviews (Gill et al. 2008). The pilot study used the same participant recruitment strategy, data collection procedures and instruments as the main study. Findings from the pilot study are presented in the following section:

#### 3.7.6.2.1 Findings from the pilot study

Almost all interview questions worked well. However, there was one question that interviewees felt was unclear. Therefore, some alternative words were used: for instance, using “*any factors*” interchangeably with “*anything*” or “*any problems*” or “*any difficulties*”.

Two interview transcripts were translated into English and back-translated into Thai, in order to ensure that the translations retained the meanings of the data. However, some meaning could not be accurately or directly translated into English, due to subtle cultural aspects that are specific to the Thai context.

From the pilot study, the data demonstrated that there are many factors which influence the decision of surgical nurses to engage in physical activity and exercise, or not to engage in physical activity and exercise. Most of the relevant factors have been listed in the literature review. However, there were some new factors found in this pilot study data, such as the participants’ basic health, ability to do a more varied activity, and availability of equipment, clothes and shoes for exercise. However, the data extracts from the pilot study were quite short, identifying that the researcher needed to explore the participant’s lifestyle in more detail in the subsequent interviews.

This pilot study provided the researcher with an opportunity to improve skills in conducting semi-structured interviews, including dealing with participants, selecting an appropriate venue for interview, conducting an in-depth interview, and seizing opportunities for probing emerging topics in the interview process. This helped to improve the researcher’s interview technique in preparation for the main research interviews.

### 3.7.6.3 Interview transcription

The researcher, in order to recall and recapture the interview situation and to reflect on anything that the researcher may have missed out, transcribed all the

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interviews. All interviews were transcribed verbatim; including pauses, gestures and laughter as such paralanguage can convey or change the meaning. Transcripts were rendered anonymous in order to protect the identity of participants and thus enhance confidentiality.

### 3.7.6.4 Interview translation

All 20 interviews were analysed in the Thai language. This analysis allowed the researcher to retain an in-depth understanding of both linguistic and cultural contexts. However, five Thai interview transcripts were chosen randomly, all of which were translated and analysed in the English language in order to consider equivalence of terminology and conceptual meaning when comparing with the original versions. Moreover, the supervisory team could check the accuracy of data from the translated transcripts (see the step of reviewing themes). The translation process of the interviews is described in the following section:

### 3.7.6.5 Translation process of the interviews

**Stage 1 Forward translation:** Translation of five Thai interview transcripts into English were undertaken by five Thai health professionals who are bilingual and hold doctoral degrees in health (in a ratio of 1:1).

**Stage 2 Backward translation:** Another one of five Thai health professionals translated the English version back to Thai (in a ratio of 1:1).

**Stage 3 Comparison:** Comparison of the original version of Thai interview transcripts with the backward translated copies were undertaken by the researcher.

**Stage 4 Proofreading:** All translated transcripts were proofread by a native English speaker, with a PhD, in order to ensure the accuracy of the language.

**Stage 5 Analysing:** Analysis of the data translated into English was presented in English.

For the process of translating transcripts, the researcher made sure that everything was anonymised before sending scripts to translators (removing names and identifiable places).

### 3.7.7 Health and safety

The researcher followed the research health and safety policies of the University of Southampton. The researcher was concerned about risks that might occur during data collection. However, there were no identifiable risks from lone

interviewing. This is because the researcher met the research participants at a suitable area where there were other people on hand such as the meeting room or common room of surgical departments, the Maharaj Nakorn Chiang Mai Hospital, Thailand. The interview times were scheduled during the day: between 10.00 a.m. and 06.00 p.m.

Also, participants are not considered at high risk of embarrassment or stress from the interviews, although it is acknowledged that those who may be relatively inactive may feel this is a negative point. The researcher would allow the participants to skip some questions if they feel stressed or uncomfortable to answer them or stop the interview session entirely if they feel uncomfortable. Some participants would be allowed to rest for 10 minutes if they request or need a break.

### **3.7.8 Data analysis**

Transcribed documents from interviews (in Thai and English language) were analysed using the Nvivo software package, in which data management includes sorting, linking and displaying codes and themes (Gibbs 2002). The six steps of inductive thematic analysis, set out by Braun and Clarke (2006), are presented in the following sections:

#### **Step 1) Familiarising with the data**

The researcher transcribed all the interviews; everything that was said and done during the interview was transcribed. Therefore, the researcher had a chance to familiarise herself thoroughly with the data and transcripts, and could start making sense of the data. Although this process is time consuming, it is worth doing for other steps of data analysis and reflection, because additional interesting points could be noted during the re-listening and transcribing of the interviews.

#### **Step 2) Generating initial codes**

Key information was coded using the NVivo software package. Interview data was processed by initial line-by-line examination of the transcripts in order to define the actions, events and subject's meanings within them (Charmaz 1990). The conceptual names or labels were suggested by wording that participants used in the interviews; they are often called "in vivo codes" (Glaser & Strauss 1998). At this point, using NVivo was helpful in assisting the researcher in coding, re-code

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and sort the interview data. Moreover, it was convenient to re-check, adjust and/or update the code definitions while collating codes into the themes. This was time-saving if compared with using manual coding alone. The example of open coding using the NVivo software package is shown in Figure 3-3.

| Name                          | Files | Referenc... | Created On         | Created... | Modified On        | Modified |
|-------------------------------|-------|-------------|--------------------|------------|--------------------|----------|
| Attitudes regarding PA        | 9     | 20          | 12 Oct 2017, 16:55 | MS         | 25 Oct 2017, 14:43 | MS       |
| Cost of exercise              | 7     | 9           | 12 Oct 2017, 16:53 | MS         | 24 Oct 2017, 22:30 | MS       |
| Doing something else          | 8     | 23          | 16 Oct 2017, 16:55 | MS         | 25 Oct 2017, 14:39 | MS       |
| Employment status             | 0     | 0           | 12 Oct 2017, 16:54 | MS         | 12 Oct 2017, 16:54 | MS       |
| Exercise equipments           | 5     | 6           | 19 Oct 2017, 18:20 | MS         | 25 Oct 2017, 14:36 | MS       |
| Exercise facilities           | 7     | 18          | 12 Oct 2017, 16:49 | MS         | 24 Oct 2017, 22:36 | MS       |
| Immutable factors             | 2     | 3           | 12 Oct 2017, 16:44 | MS         | 16 Oct 2017, 18:26 | MS       |
| Lack of time for PA           | 2     | 2           | 12 Oct 2017, 16:49 | MS         | 24 Oct 2017, 17:16 | MS       |
| Motivation                    | 12    | 47          | 12 Oct 2017, 16:49 | MS         | 24 Oct 2017, 16:18 | MS       |
| Prefer                        | 10    | 20          | 16 Oct 2017, 17:13 | MS         | 24 Oct 2017, 22:25 | MS       |
| Role models                   | 6     | 7           | 16 Oct 2017, 18:10 | MS         | 24 Oct 2017, 16:18 | MS       |
| PA meaning                    | 0     | 0           | 29 Aug 2017, 17:38 | MS         | 29 Aug 2017, 17:39 | MS       |
| PA self-efficacy              | 6     | 17          | 12 Oct 2017, 16:47 | MS         | 22 Oct 2017, 17:12 | MS       |
| Prior and current PA ex...    | 4     | 9           | 12 Oct 2017, 17:01 | MS         | 24 Oct 2017, 17:17 | MS       |
| Vicarious experiences         | 1     | 1           | 12 Oct 2017, 17:01 | MS         | 16 Oct 2017, 17:28 | MS       |
| Perceived benefits            | 12    | 38          | 16 Oct 2017, 16:58 | MS         | 25 Oct 2017, 14:40 | MS       |
| Percieve barriers             | 8     | 19          | 19 Oct 2017, 17:01 | MS         | 25 Oct 2017, 14:42 | MS       |
| Physiological or affective... | 10    | 29          | 12 Oct 2017, 17:07 | MS         | 25 Oct 2017, 14:35 | MS       |
| Public transportation         | 3     | 6           | 12 Oct 2017, 16:52 | MS         | 22 Oct 2017, 16:45 | MS       |
| Safety issues                 | 1     | 1           | 12 Oct 2017, 16:52 | MS         | 25 Oct 2017, 14:35 | MS       |
| Social support                | 14    | 36          | 12 Oct 2017, 16:55 | MS         | 25 Oct 2017, 14:45 | MS       |
|                               | 0     | 22          | 16 Oct 2017, 16:45 | MS         | 24 Oct 2017, 22:26 | MS       |

**Figure 3-3 The example of open coding using NVivo software package**

### Step 3) Searching for themes

Axial coding was instrumental in validating the fittingness of data to constructed or emerged categories (Strauss & Corbin 1990). Coded data from in vivo codes were analysed to find the similarities and group them into categories based on their common properties and dimensions. Also, sub-categories were created from the codes then linked to categories.

### Step 4) Reviewing themes

Similar codes were gathered in the same categories/themes, therefore, helping to create the themes of a qualitative study in rich detail. Thick and rich qualitative data refers to the data containing context and description which should be rich enough to enable the readers to understand the situation of the study (Creswell and Miller 2000).

After collating codes, the themes were reviewed several times, in order to re-check the relevance of the original interview transcriptions. Themes, codes, and quotes from the data analysis were translated into the English language. At this step, the researcher copied all codes and quotes under each theme to a Microsoft Excel programme (see Table 3-5). Displaying such information in a Microsoft Excel programme was also useful for the supervisory team because they could re-check the accuracy and match of themes, codes, and quotes. The supervisory team also did check the accuracy of coding and the relevance of quotes from the translated transcripts. This helps to ensure that the researcher employed good coding skills of qualitative data analysis and was able to analyse the remaining Thai transcripts.

### **Step 5) Defining and naming themes**

The researcher named the themes, and identified which story the theme tells and how this story relates to other themes as well as to the research questions. During this step, the researcher discussed all of these with the supervisory team, in order to check the accuracy of themes and selected quotes.

### **Step 6) Producing a report**

The interesting quotes of what the participants said were used to support the four emergent themes in the final report. Research questions and aims of the study were used for organising the data included in the report. This means that all themes need to answer the research questions and aims.

Table 3-5 The example of displaying themes, codes, and quotes

| Emerging theme | Participant | Initial code                        | Quote  | Translate quote  |
|----------------|-------------|-------------------------------------|--|--|
| Health         | P3          | Desire to be as healthy as possible | “ก็อยากให้สุขภาพร่างกายแข็งแรง สามารถทำงานได้เต็มที่ สามารถดูแลครอบครัวได้ และถ้าเราแข็งแรงก็จะได้ไม่ต้องเป็นภาระใคร เพราะว่าถ้าเกิดเราเจ็บป่วยหักคนเนี่ย รู้สึกว่าจะต้องเดือดร้อนกันไปทั่ว ดังนั้นก็ต้องพยายามรักษาสุขภาพร่างกายให้แข็งแรงเข้าไว้ซึ่งการออกกำลังกายนี่ก็ช่วยได้ขอบคุณ เก่าๆไปออกกำลังกายก็จะรู้สึกว่าร่างกายแข็งแรง จิตใจปลดปล่อยร่างกายที่นั่น ก็จะเต็มไปด้วยคนที่มีแนวคิดเหมือนกันที่ไปออกกำลังกายที่เราไปเช่น แต่เราต้องไม่ได้พูดคุยกันนะคะต่างคนก็ต้องออกกำลังกายแต่เราต้องเห็นคนที่มีแนวคิดเดียวกันเราคือรักสุขภาพของกันให้ร่างกายแข็งแรง” | “I want to be healthy, be able to work proficiently and be able to take care of my family. If I keep fit, I will not be a burden. I think that if I am sick, it will be a trouble to all. Therefore, I need to keep myself healthy and exercise to benefit from this. Exercise makes me feel strong and gives me a good mood. All people there do have the same idea; -we do not even talk to others.” |
|                | P2          | Desire to be as healthy as possible | “ที่พ่อของจะไปนี่ก็คือด้วยความที่มีโรคเบื้องต้น ....พี่ปวดหลัง เขายืนอကง่าจะต้องไปออกกำลังกาย ทุกคนที่จะใหญ่กว่าพี่ไม่ออกกำลังกาย ดังนั้นถ้าพี่จะไปออกกำลังกี เพราะด้วยเหตุนี้”  | “I would like to go [and do exercise] because I have a lot of diseases....I get back pain, they (friends and colleagues) said that I have to do exercise. Everyone blames me, saying that I get pain because of not doing exercise. So, I'm going to do exercise because of this.”   |

| Emerging theme | Participant | Initial code                                       | Quote  | Translate quote   |
|----------------|-------------|--|--|---|
|                | P15         | Clinical outcomes or past experience with activity | “ถ้าเราได้ออกกำลังกายแล้วมันจะรู้สึกสดชื่น ช่วงที่หยุดไป มันจะไม่สบายเนื้อไม่สบายตัว จะรู้สึกไม่สดชื่น ถ้าจะเห็นได้ชัด มันก็เลยทำให้เรารู้สึกว่าเราจะต้องกลับมาออกกำลังกายละ เหมือนเป็นแรงขับที่เราจะต้องทำให้ได้” | “After doing exercise, I feel fresh. Previously, I didn't do regular exercise; I sometimes left it for a while so that I would feel uncomfortable and tired, obviously. At this point, I feel that I need to do regular exercise. It is like a motivator for doing serious exercise.” |
| Time           | P14         | Doing something else                               | “บางทีเราต้องแบ่งเวลาให้ครอบครัวด้วย ไม่ขอกะจะแบ่งเวลาไปเล้าอกบ้านทุกวัน”  | “...Sometimes, I have to spend time taking care of my family, so I can't go and exercise every evening.”  |
|                | P13         | Doing something else                               | “เวลาในการที่จะไปออกกำลังกายมันไม่มี เพราะเราจะให้เวลา กับการท่ากิจกรรมของอื่นที่เราคิดว่าสำคัญมากกว่า ไม่ใช่ว่าการ ออกกำลังไม่สำคัญนะ แค่คือสำคัญแต่เราเพื่อเวลาให้กิจกรรมที่ เรากำหนดมากกว่า”                    | “My time to exercise is limited because I have to spend time doing other things of greater importance. It doesn't mean that exercise is not important, it's important, but I sometimes have to prioritise other things.”  |
| Environment    | P2          | Exercise facilities                                | “...ถ้าจะให้พี่ไปฟิตเนสข้างนอก พี่คงไม่ไป เพราะไปลำบากไป ยาก หนึ่งที่คือต้องมีคนพาไป มีเพื่อนไป ถ้าจะให้ไปองที่คงไม่ ไป การเดินทางลำบาก”   | “...if you asked me to go fitness outside, I wouldn't go because it's difficult. I have to have someone take me there. A friend could take me. If asked to go there by myself, I wouldn't go because it's too difficult to travel.”   |

| Emerging theme | Participant | Initial code | Quote  | Translate quote   |
|----------------|-------------|--------------|--|---|
|                | P7          | Weather      | <p>“ถ้าเป็นฤดูหนาวที่เชียงใหม่มันก็โอเค แต่ถ้าเป็นช่วงหน้าร้อน<br/>แบบนี้ มันก็จะมีหมอกควัน nehaze เขาอาจจะให้ค่าการออกกำลังกาย<br/>ลดลงแจ้ง”</p> <p>“..บางคนก็ไปอยู่แต่ออกกำลังแบบปิดหน้ากากมันก็ไม่ใช่วะ<br/>(หัวเราะ) ผันนั้นไม่ใช่ว่าก็เลยเปลี่ยนการออกกำลังกายใหม่”</p> | <p>“During winter in Chiang Mai, it is OK. During summer,<br/>like now, there is chronic air pollution, so we need to<br/>stop doing outdoor exercise.”</p> <p>“..some people will still do outdoor exercise whilst<br/>wearing a mask, I don't think that's good (laugh). I can't<br/>do it like that, so I change the way I do exercise.”</p> |
| Occupation     | P11         | Shift work   | <p>“ส่วนใหญ่ถ้าเป็นลงเรื่องดีก็แล้วต้องต่อดีก็จะไม่ไปละ เพราะ<br/>ต้องกลับบ้านตอนมันก็จะหนึ่งอยู่ ก็เลยไม่ไป แต่ถ้าลงเรื่องดีก็แล้ว<br/>อีกวันไม่ใช่เรื่องดีก็จะไปอยู่ค่ะ”</p>   | <p>“Normally, if I have the double night shift, I will not go<br/>and exercise. I will rest myself after the night shift<br/>because of tiredness, so I don't (exercise). However, if I<br/>have only one-night shift, I will go and (exercise) in the<br/>evening.”</p>  |

### 3.7.9 Trustworthiness of data

Trustworthiness is the main criterion for ensuring an acceptable standard for qualitative research which comprises of four key areas, including credibility, confirmability, dependability and transferability (Lincoln and Guba 1985; Shenton 2004). The four key criteria for ensuring trustworthiness of this study are discussed in the following sections.

#### 3.7.9.1 Credibility of data

The credibility of a study is determined when readers are confronted with the experience, they can recognize it (Guba and Lincoln 1989). For this study, in order to ensure the credibility of a study's findings, triangulation was carried out (Shenton 2004). According to Patton (2002), triangulation is used to decrease, negate, and counterbalance the deficiency of a single strategy, thereby increasing the ability to interpret the findings. Triangulation might involve the use of different methods, data sources, organisations, investigators, and theories to establish credibility (Lincoln and Guba 1985; Patton 2002; Flick 2009).

This study considered using wards, 16 different surgical department wards, which have different working conditions including general-surgical wards, trauma-surgical wards, neuro-surgical wards, cardiovascular-surgical wards, plastic-surgical wards, a surgical intensive care unit (SICU), a sub-surgical intensive care unit (sub-SICU) and a burns unit. Here interviewing a range of people in different sites, might be employed to provide the diversity of perspectives in order to get more stable view of reality, and allows the researcher to gain better understanding of or insight into the phenomenon from the participants' point of view, and its social and organisational context (Shenton 2004). This increased the researcher's ability to interpret the research findings, and can establish the credibility of the study and also confirm the validity and reliability of data (Flick 2009).

Moreover, the use of more than one method in the examination of the phenomenon was used in this study, in order to compensate for weakness or potential biases and the problems that might come from a single method (Shenton 2004). Concept analysis was used as a supporting strategy to provide a background to and help explain the attitudes, reasons and behaviour of the research participants, as well as to verify particular details that the participants have supplied. Thus, using methodological triangulation also increased the researcher's ability to interpret the research finding.

Besides, member checks or respondent validation was also used to establish the credibility of the study (Lincoln and Guba 1985; Shenton 2004). In this study, the participants were offered the opportunity to read transcripts of their own accounts in order to check the authenticity of the work. The participants' comments were served as a check on the viability of the interpretation.

#### **3.7.9.2 Confirmability of data**

Measures to confirm data are employed to help ensure as far as possible that the findings are the result of the experiences and ideas of the participants, rather than the researcher's assumptions and preconceptions (Shenton 2004). In this study, the researcher did remain connected to participant experiences and emotions by encouraging them to share their thoughts, feelings, and attitudes whilst actively attempting to avoid researcher influence. Initial planned questions were structured to avoid bias, where possible. The researcher did document the procedures for checking and rechecking the data throughout the study.

#### **3.7.9.3 Dependability of data**

Dependability of qualitative data could be established by critical appraisal of a research study through written reflections (Shenton 2004). During this study, written reflections were kept to assist in informing and developing the analysis and the researcher's own emergent interpretations, which are considered critical in establishing credibility (Shenton 2004).

#### **3.7.9.4 Transferability of data**

Transferability of data refers to the extent to which the results of qualitative research can be generalised or transferred to other contexts or settings (Shenton 2004). In this study, the full context of the study, including the individual context of respondents (where possible) was outlined, providing as much background and detail as possible. Whilst no claim to transferability is made in this study, there may be similarities with other studies which may allow a degree of comparison, afforded by the depth and detail provided.

### **3.8 Ethical considerations**

Ethics in the conduct of research on humans is the most important fundamental concern in any study. All research participants are vulnerable people whose rights are protected by law as well as medical and academic ethical considerations.

According to Edwards (2009), there are six principles of ethical consideration for carrying out research on humans, including respect of autonomy, beneficence, non-maleficence, justice, fidelity and confidentiality.

In this study, permission to undertake the study was obtained from the University of Southampton Ethics Committee (Research ID: 23677) and sample setting in Thailand; Research Ethics Committee, Faculty of Medicine, Chiang Mai University; (Research ID: 4224) (see Appendix C).

Participants were invited to participate in this study. The researcher informed participants of the general purpose of the study and how data would be used, would ensure confidentiality of individual responses, anonymity and the right to refuse or withdraw from the study at any time without any effect on their work. In addition, all data was analysed as a whole so that individuals cannot be identified. Before deciding to be a research participant, informed consent was obtained.

### **3.9 Chapter summary**

This chapter describes and discusses the research philosophy underpinning this research study. A qualitative approach, using concept analysis and semi-structured interviews, was used as a base for gathering the information relevant to this study. From the beginning, this chapter began with the researcher's journey through the logic of the theoretical framework, followed by a description of the research design, sampling strategy, data collection process, methods of data analysis, as well as ethical considerations.

The next chapter will present the finding from the interviews.



# Chapter 4 Findings

## Introduction

This chapter aims to present the findings from 20 Thai surgical nurses who were recruited to participate in the interviews.

### 4.1 Overview of the participants

The research participants were recruited from 16 wards of the surgical departments at the Maharaj Nakorn Chiang Mai Hospital, Thailand.

Table 4-1 presents demographic characteristics of the study sample. The 20 participants were between 29 and 52 years old, 18 (90%) were female, and 13 (65%) are single. The length of employment as a surgical nurse was between 6 and 30 years. Ninety per cent of the participants (18) worked as staff nurses and almost 50% (9) have a master's degree.

**Table 4-1 Characteristics of the research participants**

| ID | Gender | Age | Status    | Education level | Work as a nurse (years) | Work as a surgical nurse (years) | Ward        | Role    | *Most recent shift |
|----|--------|-----|-----------|-----------------|-------------------------|----------------------------------|-------------|---------|--------------------|
| P1 | Female | 40  | single    | Bachelor        | 17                      | 17                               | sub-ICU-CVT | Staff   | M&A&N              |
| P2 | Female | 41  | single    | Master          | 18                      | 18                               | Gen-F       | Staff   | A                  |
| P3 | Female | 50  | married   | Master          | 27                      | 27                               | Burn        | Staff   | N                  |
| P4 | Female | 50  | married   | Bachelor        | 29                      | 29                               | Burn        | Manager | M                  |
| P5 | Female | 33  | single    | Bachelor        | 10                      | 10                               | Gen-F       | Staff   | A                  |
| P6 | Female | 29  | single    | Bachelor        | 6                       | 6                                | Gen-F       | Staff   | A                  |
| P7 | Female | 39  | separated | Bachelor        | 17                      | 17                               | ICU-CVT     | Staff   | A                  |
| P8 | Female | 29  | single    | Bachelor        | 6                       | 6                                | ICU-CVT     | Staff   | N                  |
| P9 | Female | 40  | separated | Master          | 18                      | 18                               | Neuro       | Staff   | A                  |

| ID  | Gender | Age | Status  | Education level | Work as a nurse (years) | Work as a surgical nurse (years) | Ward  | Role   | *Most recent shift |
|-----|--------|-----|---------|-----------------|-------------------------|----------------------------------|-------|--------|--------------------|
| P10 | Female | 42  | married | Master          | 19                      | 19                               | ICU-S | Staff  | M&N                |
| P11 | Female | 42  | single  | Master          | 18                      | 18                               | Neuro | Staff  | M&A&N              |
| P12 | Female | 46  | single  | Bachelor        | 23                      | 23                               | Gen-M | Staff  | M                  |
| P13 | Female | 48  | single  | Master          | 25                      | 25                               | SCCU  | Staff  | M                  |
| P14 | Female | 54  | single  | Master          | 30                      | 30                               | Gen-F | Senior | M                  |
| P15 | Male   | 52  | single  | Bachelor        | 24                      | 24                               | ICU-S | Staff  | M                  |
| P16 | Female | 46  | single  | Bachelor        | 23                      | 23                               | ICU-S | Staff  | A&N                |
| P17 | Male   | 40  | single  | Bachelor        | 19                      | 19                               | Gen-M | Staff  | A                  |
| P18 | Female | 50  | married | Bachelor        | 13                      | 13                               | Gen-F | Staff  | M&A&N              |
| P19 | Female | 42  | single  | Master          | 20                      | 20                               | Gen-F | Staff  | A&N                |
| P20 | Female | 38  | married | Master          | 16                      | 16                               | ICU-N | Staff  | M                  |

\*M Morning shift

A Afternoon shift

N Night shift

## 4.2 Participants definitions and types of physical activity

Study participants had a broad perspective of the concept of physical activity. Most of them viewed physical activity as including not only formal exercise but also work- and home-related activities. They agreed that physical activity includes activities such as housework, yard work, dancing, shopping, walking a dog, and walking in a forest. They also used the terms physical activity and exercise interchangeably. Some individuals enjoyed participating in other forms of physical activity more than a formal exercise. One participant reported that she was doing household chores and that she saw that as a way of exercising:

*“I would do the laundry, clean my room, and do trivial things. These activities are exercise as I have free time while I am waiting for my shift”.*

P1 (Female nurse, 40 years old)

Another participant also said that doing household chores was a way to undertake physical activity. The household chores consisted of doing laundry, cooking, washing, and cleaning the home. She also related physical activity to her work activities. She stated:

*"Any day without work, I will focus on housekeeping. That is, I like housekeeping, wake up in the morning then continue housekeeping. And I think that it gets me sweating as well."*

*"...I wake up in the morning, I will clean the room, bathroom, and cook. After that, I do laundry, sweeping and mopping the house all day when on holiday."*

*"That is walking during work. And if I have a meal break or any break, or during free time when there are no other nursing activities, I will do arm swings....."*

P20 (Female nurse, 39 years old)

Also, one participant viewed the term 'physical activity' as including outside activities:

*"... It's not only about exercise but also about going shopping in a shopping centre or walking in a forest. I would see a new environment, and that can help to reduce my stress."*

P19 (Female nurse, 42 years old)

While some participants had a much broader definition of physical activity that includes leisure time-, home-, and work-related activities, someone did not perceive "child care" as such a physical activity- actually, it may be construed as a very physical activity. One participant perceived that taking care of children could keep nurses from being physically active. She said:

*"I am single, so I have enough free time, and can manage myself, to do physical activity. If I am married, I might not be able to do like this. I would be more likely to expend more activity in taking care of children. Therefore, being married may also be a barrier to undertaking physical activity".*

P19 (Female nurse, 42 years old)

In addition to providing a definition of physical activity, the participants were asked to identify examples of physical activity that they preferred. All participants described their own preferences for physical activity. For instance, they said:

*"I personally like exercising alone because it's more convenient. Although we [partner or group of friends] go together, we would exercise individually. For example, a group of friends go jogging, but they will not stick together when they run. It's like this. I am comfortable with going alone. I normally go to exercise alone. I occasionally go with friends when we are free at the same time. I even reject my friends' invitations sometimes."*

*P1 (Female nurse, 40 years old)*

*"Personally, I like doing exercise alone. I usually go alone that I can do exercise as much as I wish. If I go with other people, I have to participate with them."*

*P11 (Female nurse, 42 years old)*

One participant said that she preferred walking and running which could be undertaken anywhere and anytime, and access to exercise facilities did not affect her exercise behaviour.

*"... I think that walking is a simple exercise that doesn't need any equipment. I can walk or run how I want. It is not limited only to the health park. I can run around my dormitory. So, I think this way is more convenient. Going to a fitness gym is more serious. I don't expect to do that much."*

*P1 (Female nurse, 40 years old)*

While some participants did not prefer activities using exercise equipment, several participants mentioned that exercise equipment was an important part of their exercise adherence. Someone preferred activities using exercise equipment in the fitness centre. One participant said that if she were to undertake physical activity, she would do whatever activity she did not find boring. She preferred activities in a group or class or activities using exercise equipment:

*"If I do exercise, I do a kind of exercise using exercise equipment such as Pilates, that looks enjoyable. I might do aerobic exercise as I did before, or whatever particular activity is not boring. However, I don't like exercise with a personal trainer or any kind of weight training."*

*P10 (Female nurse, 42 years old)*

Another participant mentioned that using exercise equipment was fun and made her enjoy doing the activities, and it was also associated with her exercise adherence.

*"Using equipment makes it less boring. It can encourage and motivate us to exercise. It's just fun and not so boring. It's like when we go to a gym. There is plenty of fitness equipment, making it less boring. As I exercise on my own, I try to use a lot of equipment. I also bought a small dumbbell, a half kilogram."*

*P1 (Female nurse, 40 years old)*

Additionally, one participant said that satisfaction with exercise equipment and the perception that exercise equipment is safe were very important for doing exercise. She illustrated this point with the example of running shoes:

*"Equipment, clothes, shoes are important. Especially, we run, so if shoes are not good, it will make us get foot and knee pain. Then, a person who gets knee pain will not want to do it. Someone buys shoes that they may use only one time. Aerobic shoes are used for another type (of exercise)."*

*P20 (Female nurse, 39 years old)*

Besides exercise equipment, one piece of equipment that emerged as an important part of exercise adherence amongst the participants was a pedometer. The pedometer was described as effective in promoting physical activity in participants. Variations were used, such as pedometers or mobile applications (e.g. Endomondo, Pacer, and Walker) to record fitness and health statistics which also reinforced an increase in physical activity levels. One participant said:

*"It can track all of my workouts and calorie expenditure. Even though I am not sure whether this app really works, I still use it for recording my fitness. It is also a motivator which reinforces my desire to increase my physical activity levels."*

*P11 (Female nurse, 42 years old)*

Another one explained the reason why she used the application:

*"..it shows me the number of calories I burn. Because of my concern for my health and wanting to know the level of my workouts, I use this app. There is a recommendation that we should walk around 10,000 steps a day."*

*P7 (Female nurse, 39 years old)*

### 4.3 Summary of the themes of the factors influencing physical activity

Study participants had a broad perspective of the factors influencing their physical activity participation. The themes from the participants' interviews are shown in the Table 4-2

**Table 4-2 Outline of the themes and sub-themes from the participants**

| Theme                       | Sub-theme   |
|-----------------------------|---|
| <b>Theme 1: Health</b>      | 1.1 Desire to be as healthy as possible<br>1.2 Clinical outcomes or past experience with activity<br>1.3 Physiological and emotional states   |
| <b>Theme 2: Time</b>        | 2.1 Lack of time<br>2.2 Choice to do something else   |
| <b>Theme 3: Environment</b> | 3.1 Physical environment<br>3.1.1 Exercise facilities and transportation<br>3.1.2 Neighbourhood safety issues<br>3.1.3 Weather or outdoor temperature<br>3.2 Sociocultural environment<br>3.2.1 Social support<br>3.2.2 Role models |
| <b>Theme 4: Occupation</b>  | 4.1 Shift work<br>4.2 Working conditions  |

#### **Theme 1: Health**

From the participants' perspectives, there were many motivating factors related to health that influence physical activity participation amongst this group of Thai surgical nurses. Three themes emerged from the data: i) desire to be as healthy as possible, ii) clinical outcomes or past experience with activity, and iii) physiological and emotional states.

### **Sub-theme 1.1: Desire to be as healthy as possible**

The data showed that health concerns were the most frequently mentioned motivating factor to increasing physical activity or exercising. The majority of participants kept doing exercise because they had concerns about their health status and overall quality of life, which motivated them to keep doing exercise. They felt that physical activity should be engaged in throughout their life, and perceived that being physically active can help to prevent a range of possible health problems and help them lead a healthier and happier life.

Some participants kept doing exercise because they wanted to be healthy in order to take care of their family members and be able to work proficiently:

*"I want to be healthy, be able to work proficiently and be able to take care of my family. If I keep fit, I will not be a burden. I think that if I am sick, it will be a trouble to all. Therefore, I need to keep myself healthy and exercise to benefit from this. Exercise makes me feel strong and gives me a good mood. All people there do have the same idea; -we do not even talk to others."*

*P3 (Female nurse, 50 years old)*

*"It's beneficial. At least it helps strengthen my body and improve my job performance. It improves many things, both physical and mental aspects. Exercise is just like relaxing. No matter how many opportunities for exercise you have, doing a little will be just fine."*

*P1 (Female nurse, 40 years old)*

Concerns were expressed about getting older and ageing alone, that acted as a motivation for continuing to engage in exercise. This was expressed in the following ways:

*".... I will try to do (exercise) as much as possible. I told myself to try for my own health. It will be the best thing in the long term. When I was young, I didn't care much about this. I was still strong at that time. As I am getting older, I feel like my health is declining quickly - my knee joint, for example. Before these days I didn't exercise. I didn't have an exercise programme. My weight increased fast and I felt tired. Now I take care of myself to refresh and strengthen my body."*

*P1 (Female nurse, 40 years old)*

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*“Due to the fact that I’m getting older and still being single, there is no one to look after me; if something terrible happens to me, what should I do?....  
...If I got a haemorrhagic stroke or an ischaemic stroke, what should I do?....If I have to get medical help, who will take me to the hospital (laugh)? So, I need to be as healthy as possible.”*

*P11 (Female nurse, 42 years old)*

*“As I’m getting older, it seems to me that exercise will be needed and very important to my life. Recently, I feel that I get headaches frequently, upper and lower back pain so that I should make time for exercise.”*

*P20 (Female nurse, 39 years old)*

While some participants without any health conditions kept doing physical activity in order to retain a healthy lifestyle, others with illnesses or existing health conditions also tended to exercise because they wanted to promote recovery from disease and to be healthy:

*“I would like to go [and do exercise] because I have a lot of diseases.....I get back pain, they (friends and colleagues) said that I have to do exercise. Everyone blames me, saying that I get pain because of not doing exercise. So, I’m going to do exercise because of this.”*

*P2 (Female nurse, 40 years old)*

*“I have a problem with my bowel. A doctor advised me to do walking or running or Yoga in order to improve my bowel movements. So, I have been doing these activities as the doctor advised, but I have never tried Yoga. I will try to do Yoga...”*

*P9 (Female nurse, 40 years old)*

*“I confess that I didn’t put any effort into exercise previously. I sometimes did exercise depending on chance and my intention. Then, when I took a blood test in the last three years, my HDL cholesterol level was very low. Actually, it should be high if I am healthy. I was afraid of the blood test result. After that, I tried to change my behaviour, I have tried doing exercise as much as I can by walking and running.”*

*P11 (Female nurse, 42 years old)*

### Sub-theme 1.2: Clinical outcomes or past experience with activity

Clinical outcomes or past experience with activity were the second most commonly reported by the participants. Most participants mentioned that their motivator for physical activity was the resulting sense of physical and mental well-being. One participant said that she felt good and had recovered from her health conditions since undertaking exercise. She felt that exercise could reduce her symptoms. At this point, she would like to keep exercising and exercise regularly:

*"At first, I felt that my health was probably not good. I got sick often. Then, when I started to exercise, it began getting better. That is, my headaches decreased, and my muscle and back pains are better. I feel that I will probably continue exercising and exercise regularly. At this point, I like exercising."*

*"It makes my muscles fitter. I feel that I will be stronger. Before that, my limbs didn't have any energy, but right now I can run, swing my arms, whatever, I'm getting better and don't take any more NSAIDs. That is, before I took NSAIDs frequently. When getting pain, take it. Now, I don't take it anymore."*

P20 (Female nurse, 39 years old)

One man said that doing exercise made him feel fresh and feel comfortable. Once he ceased to take exercise, he felt discomfort and tiredness. This, therefore, motivated him to keep doing exercise:

*"After doing exercise, I feel fresh. Previously, I didn't do regular exercise; I sometimes left it for a while so that I would feel uncomfortable and tired, obviously. At this point, I feel that I need to do regular exercise. It is like a motivator for doing serious exercise."*

P15 (Male nurse, 52 years old)

Interestingly, even for the participants with musculoskeletal injuries arising from work, pain-related injuries such as leg pain, knee pain, neck pain, and shoulder pain were not a barrier to physical activity participation. They felt that doing exercise could help them to relieve their musculoskeletal injuries:

*"P1. My job requires me to walk a lot, so I have some leg pain and knee pain. But recently I have only had knee pain."*

*R. How do you manage this problem?*

*P1. I try to stretch out and go to exercise.*

R. Do you feel better?

P1. *It is not so obvious. I feel it relieves my symptoms. I feel that I can walk longer before becoming tired. I still have some knee pain, but my muscles are much stronger than before.*"

P1 (Female nurse, 40 years old)

"P10. *They (physiotherapists) taught me the steps of neck and shoulder exercises. I followed them at that time.*

R. How did you feel after that?

P10. *It's better. They also advised me to do regular exercise because it will help to improve my muscle strength. When I got neck or shoulder pain, I did the exercises, but it's not every day.*"

P10 (Female nurse, 42 years old)

However, the participants also cited negative experiences with exercise-related musculoskeletal injury as a barrier to exercising or becoming more physically active. They said that musculoskeletal aches and pains associated with being active reduced the enjoyment of an activity and stopped them from being physically active:

"*I used to play badminton. At that time, I got a lot of joint pain, and I had to treat it by medical injection. Hence, that's not my way, I think.*"

P13 (Female nurse, 48 years old)

"*Actually, I want to walk a lot, but I have health problems. If I walk a lot, my left heel will become painful...To relief pain, I have to rest. Therefore, I walk for 2-3 rounds and then assess how it feels. If I cannot tolerate the pain, I have to stop and go back home.*"

P3 (Female nurse, 50 years old)

Moreover, some participants had negative health experiences in attempting to do physical activity, such as tachycardia, headache, and tiredness during exercise, so tried to avoid doing it:

"*Previously, when I was a young student, I used to exercise by jogging. At that time, I got tachycardia and a lot of headaches, so that I don't want to do jogging or exercise at all. Also, I try to avoid any activities that might lead to getting tachycardia and headaches.*"

P4 (Female nurse, 50 years old)

*“Running in the park is too tiring for me. I used to go with my friends. They kept running, but I took a lot of breaks because I was tired. I didn’t usually go there, so it was quite tiring for me. This is just like playing badminton when the balls fall down a lot, which was not fun for me. I’m not that professional, I can’t play it.”*

*P2 (Female nurse, 40 years old)*

### **Sub-theme 1.3: Physiological and emotional states**

From the interview data, it appears that the physiological and emotional states of the participants have both negative and positive effects on their physical activity self-efficacy and physical activity participation. For example, body-shape played an important role in persuading and influencing the participants to undertake physical activity. Some participants had a concern to control body weight within an acceptable range in order to be healthy:

*“Sometimes I feel tight. I need agility for my work. I can’t wear my uniform when my belly is too fat and I have to get a new uniform. So, I try to control my weight within an acceptable range. Besides my strength, I will get in better shape.”*

*P1 (Female nurse, 40 years old)*

*“For me, why I have to do exercise? Because of my weight gain and my bigger belly.”*

*P17 (Male nurse, 40 years old)*

*“I have left doing exercise for a long time. Now, I feel uncomfortable. That might be from my weight gain or from eating more calories than I burn, so the number of calories is still in my body, that why I feel uncomfortable. At this point, I think I will go back to do more exercise.”*

*P5 (Female nurse, 33 years old)*

Someone said that they participated in physical activity on purpose to improve their physical appearance and physique. One participant who had this concern expressed:

*“I have intended to workout at a gym because I would like to improve my physical appearance and physique. I purpose to do a workout for a nicer figure.”*

*P9 (Female nurse, 40 years old)*

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Regarding one's emotional state, one participant said that when she became stressed, she would do whichever activity that helped her to reduce her stress levels:

*"I would manage my stress by doing outside activities. It's not only about exercise but also about going shopping in a shopping centre or walking in a forest. I would see a new environment, and that can help to reduce my stress."*

*P19 (Female nurse, 42 years old)*

On the other hand, physiological and emotional states, such as fatigue, feeling listless or inhibited, were commonly reported personal barriers to increasing physical activity or exercising. Many participants stated that they knew what to do to become more physically active, but were just "lazy" and "tired":

*"I know I should do it, but I don't. I'm too lazy to go out because I'm too lazy to dress up, too lazy to shower to go out. My nature, I don't like going out, don't like to go anywhere..."*

*...and if I have to go and exercise alone, I feel shy."*

*P2 (Female nurse, 40 years old)*

*"I have time if I want to do it, but when I finish my work and go back home, I feel tired, so how am I going to exercise? I just want to rest my body. It's just that [I have] no motivation."*

*P4 (Female nurse, 50 years old)*

*"If I am not too tired, I will go and exercise. But if I am worn out, I can't exercise much. Those are my problems and barriers."*

*P1 (Female nurse, 40 years old)*

## Theme 2: Time

The time issue is one of the most frequently reported barriers to physical activity among the participants, and is often perceived as the most difficult to overcome. There are two themes relating to the time issue which emerged from the data including i) lack of time and ii) choice to do something else.

### Sub-theme 2.1: Lack of time

One of the major barriers to physical activity amongst the respondent group of Thai surgical nurses was not having the time because of work and family obligations. Some participants said that lack of time to exercise or be more physically active stemmed from family (parents, children, spouse, grandchildren) and work responsibilities. The participants as a group of women indicated that they had many domestic duties, which left considerably less time for themselves. They said:

*"In the last five years, my mother got an illness, so I had to cease taking exercise because I couldn't go anywhere, I couldn't go and exercise. Obviously, in the last two years, she had a recurrent stroke and couldn't take care of herself. She just rested in bed and used a wheelchair."*

P10 (Female nurse, 42 years old)

*"...Sometimes, I have to spend time taking care of my family, so I can't go and exercise every evening."*

P14 (Female nurse, 54 years old)

*"..I perceive the benefits of exercise. If I am single, I might have the time to go and exercise in the evening."*

P18 (Female nurse, 50 years old)

*"I do not exercise when I am at home. I only do family activities. I don't do serious exercise when I am alone in my dormitory".*

*"There are common activities, such as cooking. This is my main responsibility at home. I also water the plants and clean the house. I usually do these when I go back home".*

P1 (Female nurse, 40 years old)

It was apparent that the participants identified themselves as the main caregivers often in addition to working outside the home. The combination of these two roles left little time for leisure time activities. It was also suggested that this lack of time to be more physically active was related to cultural and social expectations, and gender roles.

### **Sub-theme 2.2: Choice to do something else**

However, some participants had time, but they gave priority to doing something other than physical activity. They said that they knew how important exercise is, but they had to prioritise other things. One participant indicated:

*"My time to exercise is limited because I have to spend time doing other things of greater importance. It doesn't mean that exercise is not important, it's important, but I sometimes have to prioritise other things."*

*P13 (Female nurse, 48 years old)*

Some participants felt they needed time to rest or sleep in their free time or when on holiday instead of exercising:

*"I would like to rest and sleep on the days following my working shifts or on my holidays because I feel so tired and weak as a result of work."*

*P6 (Female nurse, 29 years old)*

*"Basically, nurses want to rest in their free time, they might not want to do any activities. Someone might eat out and then go back home to rest."*

*P11 (Female nurse, 42 years old)*

## Theme 3: Environment

From the participants' views, an environment was an important factor in influencing a decision to engage or not in physical activity. There are two themes relating to the environment which emerged from the data: i) physical environment and ii) sociocultural environment.

### Sub-theme 3.1: Physical environment

One of the key themes relating to the environment was physical environment. Several physical environmental issues were apparent in the interviews. The majority included exercise facilities and transportation, a safe neighbourhood, and favourable weather or outdoor temperature.

#### 3.1.1 Exercise facilities and transportation

From the interview data, it appears that easy access to exercise facilities and transportation can enhance exercise adherence. Some participants mentioned that the exercise facility was an important factor influencing their exercise participation. Among this group of Thai surgical nurses, having an exercise facility onsite or nearby the hospital seemed to facilitate their exercise participation because it was convenient.

*"The place where exercise occurs is also an important factor. Around my home, it looks like a housing estate. There is a road available for me to run, and I often go running there. Also, there is a place for exercise. In my workplace, there is the CMU auditorium nearby where I can go. No driving involved, so far. Sometimes I can walk there from the Maharaj Hospital. During walking, I can warm up. When I reach the place, I can run right away."*

P20 (Female nurse, 39 years old)

*"I decided to choose this gym because it is not far from here (the hospital). Moreover, the exercise equipment in the gym is new, and my personal trainer is very friendly."*

P5 (Female nurse, 33 years old)

*"Going to the fitness centre in the hospital is handy because it is nearby and just takes a short time....*

*...if you asked me to go fitness outside, I wouldn't go because it's difficult. I have to have someone take me there. A friend could take me. If asked to go there by*

*myself, I wouldn't go because it's too difficult to travel."*

*P2 (Female nurse, 40 years old)*

However, such exercise facilities and equipment represent self-investment. Cost of exercise equipment or fees at exercise facilities affected participants' perceived capacity to exercise. This issue was mentioned in the context of the purchase of higher priced items, which limited decisions. The cost issues focused on commercial gyms and fitness centres and the high costs of memberships and classes. The participants said:

*"100 bath per hour (a fee) that's quite expensive. If I were to go to the fitness centre every day, that might not be OK."*

*P8 (Female nurse, 29 years old)*

*"Some of my colleagues attend a fitness course which is very expensive. They have to pay for a whole course. I also used to go to the fitness centre at the Faculty of Medical Technology, and, although I am a member of hospital staff, I had to pay 90 baths a time like other people [non-members]. So, I don't appreciate that very much."*

*P11 (Female nurse, 42 years old)*

*"I could purchase an inexpensive course (a fitness class) .....but if it is very expensive, I couldn't."*

*P10 (Female nurse, 42 years old)*

*"... this type of exercise does not need a lot of money. So, I am OK."*

*P1 (Female nurse, 40 years old)*

### **3.1.2 Neighbourhood safety issues**

Some participants mentioned neighbourhood safety concerns. Although there were relatively few participants who mentioned this issue, it was associated with decreased physical activity behaviour. From the findings, the key neighbourhood safety issues of concern were lack of adequate walking trails, pavements or malls for walking or cycling, heavy traffic, and fear of interpersonal crime in areas with a reputation for crime.

*"For cyclists, nowadays, there are a lot of motor vehicles on the roads. I am afraid of being involved in a road accident, so I stopped cycling."*

*P15 (Male nurse, 52 years old)*

*"...sometimes, I go and exercise alone, but not often, because I have concerns about safety issues. There is an area that has become poorer, and I sometimes go walking and running there in the evening after work and go back home at around 6.00-7.00 pm. So, it might not be very safe..."*

*P19 (Female nurse, 42 years old)*

### **3.1.3 Weather or outdoor temperature**

Weather or outdoor temperature was mentioned by the majority of participants as a barrier to physical activity. Having to contend with hot weather and air pollution made it harder to get out and engage in outdoor activities.

*"The weather is somewhat variable. There can be three seasons in a day. This can be a barrier to taking exercise.*

*...When the weather is hot, I will feel lazy and stop doing exercise."*

*P1 (Female nurse, 40 years old)*

*"If you asked me to cycle at 10.00 a.m., I can't. The weather is too hot at that moment. Even doing nothing is still not OK. In hot weather like this, I want to sip coffee in an air-conditioned room."*

*P2 (Female nurse, 40 years old)*

*"I keep going (exercise) in the evening. If do not want to go due to the weather, when it is quite hot, I do not go. The hot weather is a barrier to exercise (laugh). If the weather is too hot, I won't go."*

*P3 (Female nurse, 50 years old)*

*"During winter in Chiang Mai, it is OK. During summer, like now, there is chronic air pollution, so we need to stop doing outdoor exercise."*

*..some people will still do outdoor exercise whilst wearing a mask, I don't think that's good (laugh). I can't do it like that, so I change the way I do exercise."*

*P7 (Female nurse, 39 years old)*

Someone linked this issue to the government policy regarding exercise on a Wednesday afternoon. They commented that:

*“.... The government policy is to exercise on a Wednesday afternoon. But right now, it is summer. The prime minister is afraid of heat stroke, so suggests we take a break from this activity.”*

P20 (Female nurse, 39 years old)

*“...The weather is very hot, so no one wants to go and do outdoor exercise. If someone is 40-50 years old, they can't do the exercise like this. They can't tolerate doing exercise in this kind of heat. Recently, this activity was officially stopped due to the hot weather and a decrease in staff joining in.”*

P4 (Female nurse, 50 years old)

### **Sub-theme 3.2: Sociocultural environment**

The sociocultural environment was the large-scale force within culture and society that affects the thoughts, feelings, and behaviours related to physical activity participation among the participants. This theme includes social support and role models.

#### **3.2.1 Social support for physical activity**

Some participants mentioned their social support networks which contribute to their participation in physical activity. From the interview data, social support was provided from a variety of sources. There appeared to be two main sources for social support: i) family and peers, and ii) organisation and government sectors.

##### ***i) Social support from family and peers***

Several participants stated that having a companion to exercise with would increase their motivation to become more physically active or to exercise. They indicated that family members or peers were not only a source of support for physical activity but also a motivator:

*“... my husband likes exercising, and when he goes exercising, I have to go with him. Previously, I didn't like exercising, I preferred eating and then lying down. When my husband goes now, I go with him. When going, I feel that it's good for my health. After that, I feel more like I want to go. As my parents got sick, got hypertension and DM, the doctor advised exercise and weight loss. I have induced them to go and exercise.”*

P20 (Female nurse, 39 years old)

*“...She (the youngest daughter) let me go and exercise. She said “mommy will be healthy and stay with me for a long time. Mommy will stay young”. She does not want me to get older (Laughs). Therefore, she agrees to let me go and exercise in order to keep mommy staying young.”*

*P3 (Female nurse, 50 years old)*

Someone said that having others to exercise with would increase the likelihood of being active and would make the activity more enjoyable:

*“Some people, such as friends and colleagues all go and exercise together. Sometimes when I find interesting videos on exercise on YouTube, I talk with them and suggest it to them to do. For example, some videos teach how to reduce pain, how to reduce belly fat. They are topics for conversation.”*

*“...on my ward we usually exercise by walking in working hours. My colleagues encourage each other to exercise together.”*

*P1 (Female nurse, 40 years old)*

*“My close friend and I will do exercise together. If I am in my dormitory, I will have time to do exercise in the evening. If I am at home, I will do exercise with my father, who is 70 years old right now. He will do exercise by walking in both the morning and evening time. I will do it with him.”*

*P12 (Female nurse, 46 years old)*

*“...It also has to be close friends, but if I have to go with other groups, I won't go for a marathon.*

*...If I have close friends with me, I would go and exercise.”*

*P2 (Female nurse, 40 years old)*

*“At that time, my aunt paid for this fitness course for me....so it's 'free', in which case I would go. When going, it's okay, I was happy.”*

*P10 (Female nurse, 42 years old)*

### ***ii) Social support from the government sector and the employing organisation***

In this study, the policies of the employing organisation and government were a factor in hospital staff having a chance to engage in physical activity. Regarding the Maharaj Nakorn Chiang Mai Hospital, government and organisation policy

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interventions were designed to promote healthy activity among hospital staff, notably in the form of “exercise on Wednesday afternoons”. Some participants said:

*“...government policy is to exercise on Wednesday afternoons.....For our hospital, there will be evening activities such as dancing, aerobic and classical dance. People who like dancing will go together. That is, the hospital already has the activity.”*

*P20 (Female nurse, 39 years old)*

*“...it (the policy) sparks people’s interest in exercise and taking care of themselves. It seems to be that the organisation would like to be a part of encouraging hospital staff to engage in physical activity.”*

*P11 (Female nurse, 42 years old)*

While the organisation has encouraged staff to engage in physical activity by providing an alternative way of adopting exercise during working, some participants did not agree with this policy. They indicated that their working conditions were not suitable for joining in the activity:

*“Actually, there are activities related to exercise provided, such as aerobic dance, but I could not attend. It is from 3.00 to 4.00 pm. which does not suit my daily life. Therefore, I decided to do exercise only when it was convenient for me.”*

*P3 (Female nurse, 50 years old)*

*“Our working conditions are not suitable to join (exercise), where a condition of patients, the activity place, and the activity time were not conducive to joining in.”*  
*“I think it fits with the back-office staff. It’s not worked for ward staff because there aren’t enough staff working to allow us to do it. For the back-office staff, they could swap jobs with each other and take turns to join in the activity.”*

*P18 (Female nurse, 50 years old)*

*“Usually, staff living in hospital dormitories or a group of back-office staff or administrators would join the activity. For my ward, someone used to go, but most staff didn’t go because they were on duty on the morning shift.”*

*P15 (Male nurse, 52 years old)*

### 3.2.2 Role models

Some participants acknowledged that role models who help foster motivation to exercise were an important factor in exercise participation. For the participants, friends, co-workers, and people around them could play an important role in inspiring them and motivating them to do physical exercise. They stated:

*"It stimulates me when I see old people come to exercise. Some people have families. They take their children or their dogs for a walk. It is interesting, that exercise doesn't come in a specific form. Many ways give me a broader perspective.*

*...I see that others can do exercise and they can do it every day. This encourages me to exercise."*

P1 (Female nurse, 40 years old)

*"...when I see my friends do a marathon, I want to do so."*

P2 (Female nurse, 40 years old)

*"At first, I saw one colleague who was obese, but she is now a slim lady. She has been doing "Walk a Mile". Therefore, I tried to search out (Walk a Mile) via YouTube then I to try to do it in my room."*

*"One of my colleagues, she is very physically toned and fit. I asked her what she does. She told me that she has been doing Yoga. She also invited me to go with her. ....I would like to go as well."*

P12 (Female nurse, 46 years old)

*"I was motivated by my younger sister. She's got six-pack abs....when I saw her physically toned and fit and saw her six-pack abs, I was impressed. Even though she was obese like me previously, she is now perfect shape, and she can wear any clothes she wants."*

P5 (Female nurse, 33 years old)

One participant gave an example of sports celebrities, actors or entertainers who inspire people to recognise the importance of physical exercise. She illustrated this point with one Thai rock star.

*"Toon Bodyslam (a rock super star in Thailand), for example, he is a role model as a runner, and he inspires people to do exercise. Although there were some people doing exercise before, there are more people doing exercise now, once they saw Toon's run, I guess."*

*P12 (Female nurse, 46 years old)*

## **Theme 4: Occupation**

From the interview data, many participants mentioned that their work was a negative influence on physical activity behaviour. There were two main points to this issue, including i) shift work and ii) working conditions.

### **Sub-theme 4.1: Shift work**

Many participants mentioned that working afternoon and night shifts were a negative influence on their physical activity participation. Most of them, when working night shifts, were likely to have difficulties in achieving physical activity participation because of tiredness and the need to rest after nocturnal shift work. If they were assigned to work on a night shift, they also needed to rest or sleep beforehand, so that they would not go anywhere or do any physical activity. They expressed it as follows:

*"Sometimes I have a morning shift and a night shift on the same day. I would not go anywhere far if I have a night shift. After the morning shift, I will find something to eat and rest before taking on the night shift. If I don't have a night shift, I will go and relax or exercise.*

*...When I have a night shift, I will not take much exercise, and I will not go out. But when I don't have a night shift, I feel more comfortable about doing other activities."*

*P1 (Female nurse, 40 years old)*

*"...if I go somewhere or go and exercise before a night shift, I feel uncomfortable. This is because I need to rest or sleep before taking a night shift."*

*P7 (Female nurse, 39 years old)*

*"Normally, if I have the double night shift, I will not go and exercise. I will rest myself after the night shift because of tiredness, so I don't (exercise). However, if I have only one night shift, I will go and (exercise) in the evening."*

P11 (Female nurse, 42 years old)

Some participants said that afternoon and night shifts block them from going to exercise.

*"I usually work on night shifts. I think exercise in the morning is suitable, because of the nice atmosphere I could do much more exercise. But it would be hard to do that after a night shift, so to quit night shift would be better."*

P3 (Female nurse, 50 years old)

*"If I work more on the afternoon shift, I won't go exercising."*

*"Morning or night shift is OK. If there is more morning shift, this would be very good."*

P20 (Female nurse, 39 years old)

*"If I go, I have to finish the morning shift because it (the gym) will be open in the evening but mostly I work on afternoon shifts. Therefore, I'm hardly going."*

*"Someone has told me that "if you always have afternoon shifts, you should go in the morning. Go to the park in the morning". I said that "I sleep at 2 a.m., if you asked me to get up at 6 a.m. (then) go to the park at 7 a.m., I can't. So what? I'm not going."*

P2 (Female nurse, 40 years old)

*"..I used to ask the ward manager whether she could give me a double or triple morning shift. I don't want a triple or quadruple afternoon shift. I would like just one-morning shift, then an afternoon shift, because I would like to go and exercise."*

P5 (Female nurse, 33 years old)

Furthermore, long working hours or working lots of double shifts also affected their physical activity. One participant said:

*"I have a lot of double shifts and then a few days off. After work, when I go back to my room, I am tired and will sleep. I will wake up in the late evening, so I can't go and exercise at all."*

P16 (Female nurse, 46 years old)

### Sub-theme 4.2: Working conditions

Thai surgical nurses were assigned to work in the form of performing nursing care of surgical patients. Due to the nature of their job or their working conditions, many participants reported feeling exhausted after work, so they did not want to do anything else. Also, they did not want to do exercise after work. Some participants said:

*"I would not want to exercise because I have walked about 10 hours during my working day already."*

*"...My major problem is about working. I don't know what I will have to handle each shift. If I am not too tired, I will go and exercise. But if I am worn out, I won't exercise much."*

*P1 (Female nurse, 40 years old)*

*"Normally, nurses working in ICU don't have time to do that (do exercise), I would say. Because they have a heavy workload at work and also have a lot of double shifts, they will be tired from work and won't want to do exercise."*

*P10 (Female nurse, 42 years old)*

## 4.4 Chapter summary

This chapter presents the research finding from interviews with twenty Thai surgical nurses. The findings are divided into three parts. The first part presents descriptive information of participants' demographic data. The second part provides a comprehensive insight into the concept of physical activity amongst a group of Thai surgical nurses. The third part reports a broad range of factors which influenced participants' physical activity engagement.

From the interviews, the participants raised themes about their lifestyle, usual daily routines and activities. The major factors influencing physical activity amongst this group of Thai surgical nurses involved health, time, environment, and occupation. The findings provide alignment with the concept analysis.

The next chapter will present a discussion of the research findings.

# Chapter 5 Discussion

## Introduction

This chapter presents a discussion of the key findings, critical evaluation and recommendations with regard to this research study. The summary of the study findings was drawn from 20 Thai surgical nurses which presented a broad perspective of the concept of physical activity and the factors influencing their participation in physical activity. The chapter will conclude with a summary of the study's key findings. The structure of this chapter will start with a discussion of the findings in relation to each specific area, followed by the study's limitations and recommendations for future research and practice.

### 5.1 Key finding 1: The concept of physical activity

#### 5.1.1 The participants' perspectives on physical activity

In this study, there was a range of perspectives on the value and utility of physical activity, as a means to avoid, protect against or prevent workplace injury, among the participants. The findings show that the study sample had a broad perspective of the concept of physical activity, which resonates with previous research (Caspersen et al. 1985; Eyler et al. 1998; World Health Organization 2016). Caspersen et al. (1985) demonstrated that physical activity, as with any activity which involves bodily movement produced by skeletal muscles, results in energy expenditure. The World Health Organization (2016) categorises physical activity in a variety of ways, including physical activity occurring when travelling (e.g. walking or cycling), as a component of leisure time, and as part of work. Regarding the finding from the concept analysis, characteristics of physical activity for patients with health conditions (musculoskeletal disorders, diabetes, and cardiovascular disease) were involved in both formal and informal exercise (see Section 3.6.3.3.2, page 91). Also, other research has shown that undertaking household chores and walking are recognised way of engaging in exercise (Van Rooijen et al. 2002). A similar study among minority women found that, while participants did not identify themselves as "exercisers", they indicated they undertook sufficient physical activity from caregiving, housekeeping, and workday activities (Eyler et al. 1998).

As a broader definition of physical activity, "child care" may be construed as a very physical activity, however, some participants in this study did not necessarily

find this to be the case. They perceived that taking care of children or grandchildren would keep them from being physically active. It seems to be that the participants did not realise or appreciate that this activity may count toward daily quotas of physical activity.

Therefore, the participants' perspectives on what physical activity actually is should be clarified. Also, the use of accelerometers might be examined to address the limitations of objective measurements of the level of physical activity in this group.

### **5.1.2 Types of physical activity**

From the findings of this study, it was clear that the participants preferred a range of different kinds of activities. Some participants preferred to undertake physical activity on their own rather than as part of a group or class (King et al. 1990), such as walking, cycling, and running, because they could undertake the activity anywhere and at any time (that is, without having to be tied to specific times of exercise 'classes', for example). According to Sherwood and Jeffery (2000), physical activity on one's own can be undertaken anywhere and anytime, and access to exercise facilities may not necessarily affect exercise behaviour. Some participants preferred unstructured exercise (Brownell et al. 1980; Blamey et al. 1995) such as doing household chores, gardening, dancing, shopping, walking a dog, and even walking in a forest. Some individuals preferred more structured activities, for example involving the use of exercise equipment in a gym setting or fitness centre (Sherwood and Jeffery 2000; French et al. 2001). Also, equipment such as pedometers or some mobile applications has been shown to be effective in promoting physical activity amongst this respondent group of Thai surgical nurses. Some participants used mobile applications (e.g. Endomondo, Pacer, and Walker) to record their fitness and health statistics which demonstrated a pre-existing concern for their health and fitness levels, and also reinforced a desire to engage in and possibly increase physical activity levels. A similar finding was reported in the concept analysis (see Section 3.6.3.3.2, page 91), in which a pedometer acted as a positive reinforcement for walking in older adults with osteoarthritis of the knee (Talbot et al. 2003). Also, among diabetes and cardiovascular patients, a pedometer has been used as part of a programme to increase physical activity self-efficacy levels, as it helps to act as a motivation, as tangible results are observable quickly, reinforcing a sense of achievement (Gleeson-Kreig 2006; Gany et al. 2014). This might also be related to the use of fitness equipment (e.g. treadmill, exercise bike, elliptical and rowing machine), in

which individuals can monitor their step count, heart rate, calories burned, and activity levels that show how they progress and what might motivate them to increase physical activity levels. Therefore, the use of technology to provide feedback in real time about individuals' level of physical activity and help them set and achieve goals to become more active could be explored.

## 5.2 Key finding 2: The factors influencing physical activity

The factors influencing the nature and form of physical activity amongst this group of Thai surgical nurses involved a complex range of factors. The main themes identified as influential in Thai surgical nurses' participation in physical activity were health, time, environment, and occupation.

### 5.2.1 Health

Previous studies support this study finding in terms of identifying the key motivation for nurses and their perceived benefits of exercise (Kaewthummanukul et al. 2006; Esposito and Fitzpatrick 2011; Kolbe-Alexander et al. 2014; Almajwal 2015; Bakhshi et al. 2015). In this study, the greatest perceived benefit from physical activity was preventive health, followed by benefits for physical performance, life enhancement, and psychological health.

It may be that, because all the participants were nurses, they had a good knowledge of the effects of physical activity, and an awareness of the need to undertake physical activity to prevent a range of possible health problems linked to workplace demands. Interestingly, those participants with existing health problems were actually more likely to be physically active. Although some of the participants had health problems-related workplace injuries, such as leg pain, knee pain, neck pain, and shoulder pain, they still kept exercising and exercised regularly. One possible reason may be that they wanted to promote recovery from their health problems and wanted to regain and retain a healthy lifestyle. This is linked to the data elicited from the concept analysis, in which the physical activity for musculoskeletal health is linked more strongly to improved musculoskeletal fitness, health status and overall quality of life (see Section 3.6.3.4, page 93).

Similarly, many studies have shown that illnesses or existing health conditions (e.g. musculoskeletal, diabetes, and cardiovascular conditions) can trigger concern for health and the adoption of an active lifestyle (Hellman 1997; Cooper et al. 2002; Lawton et al. 2006; Korkiakangas et al. 2009; Jinks et al. 2010; Hamer et al. 2014). Moreover, image or aesthetic results also play an important

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role in persuading and influencing nurses in this study to undertake physical activity. Motivations varied, including a concern to control body weight within an acceptable range in order to be healthy, whilst others were already in a healthy weight range but participated in physical activity in order to improve their physical appearance and physique. The emergence of this result aligns with the findings of Bakhshi et al. (2015); being overweight or obese was positively associated with nurses' physical activity, and indicated that they perceived their health to be threatened.

This phenomenon can be linked to the theory of health behaviour change in which a perception of risk is a central factor in the majority of psychological models of behaviour change, and it appears to be a key ingredient in creating behaviour change (Rosenstock 1990; Conner and Norman 2005). As part of the findings, while the participants perceived their health to be threatened by obesity, having health conditions, and getting older, they are more likely to adhere to physical activity. The phenomenon may also be linked to the theory of human motivation as identified in Maslow's hierarchy of needs, that identified the basic types of motivation and the order in which people would tend to acquire and accrue the required needs. Safety is the second most fundamental need in Maslow's hierarchy (Maslow 1943). The participants with a life-threatening health problem would have a greater need to feel safe, thus were more likely to undertake physical activity to prevent a range of possible yet preventable health problems.

However, there were some participants who reported adverse experiences in attempting to do physical activity, such as musculoskeletal injury, tachycardia, and headaches during exercise. The study findings align well with earlier studies that showed physical activity is associated with the potential for musculoskeletal injury (Morrow Jr et al. 2012) and cardiac-related complications (Myers 2003). Negative experiences as a consequence of adhering to physical activity participation can lead to lower physical activity self-efficacy and lower physical activity participation (Voskuil and Robbins 2015). Therefore, an approach which specifically asked Thai surgical nurses to tell their story of a positive and, or negative experience of physical activity participation might be needed.

### 5.2.2 Time

A lack of time was identified as a common barrier to physical activity participation in this study. This finding is consistent with results from a study in the Western Cape, South Africa, in which a lack of time was the main barrier to regular physical activity among nurses (Kolbe-Alexander et al. 2014). Equally, a study in adult workers in North Carolina found that a lack of time was the primary reason for an inactive lifestyle among study participants (Stutts 2002). Some participants in this study reported having to spend time taking care of parents or family, creating a perceived obstacle to exercise. This may equally apply to Thai culture, as women are perhaps more encultured and subject to social expectations to be more family-oriented, where the role of women as main caregivers and housekeepers predominates. With all these responsibilities, it is unsurprising that many report that there is a lack of time to engage in formal exercise.

However, activities such as household chores, taking care of a parent or family, and taking care of children or grandchildren may be construed as very taxing and demanding forms of physical activity. A study in Saudi Arabia demonstrated that female nurses who were married were more likely to spend time taking care of family and home chores, but could actually engage in more physical activity in comparison with unmarried nurses (Almajwal 2015). It may be that physical activity is generated by family commitments involving physically assisting elderly family members, walking children to school, supporting frail older people, all in the context of daily living and family activities. According to Lear et al. (2017), physical activity of any type (recreational or non-recreational physical activity) is beneficial. Physical activity deriving from non-recreational physical activity, such as during transportation, housework, and occupational physical activity, has the potential to achieve higher physical activity. Therefore, amongst nurses living with time constraints, this might constitute an alternative way of undertaking exercise and may be an interesting area to explore further.

Clearly, cultural and social expectations, and gender roles may play a part in the perception of available time for exercise.

Nevertheless, some participants viewed the time issue as less of a major barrier to physical activity, as a lack of motivation. According to King et al. (1992), perceptions of lack of time might represent a lack of interest or commitment to physical activity. It might be concluded that a perception that they are unable to engage in physical activity reinforces their inactivity. Similar findings were also reported in other previous research (Sherwood and Jeffery 2000; Stutts 2002;

Trost et al. 2002; Voskuil and Robbins 2015), in which an individual's beliefs and confidence in an ability to achieve desired goals play an important role in becoming more physically active. Therefore, amongst this study group, goal planning and self-efficacy for participation in physical activity may be a useful area to explore further in future.

### 5.2.3 Environment

#### 5.2.3.1 Physical environment

In the present study, weather or outdoor temperature was a frequently reported barrier to physical activity. This is also consistent with previous research, which found that the weather or outdoor temperature can contribute to a reported lack of physical activity among nurses (Almajwal 2015). The tropical climate of Thailand is characterised by a hot, humid environment almost throughout the year, with daily temperatures ranging from a minimum of 10° C in winter to over 40° C in the summer; such climate is normally not conducive to engaging in physical activity. This problem is compounded by the phenomenon of periodic air pollution in the North of Thailand, especially in Chiang Mai, due to seasonal crop burning, that creates a constant pall of smoke which permeates the urban atmosphere for long periods ('smoky season'). Because Chiang Mai is situated within the centre of a ring of surrounding hills and mountains, the smoke generated by crop burning accumulates over the city, similar to a fog consequent upon a temperature inversion. This ensures the pall of smoke remains in situ over the city for long periods throughout the burning season, and continues to rest over hospitals and urban area. Chiang Mai's "smoky season" occurs during early January and may continue until the middle of May. Hence, during this period of time, outdoor activities such as walking, running, and cycling are often not considered a viable option as far as exercise is concerned, given the anxiety over the adverse health effects of air pollution.

Moreover, concern over neighbourhood safety issues also affected participants' physical activity participation. This is consistent with findings from a previous survey elsewhere, in which more than 50% of respondents indicated they would walk, or walk more, if there were safe pathways and crime was not a consideration (U.S. Department of Transportation 1994). In this recent study, some participants tried to avoid outdoor activities (e.g. walking and cycling) and tended to go to sports facilities rather than risk outdoor activities as a result of similar safety concerns.

Even though crime rates in Chiang Mai are relatively low, pedestrian safety in Chiang Mai is a greater concern. Many areas in Chiang Mai lack adequate walking trails, pavements or malls for walking or cycling. Some local drivers are considered to be less concerned with pedestrian safety or the wellbeing of foot traffic, creating a sense of risk among pedestrians (OSAC 2017). Unsurprisingly, pedestrians have to be extra cautious of vehicles driving on the road and be constantly alert to danger from urban traffic. For this reason, it is understandable that many participants tended to go to sports facilities for exercising, rather than risk using hazardous and inadequate pavements or walkways.

However, costs and transportation associated with exercise facilities were a reported barrier in and of themselves. Transportation, fees (at exercise facilities), and sports equipment (such as walking shoes) can be costly, especially for relatively low-income individuals trying to save money. The monthly income of Thai nurses ranges from 15,000–50,000 Thai Baht (roughly 350–1,150 British Pounds), which is considered relatively low income, and this may affect their perceived capacity to exercise. Economic limitations in buying sports equipment and in membership of sports facilities were evident among nurses, described in a previous study as a main barrier to physical activity (Almajwal 2015).

Several of the physical environment barriers might be altered by the promotion of physical activity policies which make neighbourhoods environmentally suitable for physical activity (Mier et al. 2007). An example of such a policy would be the building and maintenance of walking trails, modifying environments to enable access to facilities much closer to work or home, and incorporating low cost exercise facilities such as gyms or fitness centres to facilitate physical activity participation.

### **5.2.3.2 Sociocultural environment**

One key finding from this study is supported by Kaewthummanukul et al. (2006) and Persson and Mårtensson (2006) in which social support from family members, friends, acquaintances or co-workers was positively associated with physical activity participation among nurses. A possible reason for this finding may be that most of the participants were single and lived in hospital dormitories or apartments, where they could spend time with their friends or co-workers in these residential facilities, and could thus encourage each other to do exercise together. In addition, they also reported that they often shared exercise routines, adopting exercise with friends and colleagues which strengthened their ability to adopt an active lifestyle. That means friends and colleagues had an important

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role as conversation partners and in providing mutual support and motivation. Similarly, Rothman (2000), found that a desire for a healthy lifestyle is promoted by communication and reflection with others. Moreover, friends, co-workers, family members, and celebrities or actors have been shown to be effective as role models and motivators to participate in physical activity. For example, Bailey et al. (2004), found that some people such as family members, sports celebrities, actors or entertainers can be role models who help foster an individual's motivation and drive to exercise. A possible explanation may be related to the concept of anticipatory socialisation, in which non-group-members learn to take on the values and standards of groups that aspired them to join, to ease their entry into the group and help them interact once they have been accepted by it (Wilcoxon 2007).

An example of such role models who inspire Thai people to do exercise includes sports celebrities, actors or actresses or entertainers. From the findings, Toon Bodyslam who is a rock super star in Thailand. He was a role model as a runner. Toon Bodyslam's run is an interesting phenomenon in Thai society. In 2017, he took part in a charity run to raise funds for 11 hospitals in the country. His project also inspired people to appreciate the importance of physical exercise and good health in the hope of spreading the idea that prevention is better than cure. The run project attracted many people and organisations. Following Toon's run, there are now more Thai people doing exercise and more charity runs or marathon projects happening throughout Thailand. Therefore, it is possible that role modelling in sport and physical activity can be a relevant motivation influencing physical activity participation among Thai surgical nurses.

Another interesting finding from this study related to Government and organisation policy interventions designed to promote healthy activity among state employees or public-sector workers, notably in the form of "exercise on Wednesday afternoons". This policy is also reflected in several studies (Tullar et al. 2010; Hensel 2011; Yancey et al. 2013; Cowell 2014; Kolbe-Alexander et al. 2014; Bakhshi et al. 2015; Chin et al. 2016) suggesting that healthcare organisations or workplaces sometimes structure policy or strategies to provide an alternative way of adopting exercise among nurses. Intriguingly, however, most participants did not join the activity with this public policy. A possible explanation may be found in the ward staff's working conditions, where the activity time (3.00–4.00 pm.), activity place (football field), and outdoor temperature in summer were not conducive to joining in, thus a reduced number of staff engaged in the activity. Perhaps greater thought and planning of these

policy-driven initiatives might promote participation, if issues such as time, weather conditions and venue are taken into account more fully.

#### 5.2.4 Occupation

One of the most important factors related to determinants of physical activity participation among the study group was occupational demands and requirements, such as shift work, length of service, and work assignment. Most of the participants, when working night shifts, were likely to have difficulties in achieving physical activity participation, unsurprisingly because of tiredness and the need to rest after nocturnal shift work. If they were assigned to work on a night shift, they also needed to rest or sleep beforehand. Clearly, the disruption to normal daily activity and routine was an important determinant. In addition, nurses working on night shifts, who were free during the daytime, sometimes gave priority to doing something else instead of doing physical activity. This study finding is consistent with other studies (Kaewthummanukul et al. 2006; Persson and Mårtensson 2006; Zhao et al. 2011; da Costa Fernandas et al. 2013; Peplonska et al. 2014; Chin et al. 2016) showing that night shift working is a negative influence on physical activity participation among nurses. However, this finding contrasts with other previous research in Swedish nurses working night shift (Persson and Mårtensson 2006). A possible reason for this difference may be that nurses' work assignment or job is different between Swedish and Thai nurses. While the night shift Swedish nurses was organised in the form of visiting the clients by car and attending them in their home (Persson and Mårtensson 2006), the night shift Thai surgical nurses were assigned to work in the form of performing nursing care of surgical patients. The higher workload performed by Thai surgical nurses, such as lifting and transporting patients, spending long periods in a standing position, and participating in medical team rounds may be relevant (Attar 2014). Therefore, greater demands or responsibility among the Thai surgical nurses working night shifts may be relevant and may be associated with less engagement in physical activity. Similarly, longer length of service or longer working hours also affected physical activity participation among the study sample. Furthermore, especially with a group of younger staff, of the practice of assigning double shifts may be particularly important as an obstacle to engagement in physical exercise. This finding is also supported by da Costa Fernandas et al. (2013) and Chin et al. (2016), showing that longer working hours acts as a negative influence on physical activity participation among nurses.

### 5.3 Limitations and potential biases

There are several limitations and potential biases to this study, which can be grouped as a) factors related to the study sample, and b) methodology and data gathering approaches used.

First, the selected research participants appeared to be the most important factor which could shape the study findings. All Thai surgical nurses who participated in this study were working at the Maharaj Nakorn Chiang Mai Hospital only. Hence, this study may not include different perspectives from surgical nurses who work in other organisations and nurses working in other sections, each having a unique context. It should be noted that the finding of this study came from 20 Thai surgical nurses who worked at the Maharaj Nakorn Chiang Mai Hospital, Thailand. Therefore, transferability from these findings may be limited. The findings may only be applicable to others from the same department and organisation.

Second, the participants were asked about those lifestyle and daily routines and activities that might be sensitive in nature, and might make the participants hesitant about discussing them in the interviews. Additionally, cross-sectional interviews were used to seek and explore Thai surgical nurses' views, attitudes, reasons, and experiences which are related to physical activity participation. The data provided was subjective which individuals may change over time and at any time. Also, individuals' behaviour might be changed resulting from their thoughts, reasons, and attitudes. Hence, regular assessments of a current evidence of this area may be crucial.

Another limitation and potential bias of this study is selection bias. Once the participants met the inclusion criteria, they agreed to participate in this study because they thought interview location and time were convenient, thus omitting those nurses who met the inclusion criteria but may have had other constraints such as no available time.

Although the generalizability of this qualitative study is limited, the interview methodology used can provide insight into a range of meanings offered by the participants. That is still a viable way to gain information that is not easily obtained through quantitative methods. Therefore, the research study makes a valuable contribution to the existing literature, despite its limitations.

## 5.4 Recommendations for future research

Following a discussion of the key findings and the study limitations, recommendations for further research include the following points:

- I. The study sample included only Thai surgical nurses who were working at the Maharaj Nakorn Chiang Mai Hospital. Future studies including nurses working in other speciality areas within the hospital, or from other organisations in urban Thai cities and a multi-centre study conducted with surgical nurses working at more than one hospital will be important. This study type will help to include a wider range of surgical nurses in different hospitals, and address geographical issues and variance, all of which increase the generalizability of the study.
- II. As an initial qualitative study, this research has enabled further work to be considered which might be longitudinal studies, using quantitative or other qualitative approaches, guided by the results obtained in this qualitative work.
  - 1) One thing that has emerged from the study is that pedometers or mobile applications have been shown to be effective in promoting physical activity among this group of the participants. Pedometers can be used successfully as part of a goal-setting programme to increase both the number steps taken daily and the pace at which individuals walk. Activities such as household chores and taking care of family members can be construed as a kind of physical activity. Therefore, it is interesting to explore the use of technology (e.g., pedometer, smart phone, and smart watch) to provide feedback in real time about individuals' level of physical activity and help them set and achieve goals to become more active.
  - 2) Self-efficacy is one of the best predictors of successful increases of physical activity among the participants. As the participant's perception that they are unable to participate physical activity due to the time issue reinforces their inactivity. Therefore, amongst this study group, self-regulation through goal setting and self-efficacy for participation in physical activity may be a useful area to explore further in future.
  - 3) Some participants reported negative experience with their physical activity participation such as musculoskeletal pain, tachycardia, and headaches during exercise. Therefore, a narrative study which specifically asked this group regarding their positive and negative experiences of physical activity participation might be needed.

## 5.5 Recommendations for clinical practice

Being physically inactive is associated with individual's poorer health and well-being, which includes both physical and mental health. These can result in reduced work efficiency, absenteeism, presenteeism, and substantial costs (Schultz and Edington 2007; Lahti et al. 2010). In relation to Thai surgical nurses, they need to be encouraged to engage in physical activity in order to improve their musculoskeletal fitness, health status, and overall quality of life, as well as to reduce the risk of premature death related to compromised cardiovascular health and diabetes. Following from this, there are likely to be benefits to individual nurses and patients (micro level), wards and services (meso level), as well as the wider and national health economy (macro level). Therefore, employers or health care managers should be concerned about this when designing facilities and implementing health promotion programmes in the workplace.

Information elicited from the findings regarding enabling factors and barriers to engagement in physical activity among Thai surgical nurses can be used to make recommendations for further health promotion programmes including the following points:

*I) Behavioural*; nurses have good knowledge of the effects of physical activity, and an awareness of the need to undertake physical activity to prevent a range of possible health problems. Although some participants had health problems-related to musculoskeletal injuries, they still kept exercising and exercised regularly. That was because they wanted to promote recovery from their health problems and wanted to regain and retain a healthy lifestyle. Hence, ways in which to assist this study group in the development of behavioural management skills that enable them to adopt and maintain behaviour change and/or to create environments that facilitate and enhance behaviour change might be crucial.

*II) Environmental or policy*; as the previous organisation policy provided an alternative way of adopting physical activity among workers in the form of "Exercise on Wednesday Afternoon". Most of the participants could not join this activity within the hospital policy due to the activity time and place, additionally outdoor temperatures were not conducive to joining in. Therefore, it might be useful to change or modify the structure of physical activity times, venues and organisational environments to provide attractive and convenient places for physical activity.

The next chapter will present a conclusion of this research study.



# Chapter 6 Conclusion and personal reflection

## Introduction

This chapter provides clarity as to how the researcher has fulfilled the purpose of this thesis. The chapter will focus on the key areas and messages that are the culmination of this thesis, followed by personal reflection regarding the researcher's experiences in the whole process of the research.

### 6.1 Conclusion

This dissertation aimed to explore the concept of physical activity for musculoskeletal health, and to explore and understand the factors which influence engagement in physical activity among Thai surgical nurses.

This study has explored the concept of physical activity and assessed the maturity of the concept of physical activity for musculoskeletal health. This process allowed the framing of a proposed definition for physical activity for musculoskeletal health, and exposed the maturity of the concept. In considering the physical activity for musculoskeletal health, the concept is linked more strongly to improved musculoskeletal fitness, health status and overall quality of life. This is also linked well to the data elicited from interviews, in which the participants with musculoskeletal injury undertook physical activity in order to promote recovery from their health problems, and they wanted to be as healthy as possible.

In addition, this study contributes to the understanding of the factors influencing the nature and form of physical activity amongst Thai surgical nurses. As indicated in the results, there appear to be many factors influencing physical activity participation. The major factors influencing physical activity involved perceived health benefits, leisure time for exercise, environmental constraints, and occupation. Even the factors influencing physical activity among this group of Thai surgical nurses seemed to be similar to previous studies, both from nurses in other countries and other groups of people. There were some issues or information related to culture, environment, and occupation that were more specific to this study group.

A qualitative approach to this problem area has provided a deeper understanding from Thai surgical nurses' perspectives, and this has provided some key findings that have the potential to influence both future research and practice. All of which

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have fulfilled the purpose of the study which is to explore the factors influencing physical activity participation among Thai surgical nurses, in order to generate a baseline understanding in a hitherto unresearched area.

For further research, it is hoped that insights drawn from this data might then be used to inform assessments of different groups of nurses, such as nurses working in other settings and other organisations. Additionally, the results attained in this qualitative work might be used to guide longitudinal studies using quantitative or other qualitative approaches. The three main areas are; i) the use of technology to measure physical activity level, ii) goal setting and self-efficacy to be more physically active, and iii) negative experience of physical activity participation. Furthermore, there are some recommendations that have the potential to influence clinical practice, including two main points; i) assisting behaviour change and ii) workplace exercise structure.

Regarding the research ideas emerging from this work, these will be carried out as my further research. The planned further research will enhance the opportunity of promoting physical activity among Thai surgical nurses, and therefore achieve the desired benefits of improved musculoskeletal fitness, health status, and overall quality of life.

### 6.2 Personal reflection

Reflection is crucial for this qualitative study because it allows me as the researcher to think about previous experiences regarding each process of the study; helping to improve my knowledge and research skills for conducting future qualitative research projects.

Concerning the whole process of the dissertation, it can be said that, overall, it was a very intriguing and exciting experience, which widened my horizons and expanded my knowledge. Generally, my type is a person who loves to learn and always seeks to obtain more knowledge in and out of the classroom. I am especially passionate about learning things that relate to my career as both a clinician and academic. I am interested in the factors relevant to engagement in physical activity for musculoskeletal health among Thai surgical nurses.

In considering the ontological and epistemological underpinnings the study, I gained insight into the relationship between the research questions, research area, and researcher. Regarding the research method, concept analysis was selected on the basis of utility in addressing the research questions, with the aim

of exploring the concept of physical activity for musculoskeletal health, and assessing the maturity of the concept. The data elicited from concept analysis helps me to explain and verify details, regarding physical activity participation in the management of work-related musculoskeletal disorders, which the participants supplied in the interviews.

According to the interviews, the Thai surgical nurses taking part in this research project were drawn from different surgical wards, but with a central focus and theme. Using semi-structured interviews was appropriate to the research study aims, and enabled me to engage more fully with the participants in a conversation, thus permitting an in-depth exploration of their experiences and views. After I had revised my interview schedule several times, and conducted a pilot study with 2 Thai surgical nurses in order to improve the clarity and validity of the interview questions and schedule, I was ready to undertake my interviews. The interviews generally went more smoothly as I went along. I also relaxed a little more with every interview, as I gained more experience, improved my interview technique, and got closer to completing the research.

I tried to conduct interviews in an open-ended style, to get full and meaningful answers from the participant's, on their views, attitudes, reasons, and experiences. I did not find difficulty in getting the participants to talk. All participants responded to the questions very well, possibly as a result of the rapport which was already established before interviews. The interviews moved from general questions on participants' lifestyles (warming up phase) to their views, reasons, and attitudes towards physical activity participation, which I expected would provide "good data" as well as "good conversation". The communication with the participants provided in-depth and rich descriptions, and allowed me to gain insights into the perspectives of the different individuals, which proved very informative and useful.

The most demanding and time-consuming requirement of the research process was transcribing the interviews, but it was the most crucial part of information gathering, and helped me make sense of the data. As five interviews were translated into the English language, the challenge was to coordinate with translators and provide sufficient time for the translated transcripts that became a challenge.

Another challenge arose with the need to choose which data to use and how much to include, and to put it together in a way that was both interesting and engaging, to produce a unique "product". As a former employee myself (surgical

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nurse), and as I conducted more and more interviews with Thai surgical nurses, I became more and more confident in my interpretation of their situations and behaviours as I understood them. This reflected a degree of a priori 'insider knowledge' on my part, which both enabled a deeper appreciation of the data, but also presented greater challenges to ensuring the validity of interpretation.

Confidentiality of individual responses had been built into this study. It was always clear to me that what the participants shared with me would remain confidential. Even the process of translating transcripts, I had to make sure that everything was anonymized before sending scripts to translators (removing names and identifiable places).

In conclusion, this study produced data that is not able to be generalised universally, as it was essentially a qualitative study examining a specific occupational group within a specific cultural context in a hitherto unresearched area. However, I have discovered some of the answers that are vital for the development of further research and also have the potential to influence clinical practice.

I spent a great deal of time doing this project, but through my journey I learned that, if I set goals and push myself, I can achieve the outcome desired. I realise that when I enjoy what I am doing, it is much easier for me to excel and give my very best. I could say that every aspect of the study has given me different but challenging experiences. My writing abilities and English skills have improved significantly. I also gained new colleagues and friends to share my academic and personal thoughts. Overall, this experience has helped me grow in an academic setting. I obviously feel that this has been both a valuable and enjoyable experience.

# Appendix A Summary of selected articles

## 1. Work-related musculoskeletal disorders and physical activity or exercise

| Title and aim   | Procedure   | Result   | Conclusion   |
|---|---|--|--|
| <p><b>Study1:</b> An intervention programme to promote health-related physical fitness in nurses (Yuan et al. 2009)</p> <p><b>Country:</b> Taiwan</p> <p><b>Aim:</b> To assess the effects of exercise intervention on nurses' health-related physical fitness.</p> | <p><b>Participants:</b> Ninety nurses from five different units of a hospital in central Taiwan.</p> <p><b>Study design:</b> A quasi-experimental study.</p> <p>The experimental group engaged in a three-month intervention programme consisting of treadmill exercise.</p> <p>Indicators of the health-related physical fitness of both groups were established</p> | <p>Before the intervention, the control group had significantly better grasp strength, flexibility and durability of abdominal muscles than the experimental group.</p> <p>After the intervention, the experimental group performed significantly better on body mass index, grasp strength, flexibility, durability of abdominal and back muscles and cardiopulmonary function.</p> | <p>The development and implementation of an exercise programme can promote and improve the health-related physical fitness of nurses.</p> <p>Nurses engage in an exercise programme while in the workplace to lower the risk of musculoskeletal disorders and to promote working efficiency.</p> |

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| Title and aim  | Procedure  | Result  | Conclusion   |
|--|--|---|--|
|  | and assessed before and after the intervention.  |   |  |
| <p><b>Study2:</b> The impact of a multifaceted ergonomic intervention programme on promoting occupational health in community nurses (Szeto et al. 2013)</p> <p><b>Country:</b> Hong Kong</p> <p><b>Aim:</b> To examine the short and long-term benefits of a multifaceted intervention programme designed especially for community nurses in Hong Kong.</p> | <p><b>Participants:</b> 50 community nurses working in 4 local hospitals in Hong Kong.</p> <p><b>Study design:</b> Participants underwent an 8-week intervention programme consisting of ergonomic training, <i>a daily exercise programme</i>, equipment modification, computer workstation assessment and typing training.</p> | <p>All participants showed significant improvement in musculoskeletal symptoms and functional outcomes comparing pre- and post-intervention results.</p> <p>Significant reduction in symptom scores was observed at 1-year follow-up compared to post-intervention.</p> <p>Symptomatic group showed more significant changes overall, compared to asymptomatic group.</p> | <p>The multifaceted ergonomic intervention programme, including a <i>daily exercise programme</i>, had both short- and long-term positive outcomes, regarding musculoskeletal symptoms among community nurses.</p> |

| Title and aim   | Procedure  | Result   | Conclusion  |
|---|--|--|---|
| <p><b>Study3:</b> Initial evidence for the buffering effect of physical activity on the relationship between workplace stressors and individual outcomes. (Sliter et al. 2014)</p> <p><b>Country:</b> USA.</p> <p><b>Aim:</b> To examine physical activity as a moderator of the stressor-strain relationship in an occupation known to be highly stressful: nursing.</p> | <p><b>Participants:</b> 152 registered nurses</p> <p><b>Study design:</b> A survey about their physical activity habits and frequently experienced stressors (patient stressors, staff demands, and workload) and psychological outcomes (depression, engagement, and life satisfaction) they experienced.</p> | <p>Physical activity explained significant incremental variance in psychological outcomes.</p> <p>Physical activity moderated a majority of the stressor-outcome relationships, such that the strength of the relationship between stressors and outcomes was weaker for those who engaged in more physical activity than for those who did not.</p> | <p>Physical activities may mitigate some of the negative consequences of work stressors.</p> <p>**Psychosocial factors are important predictors in the development of musculoskeletal disorders</p> |
| <p><b>Study4:</b> The health and fitness profiles of nurses in KwaZulu-Natal</p>  | <p><b>Participants:</b></p>  | <p>Overall poor health and fitness profiles and a high incidence of</p>  | <p>The need for health and wellness intervention</p>  |

## Appendix A

| Title and aim   | Procedure   | Result   | Conclusion  |
|---|---|--|---|
| <p>(Naidoo and Coopoo 2007)</p> <p><b>Country:</b><br/>South Africa</p> <p><b>Aim:</b><br/>To determine the health and fitness profiles of nurses working in a public hospital.</p> | <p>107 nurses from a local hospital in KwaZulu Natal, South Africa.</p> <p><b>Study design:</b><br/>A health questionnaire examining medical history, dietary, exercise and lifestyle patterns was analysed. Fitness tests determined flexibility (sit and reach), muscular strength (back and grip strength), aerobic capacity (Astrand–Rhyming cycle) and anthropometrical data (percent body fat and BMI).</p> | <p>back pain correlating with increased body fat percentages.</p>                        | <p>strategies in hospitals for the nurses was emphasised.</p> |
| <p><b>Study5:</b> Health behaviours and participation in health promotion activities among</p>  | <p><b>Participants:</b><br/>Full-time employees in 100 hospitals across Taiwan,</p>   | <p>Nurses had the lowest level of health behaviours and less participation in health</p> | <p>A workplace health promotion programme for health</p>      |

| Title and aim  | Procedure   | Result   | Conclusion   |
|--|---|--|--|
| <p>hospital staff: which occupational group performs better?<br/>(Chiou et al. 2014)</p> <p><b>Country:</b><br/>Taiwan</p> <p><b>Aim:</b><br/>To examine health behaviours among full-time employees in 100 hospitals across Taiwan.</p> | <p>including 4,202 physicians; 31,639 nurses; 2,315 pharmacists; 8,161 other health professionals, and 13,079 administrative personnel.</p> <p><b>Study design:</b><br/>Cross-sectional survey health behaviors, including physical activity, eating 5 portions of fruits and vegetables per day (5 a day), and stress adaptation, and participation in hospital-based health promotion activities by occupational groups in hospitals.</p> | <p>promotion activities than other groups.</p> | <p>professionals is needed, with special emphasis on nurses.</p> <p>Hospital-based health promotion programmes could take the differences of occupational groups into consideration to tailor programmes to meet the needs of different occupational groups.</p> |

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| Title and aim  | Procedure  | Result  | Conclusion  |
|--|--|---|---|
| <p><b>Study6:</b> Prevalence, consequences and predictors of low back pain among nurses in a tertiary care setting (Abolfotouh et al. 2015)</p> <p><b>Country:</b><br/>Qatar</p> <p><b>Aim:</b></p> <ol style="list-style-type: none"> <li>1. To estimate the prevalence of LBP using different measures.</li> <li>2. To determine medical and professional consequences of LBP.</li> <li>3. To determine the associated factors and significant predictors of LBP.</li> </ol> | <p><b>Participants:</b><br/>254 nurses from different departments/wards at Hamad General Hospital (HGH), Doha, Qatar</p> <p><b>Study design:</b><br/>A cross-sectional study</p> | <p>The high levels of back pain in nursing.</p> <p>Difficult or impossible activities of daily living were reported due to LBP.</p> <p>Work stop due to LBP was reported by 76.8 % of nurses, with <math>2.03 \pm 3.09</math> days within the last year.</p> <p>*Sports practice was the significant predictor of LBP among nurses.</p> | <p>The prevalence of LBP among nurses at HGH is high and should be actively addressed.</p> <p>*Preventive measures should be taken to reduce the risk of lower back pain, such as sports activity programmes.</p> |
| <p><b>Study7:</b> Effectiveness of a releasing exercise program on</p>   | <p><b>Participants:</b></p>  | <p>At weeks 12 and 24, the experimental group had</p>   | <p>The REP effectively reduces anxiety and enhances self-</p>   |

| Title and aim   | Procedure   | Result  | Conclusion  |
|---|---|---|---|
| <p>anxiety and self-efficacy among nurses (Chen et al. 2016a)</p> <p><b>Country:</b><br/>Taiwan</p> <p><b>Aim:</b><br/>To evaluate the effectiveness of a releasing exercise programme (REP) on anxiety and exercise self-efficacy among nurses</p> | <p>99 nurses experiencing anxiety</p> <p><b>Study design:</b><br/>An experimental group (<math>n = 50</math>) that received 50-min REP sessions 3 times a week or a control group (<math>n = 49</math>) that did not attend REP sessions.</p> | <p>significantly lower anxiety levels and higher exercise self-efficacy scores than the control group.</p>  | <p>confidence in exercise capability.</p>   |
| <p><b>Study8:</b> Effectiveness of a stretching exercise program on low back pain and exercise self-efficacy among nurses in Taiwan: a randomized clinical trial (Chen et al. 2014a)</p>  | <p><b>Participants:</b><br/>127 nurses, who had been experiencing LBP for longer than 6 months and had LBP with pain scores greater than 4 on the visual analogue scale for pain (VASP).</p>  | <p>The experimental group had significantly lower VASP scores than did the control group. The experimental group showed significantly higher exercise self-efficacy than did the control group.</p> | <p>Enhance self-care capabilities with SEP for nurses that experience LBP or are vulnerable to such work-related pain. SEP is an effective and safe non-pharmacological intervention for the management of LBP.</p> |

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| Title and aim   | Procedure   | Result  | Conclusion   |
|---|---|---|--|
| <b>Country:</b><br>Taiwan<br><br><b>Aim:</b><br>To examine the effectiveness of a stretching exercise programme (SEP) on low back pain (LBP) and exercise self-efficacy among nurses in Taiwan. | <b>Study design:</b><br>The experimental group (n = 64) followed an SEP, whereas the control group (n = 63) was directed to perform usual activities for 50 minutes, three times a week.        |   |  |
| <b>Study9:</b> The effects of compensatory workplace exercises to reduce work-related stress and musculoskeletal pain (de Freitas-Swerts and Robazzi 2014)<br><br><b>Country:</b><br>Brazil     | <b>Participants:</b><br>30 administrative workers from a higher education public institution.<br><br><b>Study design:</b><br>Quasi-experimental research with quantitative analysis of the data | Workplace exercise was a statistically significant pain reduction in the neck, cervical, upper, middle and lower back, right thigh, left leg, right ankle and feet. | Workplace exercise promoted a significant pain reduction in the spine. |

| Title and aim   | Procedure  | Result  | Conclusion  |
|---|--|---|---|
| <p><b>Aim:</b><br/>To assess the effect of a compensatory workplace exercise programme on workers with the purpose of reducing work-related stress and musculoskeletal pain.</p>  |  |   |   |
| <p><b>Study 10:</b> Factors related to musculoskeletal disorders in nursing workers<br/>(Fonseca and Fernandes 2010)</p> <p><b>Country:</b><br/>Brazil</p> <p><b>Aim:</b><br/>To identify factors associated to musculoskeletal disorders in nursing auxiliaries and technicians in Salvador – Bahia.</p> | <p><b>Participants:</b><br/>308 female workers</p> <p><b>Study design:</b><br/>Cross-sectional study</p> | <p>Musculoskeletal disorders in distal upper extremities are associated to physical demands (repetitiveness and force) and years of work.</p> | <p>The need for intervention strategies, incorporating both the organisational aspects of work and adaptations in the physical environment and in the characteristics of tasks.</p> |

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| Title and aim   | Procedure  | Result  | Conclusion  |
|---|--|---|---|
| <p><b>Study11:</b> Risk factors for musculoskeletal pain amongst nurses in Estonia: a cross-sectional study<br/>(Freimann et al. 2013)</p> <p><b>Country:</b><br/>Estonia</p> <p><b>Aim:</b><br/>To describe the prevalence of musculoskeletal pain (MSP) amongst Estonian nurses, and to explore associations with personal characteristics and occupational risk factors.</p> | <p><b>Participants:</b><br/>221 female registered nurses at Tartu University hospital</p> <p><b>Study design:</b><br/>Cross-sectional survey</p> | <p>The prevalence of MSP among Estonian nurses is high. Low back, neck and knee were the sites most commonly painful.</p> <p>Pain was significantly associated with older age and tendency to somatise.</p> | <p>The high frequency of work-related musculoskeletal disorders in Estonia.</p>   |
| <p><b>Study12:</b> Impact of a physical activity program on the anxiety, depression, occupational stress and burnout syndrome of nursing professionals</p>  | <p><b>Participants:</b><br/>Twenty-one nursing professionals</p>   | <p>The WPA did not yield significant results on the levels of anxiety, depression, burnout or occupational stress.</p>  | <p>The WPA did not lead to beneficial effects on occupational stress and psychological variables, but it was well accepted by the</p> |

| Title and aim  | Procedure   | Result   | Conclusion  |
|--|---|--|---|
| <p>(Freitas et al. 2014a)</p> <p><b>Country:</b><br/>Brazil</p> <p><b>Aim:</b><br/>To assess the effects of a workplace physical activity (WPA) programme on levels of anxiety, depression, burnout, occupational stress and self-perception of health and work-related quality of life of a nursing team in a palliative care unit.</p> | <p><b>Study design:</b><br/>A quasi-experimental, pre-post intervention study</p> | <p>*However, after the intervention, participants reported improved perceptions of bodily pain and feeling of fatigue at work.</p> | <p>nursing professionals, who reported improvement in perceptions of health and work-related quality of life.</p> |
| <p><b>Study13:</b> What makes a healthier nurse, workplace or leisure physical activity? Informed by the Australian and New Zealand e-Cohort Study</p>   | <p><b>Participants:</b><br/>The nurses and midwives e-Cohort Study (NmeS)</p>     | <p>Improved well-being can be achieved through leisure-time physical activity.</p>   | <p>Nurse should consider leisure-time physical activity necessary to maintain and prolong health and that</p>     |

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| Title and aim  | Procedure   | Result   | Conclusion   |
|--|---|--|--|
| <p>(Henwood et al. 2012)</p> <p><b>Country:</b><br/>Australian and New Zealand</p> <p><b>Aim:</b><br/>To investigate health differences between nurses who report meeting the daily physical activity recommendations in or away from the workplace.</p> | <p><b>Study design:</b><br/>e-Cohort Study</p>  |  | <p>workplace activity is not a sufficient stimulus.</p>  |
| <p><b>Study14:</b> Prevalence and risk factors associated with low back pain among health care providers in a Kuwait hospital<br/>(Landry et al. 2008)</p> <p><b>Country:</b><br/>Kuwait</p>   | <p><b>Participants:</b><br/>344 health professionals working in a Kuwait hospital.</p> <p><b>Study design:</b><br/>A cross-sectional survey</p> | <p>Lifetime prevalence of LBP in the sample was 70.9%, and point prevalence of LBP was 21.5%.</p> <p>Factors associated with acute LBP included direct patient contact, performing patient lifts and/or transfers, low job</p> | <p>Direct patient contact that includes lifting and/ or transferring patients may be an important risk factor.</p> |

| Title and aim   | Procedure  | Result  | Conclusion   |
|---|--|---|--|
| <b>Aim:</b><br>To investigate the prevalence and factors associated with low back pain (LBP). |  | satisfaction, and poor self-reported health status.<br><br>The prevalence ratio (PR) of reporting acute LBP was also found to increase as a function of the number of daily lifts/transfers performed.<br>Other factors generally associated with LBP, such as age, sex, professional experience.<br><br>Smoking and exercise were not found to be significantly associated with LBP in this study. |  |
| <b>Study15:</b> The effect of yoga on coping strategies among intensive care unit nurses      | <b>Participants:</b><br>34 female nurses working in ICU. | The highest application of stress coping strategies was for   | Yoga can be considered as a complementary treatment to |

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| Title and aim  | Procedure   | Result  | Conclusion   |
|--|---|---|--|
| <p>(Mehrabi et al. 2012)</p> <p><b>Country:</b><br/>Iran</p> <p><b>Aim:</b><br/>To investigate the effect of Yoga on stress coping strategies among nurses working in intensive care units (ICUs).</p> | <p><b>Study design:</b><br/>A quasi-experimental study</p>  | <p>inconsistent stress coping strategy.</p>   | <p>amend stress coping strategies.</p>   |
| <p><b>Study16:</b> Physical recreational activity and musculoskeletal disorders in nurses<br/>(Mynarski et al. 2014)</p> <p><b>Country:</b><br/>Poland</p>   | <p><b>Participants:</b><br/>93 nurses.</p> <p><b>Study design:</b><br/>Cross-sectional survey</p> | <p>Over 70% of the examined nurses reported musculoskeletal complaints, mostly related with lower back pain.</p> <p>*Taking up at least moderate to vigorous physical recreational activity (MVPA) reduces the risk of musculoskeletal disorders.</p> | <p>Recreational physical activity at appropriate parameters may prevent musculoskeletal disorders, especially in nurses with long work experience.</p> |

| Title and aim   | Procedure   | Result  | Conclusion  |
|---|---|---|---|
| <p><b>Aim:</b><br/>To work out a preliminary assessment of possible relationship between recreational physical activity and reduced common musculoskeletal disorders in nurses.</p>   |   |   |   |
| <p><b>Study 17:</b> Prevalence and risk factors for foot and ankle musculoskeletal disorders experienced by nurses (Reed et al. 2014)</p> <p><b>Country:</b><br/>Australia</p> <p><b>Aim:</b><br/>To evaluate the prevalence of foot and ankle MSDs in nurses</p> | <p><b>Participants:</b><br/>304 nurses</p> <p><b>Study design:</b><br/>A self-administered survey</p> | <p>Foot/ankle MSDs were the most prevalent conditions experienced by nurses during the preceding seven days</p> <p>*The second most prevalent MSDs to impair physical activity</p> <p>The third most prevalent MSD, after lower-back and neck problems, during the preceding 12 months.</p> | <p>Foot/ankle MSDs are common in paediatric hospital nurses and resulted in physical activity limitations in one out of every six nurses.</p> |

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| Title and aim   | Procedure  | Result   | Conclusion   |
|---|--|--|--|
| and their relation to individual and workplace risk factors.  |  |  |  |
| <b>Study18:</b> Occupational-related back pain among Jordanian nurses: a descriptive study (Shawashi et al. 2015)<br><br><b>Country:</b><br>Jordan<br><br><b>Aim:</b><br>To explore the prevalence and determine the activities responsible for the presence of back pain among Jordanian nurses. | <b>Participants:</b><br>Nurses from governmental hospitals in Jordan.<br><br><b>Study design:</b><br>A descriptive cross-sectional study | More than three quarters of the nurses studied suffered back pain during their work. Among nurses with back pain, about a fifth of them reported it to administration. The highest percentage of back pain was among critical care nurses. | Should be placed on education programmes about the appropriate body mechanics. |
| <b>Study19:</b> Occupational safety and health Interventions to reduce musculoskeletal  | <b>Participants:</b><br>-  | Exercise as providing positive health benefits.  | Exercise interventions and multi-component patient handling interventions      |

| Title and aim   | Procedure   | Result  | Conclusion   |
|---|---|---|--|
| <p>symptoms in the health care sector<br/>(Tullar et al. 2010)</p> <p><b>Country:</b><br/>-</p> <p><b>Aim:</b><br/>To address the general question "Do occupational safety and health interventions in health care settings have an effect on musculoskeletal health status?"</p> | <p><b>Study design:</b><br/>A systematic review of the literature</p>                                       |   | <p>(MCPHI) were recommended as practices to consider.</p>  |
| <p><b>Study20:</b> Smoking, no-exercise, overweight and low back disorder in welders and nurses<br/>(Vieira et al. 2008)</p> <p><b>Country:</b><br/>Canada</p>  | <p><b>Participants:</b><br/>111 workers (64 welders and 47 nurses) from a steel company and a hospital.</p> | <p>Low back disorder is common among welders and nurses.<br/>These workers have high low back discomfort by the end of the shift.<br/>Besides the recognised biomechanical factors,</p> | <p>No-exercise, smoking, and overweight increased the risk of having low back disorder among nurses.</p> |

## Appendix A

| Title and aim  | Procedure   | Result  | Conclusion   |
|--|---|---|--|
| <b>Aim:</b><br>To assess the association between smoking, no-exercise, and overweight and low back disorder in welders and nurses.   | <b>Study design:</b><br>A retrospective epidemiological study and a questionnaire survey  | smoking, no-exercise, and overweight are personal factors related to low back disorder.   |  |
| <b>Study21:</b> Little effect of transfer technique instruction and physical fitness training in reducing low back pain among nurses: a cluster randomised intervention study<br>(Warming et al. 2008)<br><br><b>Country:</b><br>Denmark<br><br><b>Aim:</b><br>To evaluate the effect of a transfer technique education programme (TT) alone or in | <b>Participants:</b><br>TT (55 nurses) and TTPT (50 nurses), control (76 nurses)<br><br><b>Study design:</b><br>A cluster randomised intervention study | Introducing transfer technique alone has no effect in targeting LBP.<br><br>*Physical training seems to have an influence on minimising the LBP consequences. | Physical training may be taken into consideration. |

| Title and aim  | Procedure  | Result   | Conclusion  |
|--|--|--|---|
| combination with physical fitness training (TTPT) compared with a control group, who followed their usual routine.   |  |  |   |
| <b>Study22:</b> Prospective Evaluation of the 'Nurses Living Fit Intervention on Body Mass Index of Nurses' (Williams et al. 2011)<br><br><b>Country:</b><br>USA<br><br><b>Aim:</b><br>To evaluate the Nurses Living Fit Program's effect on body mass index (BMI) in nurse participants | <b>Participants:</b><br>126 nurses who were able to be physically active and provide signed consent.<br><br><b>Study design:</b><br>Quasi-experimental | NLF group participants had a greater mean reduction in BMI than contrast group participants. | The NLF programme resulted in a decrease in BMI for nurse participants. |

## 2. The factors related to physical activity participation

| Title and aim  | Procedure   | Result  | Conclusion  |
|--|---|---|---|
| <b>Study24:</b> Physical activity in schools: challenges for school nursing<br>(Cowell 2014)<br><br><b>Country:</b><br>USA                         | -   | The barriers for classroom physical activity may be lack of teachers' skills in adopting classroom physical activity, and space for classroom physical activity.<br><br>Community partnerships are essential for classroom physical activity. | School nurses can initiate and support efforts to address the whole school approach by providing data to show the need and building coalitions within the school, and out of the school, to get the momentum going. |
| <b>Study25:</b> Predictors of exercise participation in female hospital nurses<br>(Kaewthummanukul et al. 2006)<br><br><b>Country:</b><br>Thailand | <b>Participants:</b><br>970 Thai female hospital nurses in Thailand.<br><br><b>Study design:</b><br>A correlational cross-sectional study | A statistically significant relationship between exercise participation and the personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, and perceived social support.                                      | Increased exercise participation is dependent on the nurses' perceptions of exercise, self-efficacy and social support as well as their motivation to participate in exercise.                                      |

| Title and aim   | Procedure   | Result   | Conclusion   |
|---|---|--|--|
| <b>Aim:</b><br>To ascertain the relationship between exercise participation and selected personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, perceived social support, job demands and motivation. | Social cognitive theory and the 'Health Promotion Model' guided this study.   | Motivation contributed statistically significantly to the prediction of exercise participation.                    |  |
| <b>Study26:</b> Registered nurses' beliefs of the benefits of exercise, their exercise behaviour and their patient teaching regarding exercise (Esposito and Fitzpatrick 2011)<br><br><b>Country:</b><br>USA                              | <b>Participants:</b><br>112 registered nurses.<br><br><b>Study design:</b><br>A descriptive survey (self-report questionnaires)<br>-Beliefs of the benefits of exercise: EBBS<br>-Exercise behaviour: the HPLP-II | The positive correlations between exercise benefits, physical activity and recommendation of exercise to patients. | Nurses who believe in health promotion and embrace healthy behaviours are more likely to be positive role models and teach healthy behaviours to their patients. |

## Appendix A

| Title and aim   | Procedure  | Result  | Conclusion  |
|---|--|---|---|
| <b>Aim:</b><br>Focused on the relationships between nurses' beliefs regarding the benefits of exercise, their exercise behaviour and their recommendation of exercise for health promotion or as part of a treatment plan | -Recommendation of exercise to patients: two statements (for health promotion and their condition)                                   |   | *The results of this study support previously established links between beliefs of exercise and exercise behaviour.                           |
| <b>Study27:</b> Rotating night shift work and physical activity of nurses and midwives in the cross-sectional study in Łódź, Poland<br>(Peplonska et al. 2014)  | <b>Participants:</b><br>354 nurses and midwives (aged 40–60) currently working rotating night shifts and 371 ones working days only. | Total and occupational physical activity was significantly higher among nurses working rotating night shifts.<br><br>Leisure time activity was significantly affected among rotating night shift nurses and midwives, compared to women only working during the days. | Rotating night shift work among nurses and midwives is associated with higher occupational physical activity but lower leisure time activity. |
| <b>Country:</b><br>Poland   | <b>Study design:</b><br>A cross-sectional study.   |   | Initiatives supporting exercising among night shift workers are recommended.  |

| Title and aim   | Procedure   | Result                                     | Conclusion  |
|---|---|--|---|
| <b>Aim:</b><br>Investigated the associations between the rotating night shift work and physical activity.   | <p>The information on the work characteristics and potential covariates was collected via a personal interview.</p> <p>Weight and height were measured and BMI was calculated.</p> <p>Physical activity was assessed according to the international questionnaire on physical activity (IPAQ), and four domains: leisure time, occupational, transport related and household were analysed.</p> |  |   |
| <b>Study28:</b> Changing physical activity participation for the medical profession<br>(Yancey et al. 2013) |   | Policy change precedes social norm change. | Simple and quick episodes of moderate to vigorous physical activity (MVPA) can be |

## Appendix A

| Title and aim  | Procedure  | Result   | Conclusion   |
|--|--|--|--|
| <b>Country:</b><br>USA   |  | Instituting structured group exercise breaks at certain times of day.<br>Re-engineering buildings to encourage medical personnel to do physical activity.  | incorporated into the workplace without disrupting workflow or productivity.<br><br>Given the value of regular physical activity to health, the medical profession should lead the way in adopting such practices. |
| <b>Study29:</b> The association between shift work and unhealthy weight: a cross-sectional analysis from the nurses and midwives' e-cohort study<br>(Zhao et al. 2011) | <b>Participants:</b><br>2,494 female nurses and midwives.<br><br><b>Study design:</b><br>A cross-sectional study.<br><br>Measurement outcomes included shift work, unhealthy weight (underweight: body | Of the 2,494 participants (1259 day and 1235 shift workers), only 1% of the participants was underweight, 31.8% were overweight, and 26.9% were obese.<br><br>Shift workers were 1.15 times more likely to be overweight/obese than day workers. | Shift work is associated with higher risk of being overweight/ obese, and with low levels of physical activity.  |

| Title and aim   | Procedure  | Result  | Conclusion  |
|---|--|---|---|
| <b>Aim:</b><br>To examine the association between shift work and unhealthy weight among female nurses and midwives.         | mass index [BMI] < 18.5; overweight: BMI 25.0 to 29.9; obesity: BMI > 30.0), diet quality, physical-activity level, alcohol consumption, and smoking status. | *Lower levels of physical activity among shift workers compared with day workers.   |   |
| <b>Study30:</b> Nurses' health behaviour and physical activity-related health-promotion practices.<br>(Bakhshi et al. 2015) | <b>Participants:</b><br>623 registered nurses (RNs)<br><br><b>Study design:</b><br>A cross-sectional study (A 67-item cross-sectional questionnaire).        | 75% of the sample reported engaging in personal physical activity, 25% were at risk of hazardous drinking or active alcohol use disorders, 17% were past smokers and 11% were current smokers, 47% reported having a normal body weight-size, and 73% desired to be a normal body weight/size.<br><br>Nearly half of the sample reported that they were promoting physical activity within their clinical practice. | A need for training on physical activity-related counselling, including awareness of the latest recommendations and strategies to promote physical activity.<br>Health-care employers should also consider addressing nurses' barriers to the promotion of physical activity within their clinical practice, so that all health-care contacts are able to |

## Appendix A

| Title and aim   | Procedure  | Result   | Conclusion  |
|---|--|--|---|
| activity-related health-promotion practices.  |  | Personal physical activity behaviour, perceived health status, length of clinical practice, clinical specialty, and actual body weight/size were significantly related to the RNs' professional, physical activity-related practices.    | maximise opportunities to promote active ageing.  |
| <b>Study31:</b> Working hours and health behaviour among nurses at public hospitals<br>(da Costa Fernandas et al. 2013)<br><b>Country:</b><br>Brazil<br><b>Aim:</b><br>To analyse the differences between genders in the description in the professional, domestic and total work hours | <b>Participants:</b><br>2,279 nurses working with assistance in 18 different public hospitals in the municipality of Rio de Janeiro.<br><br><b>Study design:</b><br>Questionnaires | For the women, both the professional hours and total work hours were often associated with excessive consumption of fried food and also coffee, lack of physical exercise and also the greater occurrence of being overweight and obese. | The need for actions for health promotion in this occupational group and the importance of assessing the impact of long working hours on the health of workers. |

| Title and aim  | Procedure  | Result   | Conclusion  |
|--|--|--|---|
| and assess their association with health-related behaviour among nurses.   |  |  |   |
| <p><b>Study32:</b> Correlations of physical activity, body mass index, shift duty, and selected eating habits among nurses in Riyadh, Saudi Arabia (Almajwal 2015)</p> <p><b>Country:</b><br/>Saudi Arabia</p> <p><b>Aim:</b><br/>To assess the relationship among physical activity and barriers, shift duty, elevated BMI, and selected eating habits among non-Saudi female nurses in Riyadh, Saudi Arabia.</p> | <p><b>Participants:</b><br/>362 nurses in Riyadh, Saudi Arabia</p> <p><b>Study design:</b><br/>cross sectional study</p> | <p>Marital status, shift duty, education level, and BMI were significant predictors of physical activity. Weather was the most frequently reported barrier to physical activity (88.3%), followed by a lack of transportation (82.6%), and a lack of time (81.3%).</p> | <p>Nurses should be encouraged to maintain better healthy lifestyles.</p> |

## Appendix A

| Title and aim   | Procedure   | Result  | Conclusion   |
|---|---|---|--|
| <p><b>Study33:</b> Nurses' lifestyle behaviours, health priorities and barriers to living a healthy lifestyle<br/>(Kolbe-Alexander et al. 2014)</p> <p><b>Country:</b><br/>South Africa.</p> <p><b>Aim:</b><br/>To determine the health concerns, priorities and barriers to living a healthy lifestyle among nurses and hospital management staff working in public hospitals.</p> | <p><b>Participants:</b><br/>All the nurses employed at the five participating hospitals.</p> <p><b>Study design:</b><br/>Qualitative study<br/>(Focus groups)</p> | <p>Lack of time was the main barrier to regular physical activity.</p> <p>Both day and night shift nurses were interested in worksite health promotion programmes (WHPPs) that provided opportunities for physical activity in addition to stress management programmes and support groups.</p> | <p>The need for WHPPs in hospitals that support nurses in managing stress and controlling their weight, as well as transforming the work environment to facilitate healthy lifestyles.</p> |
| <p><b>Study34:</b> Situations influencing habits in diet and exercise among nurses working night shift</p>  | <p><b>Participants:</b><br/>27 registered/enrolled community nurses.</p>  | <p>The nurses' diet and exercise habits were influenced by social interaction with colleagues at work</p>   | <p>The factors that influence diet and exercise habits among nurses working night shift were</p>   |

| Title and aim   | Procedure   | Result  | Conclusion   |
|---|---|---|--|
| <p>(Persson and Mårtensson 2006)</p> <p><b>Country:</b><br/>Sweden</p> <p><b>Aim:</b><br/>To describe situations with a significant influence on healthy diet and exercise habits among nurses working night shift.</p> | <p><b>Study design:</b><br/>A qualitative descriptive design</p>  | <p>and by the disruption to their circadian rhythm.</p>   | <p>examined. Strategies can be developed in order to strengthen the factors with a positive influence.</p> |
| <p><b>Study35:</b> Physical activity, sedentary behavior, and melatonin among rotating shift nurses<br/>(McPherson et al. 2011)</p> <p><b>Country:</b><br/>Canada</p>   | <p><b>Participants:</b><br/>118 nurses working at Kingston General Hospital</p> <p><b>Study design:</b><br/>Physical activity and sedentary behaviours for 118 nurses were recorded during both a day shift and a night shift using activity diaries, and</p> | <p>Physical activity and energy expended in sedentary behaviour are inversely associated with morning urinary melatonin concentrations. Nevertheless, energy expenditure explains a relatively small amount of melatonin variation.</p> | <p>Peak melatonin might be minimally affected by patterns of physical activity.</p>                        |

## Appendix A

| Title and aim   | Procedure  | Result  | Conclusion  |
|---|--|---|---|
| <b>Aim:</b><br>To determine the effect of physical activity and sedentary behaviour on melatonin levels in a group of rotating shift nurses.  | concentrations of urinary 6-sulfatoxymelatonin were analysed for each shift.   |   |   |
| <b>Study36:</b> Relationships among nurses' professional self-concept, health, and lifestyles (Hensel 2011)<br><br><b>Country:</b><br>USA<br><br><b>Aim:</b><br>To explore the relationships among nurse self-concept, health status, and healthy lifestyle practices in a sample of Midwestern nurses. | <b>Participants:</b><br>679 full-and part-time registered nurses employed at three rural Midwestern hospitals.<br><br><b>Study design:</b><br>Correlation study<br>Questionnaire | A nurse's self-concept was significantly related to total lifestyle (physical activity and stress management).<br><br>The nurses reported practicing regular physical activity sometimes, even though these nurses would be expected to know that exercise is highly linked to health outcome and mortality.<br><br>Spiritual growth and interpersonal relations were central to these nurses' professional self-concept and health status. | Health care organizations may provide an alternative way to improve self-concept and healthy life style among nurses. |

| Title and aim  | Procedure   | Result  | Conclusion  |
|--|---|---|---|
| <p><b>Study37:</b> Urban sprawl, physical activity, and body mass index: nurses' health study and nurses' health study II<br/>(James et al. 2013)</p> <p><b>Country:</b><br/>USA</p> <p><b>Aim:</b><br/>To evaluate the association between the county sprawl index, a measure of residential density and street accessibility, and physical activity and body mass index (BMI).</p> | <p><b>Participants:</b><br/>136,592 nurses' health study participants living throughout the United States in 2000 to 2001</p> <p><b>Study design:</b><br/>A multilevel cross-sectional analysis</p> | <p>The county sprawl index (indicating a denser, more compact county) was associated with a 0.13 kilograms per meters squared lower BMI, and 0.41 more metabolic equivalent (MET) hours per week of total physical activity, 0.26 more MET hours per week of walking, and 0.47 more MET hours per week of walking, bicycling, jogging, and running.</p> | <p>Living in a dense, compact county may be conducive to higher levels of physical activity and lower BMI in women.</p> |



## Appendix B The example of using the Critical Appraisal Skills Programme (CASP) to critically appraise the quality of papers identified in the search

**Title:** Predictors of exercise participation in female hospital nurses

**Author:** Kaewthummanukul et al. (2006)

### Section A: Are the results of the trial valid?

#### 1. Did the review address a clearly focused question?

The population of this study was female registered nurses (RNs) employed by the hospital, which is a government-operated regional university hospital located in the northern region of Thailand. 970 Thai female hospital nurses in Thailand were recruited for the study. The intervention of the study was a correlational cross-sectional study using social cognitive theory and the 'Health Promotion Model' guided the study. The research questions were:

- i) Does the set of selected personal factors, perceived self-efficacy, perceived benefits of exercise, perceived barriers to exercise, and perceived social support explain the variability in exercise participation among Thai female hospital nurses?
- ii) Do job demands add explanatory power for exercise participation among Thai female hospital nurses to the model already containing the set of predictor variables included in question 1?
- iii) Does motivation add explanatory power for exercise participation among Thai female hospital nurses to the model already containing the set of predictor variables included in question two?

#### 2. Did the authors look for the right type of papers?

Cross-sectional design using a self-report questionnaire was the right research approach for the researched question because it was going to examine the relationships between independent variables and exercise participation.

## Appendix B

### **3. Do you think all the important, relevant studies were included?**

There was adequate and appropriate reference to the literature.

### **4. Did the review's authors do enough to assess quality of the included studies?**

The validity assessment of each included study was conducted according to the criteria, which can minimize errors. The authors also explained which studies were excluded, but the reason for their exclusion was not presented.

### **5. If the results of the review have been combined, was it reasonable to do so?**

The results of this study were classified by following the research questions. The results of all the included studies were clearly displayed, and reasons for any variations in results were discussed.

## **Section B: What are the results?**

### **6. What are the overall results of the review?**

The results of this study were presented by different headings. The main results found in the review are a statistically significant relationship between exercise participation and the personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, and perceived social support. Motivation contributed in a statistically significant way to the prediction of exercise participation.

### **7. How precise are the results?**

In this paper, the results were analysed within three research questions.

There was a statistically significant relationship between exercise participation and the set of selected personal factors, perceived benefits of and barriers to exercise, perceived self-efficacy, and perceived social support ( $r^2=0.17$ ,  $P<0.0001$ ). The addition of job demands and its interactions did not contribute in a statistically significant way to the prediction of exercise participation. The addition of motivation contributed statistically significantly to the prediction of exercise participation,  $t (947, 0.975) = 2.81$ ,  $P<0.01$  (two-tailed).

The results can be considered to be quite precise.

**Section C: Will the results help locally?****8. Can the results be applied to the local population?**

In this paper, the authors indicated that rigorous quality assessment was used, therefore, the findings may have implications for encouraging nurses in other settings to participate in exercise; for example, to increase understanding of these factors, nurse managers and nurse educators could incorporate exercise promotion information into workshops and curricula.

**9. Were all important outcomes considered?**

In the paper, the authors suggest that increased exercise participation is dependent on the nurses' perceptions of exercise, self-efficacy and social support as well as their motivation to participate in exercise.

**10. Are the benefits worth the harms and costs?**

The authors did not address the harms and costs.



## Appendix C Ethics approval

09/10/2018 eEthics || Ethics Form Handling from iSolutions, Southampton University

 Ethics and Research Governance Online ERGO

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**The factors which influence engagement in exercise behaviour among Thai professional surgical nurses: A qualitative investigation to inform strategies to enhance exercise behaviour for relieving work-related musculoskeletal disorders**

[Submission Overview](#) [IRGA Form](#) [Attachments](#) [Peer Feedback](#) [History](#) [Adverse Incident](#)

**Amendment History**  
Original Submission

**Current Status**  
Approved

Category C Research.  
Click here for more information on research categories

**Submission Checklist**

|             |          |
|-------------|----------|
| IRGA Form   | Complete |
| Ethics Form | Attached |
| Risk Form   | Attached |

**Comments**

**Co-ordinators**

Dawn-Anne Boon  
Alan Barthwick  
Patcharin Chaisurin



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[https://www.ergo.soton.ac.uk/submit\\_info.php?submissionID=23677](https://www.ergo.soton.ac.uk/submit_info.php?submissionID=23677)

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## Appendix C



Research Ethics Committee  
Faculty of Medicine Chiang Mai University

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AF/04-010/04.0

No. 448/2016



### Certificate of Approval

| <b>Name of Ethics Committee :</b> Research Ethics Committee 4,<br>Faculty of Medicine, Chiang Mai University  |                                   |
|---|-----------------------------------|
| <b>Address of Ethics Committee :</b> 110 Intavaroros Rd., Amphoe Muang, Chiang Mai, Thailand<br>50200   |                                   |
| <b>Principal Investigator:</b> Patcharin Chaisurin,<br>University of Southampton.   |                                   |
| <b>Protocol title:</b> The factors which influence engagement in exercise among Thai professional surgical nurses: A qualitative investigation to inform strategies to enhance exercise behaviour for relieving work-related musculoskeletal disorders. |                                   |
| <b>STUDY CODE:</b> NONE-2559-04224 / Research ID : 4224   |                                   |
| <b>Sponsor:</b> -   |                                   |
| Documents filed   | Document reference                |
| Research protocol   | Version date 29 November 2016     |
| Patient Information Sheet   | Version 2.0 date 14 November 2016 |
| Informed Consent Form   | Version 1.0 date 9 October 2016   |
| Semi-Structure interview  | Version 2.0 date 14 November 2016 |
| Case Record Form  | Version date 9 October 2016       |
| Principal Investigator Curriculum vitae   | Version date 29 November 2016     |

**DECISION :** [  ] By expedited review

[  ] By full committee meeting .....Date : .....



| Opinion of the Ethics Committee/Institutional Review Board : PLS. CHECK ONE   |  |  |  |
|---|--|--|--|
| <input checked="" type="checkbox"/> Approval<br><br><input type="checkbox"/> 3 months <input type="checkbox"/> 6 months<br><input checked="" type="checkbox"/> 1 year <input type="checkbox"/> Other.....<br> |  |  |  |
| <b>Date of Approval:</b> 29 November 2016 <b>Expiration Date:</b> 28 November 2017  |  |  |  |
| This Ethics Committee is organized and operates according to GCPs and relevant international ethical guidelines, the applicable laws and regulations.   |  |  |  |
| Signed : <u>P. Kulapongs</u><br>(Emeritus Professor Panja Kulapongs, M.D.)<br>Chairperson, Faculty of Medicine  |  |  |  |

**GENERAL CONDITION OF APPROVAL:**

- Please submit the progress report at least once a year except where required more frequent by the REC.
- In particular, approval of this study must be renewed at least three months before the expiration date if work is to continue.
- Prior Research Ethics Committee approval is required before implementing any changes in the consent documents or protocol unless those changes are required urgently for the safety of subjects.
- Any event or new information that may affect the benefit/risk ratio of the study must be reported to the REC promptly
- Any protocol deviation/violation must be reported to the REC.



## Appendix D Poster advertising the study

Please tell me about your lifestyle, usual daily routines and activities.

You are invited to take part in the study "The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders."

This will be an individual face to face interview which is expected to last for between 1 and 2 hours.



*Note: your name and data will be anonymous.*

For further details please contact:

Patcharin Chaisurin

Email: [pc3n14@soton.ac.uk](mailto:pc3n14@soton.ac.uk) Tel: 053-425081

Patcharin Chaisurin  
[pc3n14@soton.ac.uk](mailto:pc3n14@soton.ac.uk) Tel:  
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053-425081

Please tell me about your lifestyle, usual daily routines and activities.

You are invited to take part in the study "The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders."



# Appendix E Participant information sheet



**Study Title:** "The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders."

**Researcher:** Patcharin Chaisurin

**Ethics number:** 23677

**Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.**

## Introduction

I am undertaking a Doctorate in Clinical Practice (DClinP) at the University of Southampton, in the United Kingdom. As part of this degree, I am conducting this research study.

I would like to invite you to participate in my research study. Before you make your decision, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with your relatives, friends or your colleagues if you wish.

If something is not clear, or you would like more information, please do not hesitate to contact me. Take time to decide whether or not you wish to take part. Thank you for reading this.

## What is the research about?

The purpose of this study is to explore and understand the factors which influence exercise behaviour among surgical nurses, and to inform strategies that enhance their exercise behaviour, in order to reduce work-related musculoskeletal disorders. The findings of this doctoral research will provide a framework of factors related to exercise behaviour among surgical nurses, which may form a basis for establishing a programme or strategies to enhance their exercise behaviour and reduce the incidence of musculoskeletal disorders and their resultant costs.

## Appendix E

### **Why have I been chosen?**

You have been chosen because of you have met inclusion criteria of the study, which means that you are:

- 1) A Thai surgical nurse who has been working in the hospital's surgical department for a period of at least 1 year.
- 2) Working at the Maharaj Nakorn Chiang Mai Hospital, Thailand.
- 3) Able to give informed consent.
- 4) Able to participate in an interview.

### **Do I have to take part?**

No, you don't, it is entirely up to you to decide whether or not to take part. If you are interested, please return the reply slip in the pre-paid envelope. The researcher will then contact you and will describe the study and go through this information sheet, which you are asked to keep. If you are still interested, you will be asked to sign a consent form to show you have agreed to take part and that you understand what is involved.

You are free to withdraw at any time, without giving a reason. This would not affect your work.

### **What will happen to me if I take part?**

The questions you will be asked will be about your lifestyle, usual daily routines and activities.

You will be asked to complete a personal information sheet which will include information about your age, marital status, religion/beliefs, educational level, duration of work, and position/role in work. This form will be anonymous, and you will not be asked to state your name in the form. You have the right to not give any information and therefore you are not required to complete the sheet if you do not wish to do so.

The interview is expected to last for between one and two hours. There will be questions on your lifestyle activities and exercise related lifestyle choices, but you may decline to answer any questions you feel you do not wish to answer. You can also stop the interview if you feel uncomfortable for any reason.

With your consent, a recording will be taken during the interview and then the interview will be transcribed verbatim.

**Are there any benefits in my taking part?**

There is no direct benefit to you from taking part. However, the information provided by you in this study may help to provide a framework of factors related to exercise behaviour among professional surgical nurses. This may form a basis for establishing a programme or strategies to enhance exercise behaviour and reduce the incidence of musculoskeletal disorders among professional surgical nurses.

**Are there any risks involved?**

The questions in the interview schedule were reviewed by the peer reviewers and ethical committee at the University of Southampton. The Thai version of the interview schedule was reviewed by the ethical committees of the Faculty of Medicine, Chiang Mai University. This will ensure that questions are very unlikely to cause stress or embarrassment.

**Will my participation be confidential?**

All information which is collected about you during the course of the research will be kept strictly confidential. Any information about you on information sheets will have your name and address removed so that you cannot be identified from it. You will be identified by a unique number that connects your data to you. Your personal details will be kept separately from the research records. The data recorded for the purpose of the research project, will be held on a password protected computer. The researcher is the only person who can access the computer. The interview voice recording and transcriptions will be kept in a locked filing cabinet in the researcher's accommodation during data collection in Thailand. Your interview record(s) will be kept in a locked filing cabinet in the Faculty of Health Sciences (University of Southampton, UK) when the researcher has returned to the UK. The anonymous transcribed data will be shared between the researcher and research supervisors, and may be disseminated in the form of publications, and may inform future policies.

**What happens if I change my mind?**

You are free to make a decision whether or not to take part in this study. You have the right to consent or to withdraw your consent for this study unconditionally at any time. This will be definitely not affect your work.

## Appendix E

### **What happens if something goes wrong?**

If you wish to make a complaint you should contact the Head of Research Governance at the University of Southampton, whose contact details are provided below:

Dr Diana Galpin  
Head of Research Governance, at the Research Governance Office  
University of Southampton  
Building 37, Highfield  
Southampton  
SO17 1BJ  
Tel: +44 (0)23 8052 8673  
Email: [D.Galpin@soton.ac.uk](mailto:D.Galpin@soton.ac.uk)

### **What will happen to the results of the research study?**

The results of the study will be compiled in reports and published or presented at scientific conferences. If you participate in this study, you will not be identified in any report, presentation or publication as your name will be removed. Your identity will be protected at all times. If you wish to know the research findings, you could contact the researcher for further information.

### **Who is organising and funding the research?**

The study is being organised through the University of Southampton and funded by Chiang Mai University, Thailand.

### **Who has reviewed the study?**

The research proposal has been reviewed by the supervisory team, peer reviewers and ethical committee of the University of Southampton. The research proposal was also reviewed by the ethical committees of the Faculty of Medicine, Chiang Mai University, Thailand in order to ensure both your physical and psychological safety.

**Where can I get more information?**

If you would like any further information, please contact:

Patcharin Chaisurin

Faculty of Nursing

ChaingMai University

ChaingMai

Thailand

50200

Mobile: +66 (0) 53425081

Email: pc3n14@soton.ac.uk

Thank you for considering taking part in this study. You will be given a copy of the information sheet and a signed consent form to keep.

Date: DD/MM/YYYY



## Appendix F Participant invitation letter



**"The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders."**

Dear surgical nurse,

I would like to invite you to consider participating in a research project. The research is about lifestyle choices and patterns of activity among Thai surgical nurses.

The research information pack contains:

1. A participant information sheet
2. A reply slip
3. A consent form
4. A prepaid envelope

You are invited to read the information provided which will explain the importance of the study and what would be involved if you decided to take part. If you wish to take part in the study but still have some questions, you can contact the researcher by sending the reply slip to the address provided. The researcher is not allowed to contact you without your permission. Alternatively, you can contact the researcher by telephoning 053xxxxxxxx or by email at [pc3n14@soton.ac.uk](mailto:pc3n14@soton.ac.uk)

Many thanks for taking the time to read this invitation letter. I look forward to meeting you if you decided to take part in the study.

Yours sincerely,

Patcharin Chaisurin

DClinP student at the University of Southampton



## Appendix G Reply slip



**“The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders.”**

Thank you for reading the participant information sheet and considering taking part in this research about lifestyle and exercise related lifestyle choices among Thai surgical nurses. In order to take part in this research, please give your permission by completing the reply slip and sending it to the researcher. This will allow me to contact you and address any questions you may have.

Please complete the following details and return this form to me in the prepaid envelope. The reply slip is not consent to participate in the study but allows the researcher to contact you. All of your personal information will be rendered anonymous and kept confidential.

If you return the reply slip, I will contact you as soon as possible. You are free to withdraw from the research at any time without giving a reason.

Alternatively, you can contact me directly via telephone: 053xxxxxxxx or email me at [pc3n14@soton.ac.uk](mailto:pc3n14@soton.ac.uk)

Thank you very much for your time.

Patcharin Chaisurin

DClinP student at the University of Southampton

| Surgical nurse code:              | (Researcher use only) |
|-----------------------------------|-----------------------|
| Name (Please print)<br>.....      |                       |
| Contact telephone number<br>..... |                       |
| Good time to phone<br>.....       |                       |
| Time to avoid phoning<br>.....    |                       |

Please put this into the prepaid provided and put it in the post.  
Thank you.



# Appendix H Consent form



**Study title:** "The factors which influence engagement in exercise behaviour among Thai surgical nurses: A qualitative investigation to inform exercise behaviour strategies for relieving work-related musculoskeletal disorders."

**Researcher name:** Patcharin Chaisurin

**Study reference:**

**Ethics reference:** 23677

*Please initial and date the box(es) if you agree with the statement(s):*

I have read and understood the information sheet and have had the opportunity to ask questions about the study

I agree to take part in this research project and agree for my data to be used for the purpose of this study

I agree to audio-recording during the interview

I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected

I am happy to be contacted regarding other unspecified research projects. I therefore consent to the University retaining my personal details on a database, kept separately from the research data detailed above. The validity of my consent is conditional upon the University complying with the Data Protection Act and I understand that I can request my details be removed from this database at any time.

## ***Data Protection***

*I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.*

Name of participant (print name).....

Signature of participant.....

Date.....



## Appendix I Document sheet for participants' information



# Appendix J Interview schedule

## Introduction of interviewer

Hello, my name is \_\_\_\_\_, and I am interested to know about your lifestyle, usual daily routines and activities as a surgical nurse. I am approaching you because you are a source of important information and insights. During the interview, I would like to ask you about your lifestyle, activities and exercise related lifestyle choices. Please tell me as honestly as you can, as this will be helpful to my research.

| Main questions   | Additional questions  | Clarifying questions   |
|--|---|--|
| 1. Please would you introduce yourself and tell me a little bit about your lifestyle/your usual daily routines and activity?   | <p>-What do you usually do on a working day?</p> <p>-What do you do on a day off?</p> <p>-Do you do regular exercise or any physical activity?</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> If so, "how?" or "in what way?"</li> <li><input type="checkbox"/> If not, "why?"</li> </ul> <p><u>Probes/prompts:</u></p> <p>-How do you find time to fit in these activities?</p> <p>-Are you able to do this as often as you would like?</p> | Could you expand a little on this or give me an example?   |
| 2. In your opinion, what do you think about exercise participation?<br><br>OR<br>How do you feel about exercise participation? | -Is regular exercise beneficial for health?<br><br><ul style="list-style-type: none"> <li><input type="checkbox"/> If so, "how?" or "in what way?"</li> </ul>   | Could you tell me anything else?<br><br>Could you tell me more experiences you had in this regard? |

## Appendix J

| Main questions  | Additional questions   | Clarifying questions |
|---|--|----------------------|
|   | <p>-Are there any problems or difficulties that exist regarding your exercise participation?</p> <p><input type="checkbox"/> If so, "how?" or "in what way?"</p> <p>-Who/What way do you think that can support you to undertake exercise?</p> <p>-Are there any other factors or problems that influence your exercise participation?</p> <p><input type="checkbox"/> If so, "how?" or "in what way?"</p> |                      |
| <p><b>Conclusion of interview</b></p> <p>Are there any other factors or problems that we have not covered?</p> <p><b>OR</b></p> <p>Do you want to add anything else within your exercise engagement?</p> <p>Is there anything else you would like to tell me?</p> |  |                      |

## Appendix K An example of interview transcript

R: Where do you go for exercise?

P3: At the (health) park near my home. I walk from home to the park and then walk around the park about three to five rounds. Also do a stretching exercise. Actually, I want to walk out a lot but I have health problems. If I walk a lot, my left heel will get pain.

R: What is the problem?

P3: Plantar fasciitis, I am not quite sure how does it occur. During the work I have to walk quite a lot and may due to overweight. It seems like lack of muscular flexibility. Then repeatedly walk makes it hurts.

R: How long does it take?

P3: Around five years ago.

R: How do you manage this problem?

P3: To relief pain I have to rest. Therefore, I start to walk for 2-3 rounds and assess. If I could not tolerate I have to stop and go back home.

R: In the past, if you walk about four or five rounds, then it would be a pain, isn't it?

P3: Sometimes I can walk around three rounds, and it may not get hurt. Afterward, I think that today there is a plenty of time to try to walk more, it will start to hurt. When I return home that night, it would have hurt a lot.

R: Have you consulted the physician?

P3: Not yet, and have not taken any medications. Just take a rest then it gone. It does not bother me so much. Sometimes I feel pain then I take a rest it will be OK.

R: That is, you spend time in the evening to go for a walk at the park about half an hour to one hour.

P3: Additionally, in my holiday I like to go for a walk about 6.30 to 7 or 8 am. in the morning because the weather is not too hot.

R: You mean after waking up you go for exercise, right?

P3: It would be after my daughter going to school. Normally, we wake up around 5 am. My daughter will go to school at 6 am. After waking up we have a light breakfast and go for a walk.

R: You mean on your holiday, the activity remains go for a walk for exercise but in the morning, right?

P3: Of course, go for a walk for exercising about half an hour to one hour.

R: After exercise, what are you doing then?

P3: Go back home, take a shower, have a meal and then watch TV until 8 pm. After that I facilitate my daughter to do her homework and do story telling before

## Appendix K

bedtime. Around 9 pm. my husband comes back from work, it's time for me I go to bed preparing for work in night shift.

Previously, I and my daughter used to go swimming but my daughter got a problem with her ear. She had otitis media and had to take operation then we stop swimming.

R: You went swimming with your daughter, don't you? What time did you go swimming?

P3: During school break, we used to go swimming at 3pm. for about half an hour a day.

R: Where did you go swimming?

P3: At the RUJI swimming pool in CMU. After my daughter had a problem with her ears, we changed to walk for exercise. Actually, swimming is the most suitable activity for my health condition because I have problem with my foot but it is unavoidable.

R: There is a limitation in both activities. On day off, after exercise what do you usually do?

P3: Go shopping for food which takes me till 11 am. and then watch television. Around 1pm I take a nap about 1-2 hours. Even though it is a day off, it seems like there is a life clock, I usually feel drowsy in the afternoon and will get better after taking a nap for 1-2 hours. After that, I take a cup of Pandan tea and snack, do house work and watch TV. Then, it's time my daughter gets back from school. That is all my life cycle.

R: On day off, if you go for exercise in the morning, do you go in the evening?

P3: It depends. If I feel I want to, I keep going in the evening. If do not want to go due to the weather is quite hot, I do not go. The hot weather is also a barrier for exercise (laugh). If the weather is too hot, I won't go.

R: What about in winter, do you go in the evening?

P3: In winter I go exercise both in the morning and in the evening but in summer only once a day in late evening around 6 pm. In some day I feel lazy I would not go. I do not go exercise everyday but try to keep 3-4 times a week.

R: Did you achieve your goal last year?

P3: Yes.

R: Is there anyone accompany you for exercise?

P3: I go alone. I used to ask my daughter but she supposed to be a teenager and wanted to stay home. Therefore, I normally go alone.

R: How do your family members think about your exercise?

P3: My youngest daughter is naughty and does not want me to go. Actually, I want her to join me but she took enough exercises by playing with her friends at school. I think going on my own makes me better achieve my goal for exercise.

For my husband, after pick up my daughter back from school he has to go back to his office, so he does not involve in my activities. He is usually busy with his work. Only he can take the kid to school in the morning and pick up back home in the evening is Ok for me.

R: Do you do the house work every day?

P3: Yes, every day except someday that I feel tried from work due to severe patients' conditions, I may skip the house work. But for ironing, I have to do almost every day because we have four people; it is needed to do laundry every day. If not, there would have lots of dirty cloth. I must try to clear up every day. Except in the day that my body does not really tolerate, I had to quit.



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