THE IMPACT OF COMBINED MUSIC AND TAI CHI THERAPY ON DEPRESSIVE SYMPTOMS AMONG COMMUNITY-DWELLING OLDER PEOPLE IN CHINA

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THE IMPACT OF COMBINED MUSIC AND TAI CHI THERAPY ON DEPRESSIVE SYMPTOMS AMONG COMMUNITY-DWELLING OLDER PEOPLE IN CHINA

ABSTRACT

China has more elderly people than any other country in the world, of which nearly one third (27.3%) suffers from subclinical depression in the community setting. The purpose of this study is to determine the prevalence rate of depressive symptoms and its relationship with both quality of life and physical mobility among community-dwelling older people in Ya'an City, China. Furthermore, this study aims to determine the impact of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. The study adopted a quantitative design which includes 2 phases. Phase 1 was a cross-sectional survey whereas phase 2 was a single-blinded randomized controlled trial. For phase 1, participants were selected through the cluster systematic randomization method, which resulted in a representative sampling of about 1 in 100 from the district registry, in eight out of sixteen communities in Ya'an City. The sample's current statuses of depressive symptoms, quality of life, and physical mobility were assessed. Information on the potential risk factors for depressive symptoms and quality of life were collected. Phase 2 used the cluster randomized controlled method to determine the effect(s) of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. Two scales were used in this study including the Chinese versions of the Geriatric Depression Scale (GDS) and the World Health Organization Quality of Life BREF (WHOQOL-BREF). The Timed Up and Go (TUG) test was used to assess the physical mobility of older people. The results of this study revealed a 31.3% prevalence rate of depressive symptoms among community-dwelling

older persons in Southwest China. The average score for the quality of life was 82.44 ± 13.483 and the average time spent to complete the TUG test was 12.11 ± 3.745 seconds. Participants of this study showed a higher prevalence of depressive symptoms and lower levels of quality of life and physical mobility. There was a significant correlation between depressive symptoms, quality of life, and physical mobility, of which the correlation coefficients were -0.657 and 0.511 respectively. Sociodemographic data such as exercise habit, gender, marital status, monthly income, living situation, health problems, and negative life events were found related to depressive symptoms and affected the quality of life. A 50-minute session consisting of 24 Yang's Tai Chi movements, accompanied by soft and relaxing Chinese folk music that occurs three times a week, lasting three consecutive months, was found effective in reducing depressive symptoms, enhancing the quality of life, and improving the physical mobility of community-dwelling older persons living in Southwest China. The findings of this study would help the nursing profession to gain a better understanding of depressive symptoms in the community context, as well as to recognise the indictors and its relationship with both quality of life and physical mobility. Also, the findings of this study anticipate major implications on the development of achievable and economically viable management of depression among community-dwelling older people in China towards helping the fast-developing, largely-populated, yet aged country to achieve its goal of healthy ageing.

Keywords: depressive symptoms; quality of life; Tai Chi; music; older people

KEBERKESANAN KOMBINASI TERAPI MUZIK & TAI_CHI TERHADAP SIMTOM KEMURUNGAN DI KALANGAN KOMUNITI WARGA TUA DI CHINA

ABSTRAK

China mempunyai lebih ramai warga tua berbanding negara-negara lain di dunia, hampir satu pertiga (27.3%) daripada mereka menderita kemurungan sub-klinik dalam suasana komuniti. Tujuan kajian ini dijalankan adalah untuk menentukan kadar kelaziman simptom-simptom kemurungan dan hubungannya dengan kualiti hidup dan mobiliti fizikal dalam kalangan warga tua yang tinggal dalam komuniti di bandar Ya'an, China serta mengenal pasti kesan gabungan terapi muzik dan Tai Chi ke atas simptom-simptom kemurungan, kualiti hidup dan mobiliti fizikal. Kajian ini menggunakan reka bentuk kuantitatif yang merangkumi 2 fasa, fasa 1 merupakan kaji selidik keratan rentas manakala fasa 2 adalah kaji selidik buta tunggal, rawak dan terkawal. Bagi fasa 1, para peserta dipilih melalui persampelan kluster rawak sistematik, perwakilan sampel kira-kira 1 dalam 100 daripada pendaftaran daerah dalam lapan daripada enam belas komuniti di bandar Ya'an. Status semasa simptom-simptom kemurungan, kualiti hidup dan mobiliti fizikal dinilai. Maklumat mengenai potensi faktor risiko simptom-simptom kemurungan dan kualiti hidup dikumpulkan. Fasa 2 menggunakan kaedah kluster rawak terkawal bagi menentukan kesan gabungan terapi muzik dan Tai Chi ke atas simptom-simptom kemurungan, kualiti hidup, dan mobiliti fizikal. Dua skala yang digunakan dalam kajian ini termasuklah Skala Kemurungan Warga Emas (GDS) versi Cina dan *World Health Organization Quality of Life BREF (WHOQOL-BREF*) versi Cina. Ujian Bangun dan Berjalan (TUG) digunakan untuk menilai mobiliti fizikal warga tua. Hasil kajian ini mendedahkan bahawa kadar kelaziman simptom-simptom kemurungan dalam kalangan

warga tua yang tinggal di Barat Selatan China adalah 31.3%, purata skor untuk kualiti hidup adalah 82.44 ± 13.483, purata masa kos untuk ujian Bangun dan Berjalan adalah 12.11 dan 3.745 saat. Peserta yang terlibat dalam kajian ini mempunyai kadar insiden yang lebih tinggi untuk mengalami simptom-simptom kemurungan dan rendah tahap kualiti hidup dan mobiliti fizikal. Terdapat hubungan yang signifikan antara simptom-simptom kemurungan, kualiti hidup dan mobiliti fizikal, pekali korelasi Pearson adalah -0.657 dan 0.511 secara berasingan. Data sosio-demografi seperti tabiat senaman, jantina, status perkahwinan, pendapatan bulanan, keadaan hidup, masalah kesihatan dan peristiwa kehidupan negatif mempunyai perkaitan dengan simptom-simptom kemurungan dan juga kualiti hidup. Sesi selama 50 minit, 24 gerakan Tai Chi Yang beserta muzik rakyat Cina yang lembut dan tenang sebagai latar belakang, tiga kali seminggu, yang berlangsung selama tiga bulan berturut-turut adalah berkesan dalam mengurangkan simptom-simptom kemurungan, meningkatkan kualiti hidup serta memperbaiki mobiliti fizikal dalam kalangan warga tua yang tinggal dalam komuniti di Barat Selatan China. Penemuan daripada kajian ini dapat membantu jururawat profesional memperolehi pemahaman yang lebih baik mengenai simptom-simptom kemurungan dalam konteks masyarakat, termasuklah peramal, hubungan antara simptom-simptom kemurungan dan kualiti hidup serta mobiliti fizikal. Kajian ini juga pastinya mempunyai implikasi yang besar terhadap pembangunan pengurusan kemurungan yang mampu dilaksanakan dan berdaya maju dari segi ekonomi dalam kalangan warga tua yang tinggal dalam komuniti di China, supaya dapat membantu negara tua China yang pesat membangun dan berpenduduk padat bagi menetapkan matlamat penuaan sihat.

Katakunci: Kemurungan, Kualiti Hidup, Tai Chi, Muzik, Lebih Tua

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LIST OF ABBREVIATIONS

GDS: Geriatric Depression Scale

WHOQoL-BREF: World Health Organization Quality of Life –BREF

TUG: Timed Up and Go Test

WHO: World Health Organization

QOL: Quality of Life

SSD: Subsyndromal Depression

CES-D: Center for Epidemiologic Studies Depression Scale

SMD: Standardized Mean Difference

CI: Confidential Interval

SD: Standard Deviation

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter presents the background, problem statement, and the significance of this study. The objectives and research questions are also clearly delineated in this chapter, followed by a description of the study's conceptual framework.

1.1.1 Global Population Ageing

Population ageing is the process whereby older individuals account for a proportionally larger share of the total population. Population ageing occurs as a result of increased life expectancy and reduced fertility worldwide. The increase of life expectancy, together with the decrease in fertility, has been reshaping the age structure of the global population by shifting the relative weight of the population from the younger to the older groups (United Nations Department of Economic and Social Affairs, 2009). Both fertility rate and overall life expectancy have undergone dramatic change and further changes are expected. Lee, Mason, and Cotlear (2010) from the United States used the population estimation and projection data of 228 countries worldwide to point out that the overall life expectancy in more developed regions would increase to 82.8 years in the time period between 2045 and 2050, while the total fertility rate in those regions would reduce to 1.80 in the same period. Lee et al. (2010) also predicted changes in life expectancy and fertility rate in both less developed and least developed regions all around the world. The life expectancy in less developed regions was expected to increase to 75.9 years in the time period between 2045 and 2050, while the fertility rate was expected to decrease dramatically to 1.93 in the same period. On the other hand, in the least developed regions,

life expectancy and fertility rate were projected at 68.5 to 2.41 within the similar time period. The estimated changes (Lee et al., 2010) of fertility rate and life expectancy are displayed in Table 1.1.

Table 1.1: The changes in total fertility rate and life expectancy of different regions of the world

Regions	Total fertility rate (years)			Life expectancy at birth (years)		
	1950-55	2005-10	2045-50	1950-55	2005-10	2045-50
More developed regions	2.82	1.64	1.80	66.0	77.1	82.8
Less developed regions	5.92	2.46	1.93	41.7	67.7	75.9
Least developed regions	6.62	4.39	2.41	36.4	55.9	68.5

According to the World Health Organization (WHO), the proportion of the world's population aged over 60 years would double from about 11% to 22% between the years 2000 and 2050 (Wei, 2017). The absolute number of people aged 60 years or above had been projected to increase from 605 million to 2 billion over the same period. By 2050, the number of people aged over 65 years is expected to triple to about 1.5 billion, accounting for 16% of the world's population. Additionally, Lee et al. (2010) estimated a population change based on the aforementioned projection data, according to which, there are people aged 60 years and over in almost half of the world's countries since 2015.

1.1.2 Ageing in China and in Ya'an City, Sichuan Province

China has a larger number of older people than any other country worldwide. This condition is coupled with the country having one of the fastest rates of population ageing. In the year 2012, the proportion of China's population aged 65 years and above was 9.4% (Wei, 2017). In Sichuan Province, people aged over 65 years comprised 11.0% of the

total population by the year of 2010. That percentage was about 2.1% higher than the nation's average (8.9%) at the time. Meanwhile, in Ya'an City, individuals aged over 60 years had already made up 10% of the population since the late 1990s. By the year of 2010, the total number of people aged over 60 years was 164,000, of which comprised 10.9% of the city's population. Population ageing has been exacerbated by China's 'one-child policy' that was strictly enforced since the 1980s, which later led to a much higher old-age dependency ratio. The dependency ratio of the Chinese society in the year 2014 was 13.7%. Sichuan Province had a more stunning proportion of 20.0% in the year of 2014 (Sanderson, Scherbov, & Gerland, 2017) and is estimated to increase to 47% by the year of 2050 (Sanderson et al., 2017).

1.1.3 Geographical Regions, Population Distribution, and Economic Development of China

The territory of China stretches 3,100 miles (5,000 kilometres) from east to west and 3,400 miles (5,500 kilometres) from north to south. China is a large country with widely varying landscapes. Its territory includes mountains, high plateaus, sandy deserts, and dense forests. China has twenty-three provinces, four province-level municipalities, two special administrative regions, and five municipalities. The twenty-three provinces include Hebei Province, Shandong Province, Liaoning Province, Heilongjiang Province, Jilin Province, Gansu Province, Qinghai Province, Henan Province, Jiangsu Province, Hubei Province, Hunan Province, Jiangxi Province, Zhejiang Province, Guangdong Province, Yunnan Province, Fujian Province, Taiwan Province, Hainan Province, Shanxi Province (JIN), Sichuan Province, Shanxi Province (SHAN), Guizhou Province, and Anhui Province. The four province-level municipalities include Chongqing, Beijing, Shanghai, and Tianjin. The five municipalities include Guangxi, Tibet, Xinjiang, Ningxia,

and Inner Mongolia. The two special administrative regions include Hong Kong and Macao. The targeted city of this study, Ya'an, is affiliated to the Sichuan Province, located in the western region of China. China had nearly 1.4 billion people at the end of 2015 (Sanderson et al., 2017). Among all the above-mentioned provinces and cities, the top four most populated provinces are Guangdong (108.94 million), Shandong (98.47 million), Henan (94.8 million), and Sichuan (82.04 million), of which the last is the targeted province of this study. In the year of 2014, people aged 65 years and above accounted for 10.1% of the national population (Sanderson et al., 2017), among which Chongqing had the highest proportion of aged people at 14.1%, followed by Sichuan at 14.0%, and later by Liaoning at 12.2%.

China is a vast country with an uneven economic development. The regions of this country are classified as East, Central, North-East and West, among which the West is the least developed region. The targeted research setting of Ya'an City is situated in the region of the west, which has the third least amount of Gross Regional Product at 46,241 million RMB in Sichuan Province compared to its first placement of 1,005,659 million RMB (Kaeberlein, Rabinovitch, & Martin, 2015).

As mentioned above, due to the unequal economic status of China, its lesser developed economy has affected the development of medical care service. As the government data has shown, Ya'an City had a total population number of 1,543,700 in the year of 2014 (Kaeberlein et al., 2015), of which people aged 60 years and above were as many as 164,000. Despite a large number of population, there were only 22 hospitals in the Ya'an region (Ya'an, 2015), a number that proves difficult to serve the demand for medical care in its current state. To make more conspicuous the gap, the birth rate in Ya'an City in the year of 2014 was 8.48 while the death rate was 5.66 (Kaeberlein et al., 2015). The two

rates exaggerated the process of ageing, thus contribute towards an already high demand for health services. China also has two categories of citizens, they are rural and urban, as identified by the household registration system. The government's financing system affects the Medicare system differently for these two categories of citizens. The cost of Medicare in the urban regions is much higher than that of the rural regions, by reason of the population's variance of basic income. Hence, there exists a need for more effort to be paid towards achieving the goal of healthy ageing in Ya'an City, which has a lower Gross Regional Product, faster-ageing population, and lower coverage of medical service provided by the government.

1.1.4 The Most Popular Daily Entertainment for the Chinese Elderly: to Gather together and Square Dance

China has a long history of about 5000 years. There has been the development of numerous entertainments throughout its uninterrupted civilization. The Chinese, or the Chinese elderly in particular, love to gather together and have fun (Min, 2011). As a result, the most popular entertainment for the Chinese elderly to date is the Square Dance, also known as Square Dancing or Dama Square Dance (Zhou, 2014). Square Dance (Zhou, 2014) refers to an act of dance participated in daily by groups of middle-aged or older, middle-class Chinese adults (both women and men). The dance is conducted in an open space, typically a square in Chinese cities, hence the name. Square Dance is considered to be an increasingly popular form of exercise in China (Gao, Zhang, Qi, & Petridis, 2016). It is generally believed that the Square Dance is an extension of line dancing, of which was introduced in China around 2004 (Zhun, 2011). Thereafter, the type of dance was quickly acculturated through the integration of Chinese dance styles and music. Compared to traditional exercises such as swimming and jogging, Square Dance is a

combination of simple movements thus garnering easy acceptance from the common people. What's more, it is not constricted by space, time, theme, or rhythm. The reasons as to why Square Dance is becoming more and more popular may be as follows: fitness/health, socialization, and government promotion (Zhou, 2014).

1.1.5 A Brief Introduction of Tai Chi

Tai Chi is a traditional Chinese exercise well known especially among middle-aged and older citizens, and even gaining popularity not only in China, but worldwide (Lan, Chen, Lai, & Wong, 2013). Tai Chi is recognized as a form a martial art, consisting of slow-paced Karate movements (Field, 2011). Tai Chi is practised in 5 different styles, the most famous in China being the Yang's style and the Sun's style. The Yang's Tai Chi was created by Yang Luchan in the early 1800s in China. It is the most widely practised and easiest to learn. There are 20 variations to this style, each varying in numbers of movements, of which the most popular is the 24-movements (Field, 2011).

The Sun's Tai Chi was created by Sun Lutang from a combination of Yang's and other Tai Chi styles in the 1900s. It is well-known for its smooth, flowing movements, yet a more upright and lesser flow than the Yang's style. It does not consist of the more physically vigorous such as leaping and crouching movements of the other more difficult Tai Chi styles (Field, 2011). Tai Chi movements typically lead to larger vertical and mediolateral displacements of the body as compared to walking (Law & Li, 2014). Tai Chi has been suggested to be a low-intensity exercise, evaluated through oxygen consumption and heart rate (Smith, Wherry, Larkey, Ainsworth, & Swan, 2015). In regards to the safety of practising Tai Chi, as evaluated by a systematic review (Wayne, Berkowitz, Litrownik, Buring, & Yeh, 2014), reveals Tai Chi as safe even for frail, older

people. Most of the randomized controlled trials conducted in the above-mentioned systematic review (Wayne et al., 2014) did not report any adverse effect or reaction towards practising Tai Chi, apart from 33% of the 153 eligible RCTs and 12% who noted a monitoring protocol for adverse events. The adverse events reported were mostly minor and involved musculoskeletal aches and pains in the knees and back. These results are tentative and much of the reporting of adverse events were limited and inconsistent (Wayne et al., 2014).

As mentioned above, the most popular Tai Chi is the 24-movement Yang's Tai Chi, which includes 24 postures such as 'Commencing', 'Part the Wild Horse's Mane, LEFT and RIGHT', 'White Crane Spreads Its Wings', 'Brush Knee and Step Forward, LEFT and RIGHT', 'Playing the Lute', 'Reverse Reeling Forearm, LEFT and RIGHT', 'Left Grasp Sparrow's Tail', 'Right Grasp Sparrow's Tail', 'Single Whip', 'Wave Hands Like Clouds', 'Single Whip', 'High Pat on Horse', 'Right Heel Kick', 'Strike to Ears with Both Fists', 'Turn Body and Left Heel Kick', 'Left Lower Body and Stand on One Leg', 'Right Lower Body and Stand on One Leg', 'Shuttle Back and Forth, RIGHT and LEFT', 'Needle at Sea Bottom', 'Fan Through Back', 'Turn Body, Deflect, Parry, and Punch', 'Withdraw and Push, as if Closing a Door', 'Cross Hands', and 'Closing'. The style is easy to learn and practice, and is the most welcomed form of Tai Chi movement in Ya'an City.

China is a country with the largest number of elderly people worldwide, of which the population is ageing rather faster than any other country in the world. Though the owner of a generally sound economy as a whole, the inequality of economic status among regions has affected the medical services in the less developed. The aged Chinese love to

dance and exercise after dinner, therefore 'square dance' was nominated as the activity of the Chinese elderly. Tai Chi is a form of mind-body exercise, popular among the Chinese elderly. There exists a long history of Tai Chi in China, birthing several forms of the exercises, with the most popular form in the targeted area being the 24-movement Yang's Tai Chi.

1.2 Problem Statement

1.2.1 Depressive Symptoms among Older People

The prevalence of depressive symptoms among community-dwelling older people in Japan has been reported at 16.9% (Yoshida et al., 2015) to 21.1% (Yamagata et al., 2013), with rates reaching as high as 65% among institutionalized older people (Kowalska, Rymaszewska, & Szczepanska-Gieracha, 2013). The prevalence rate of depressive symptoms was reported at 21.1% in Singapore (Tiong, Yap, Huat Koh, Phoon Fong, & Luo, 2013), 39.1% in India (Nakulan, Sumesh, Kumar, Rejani, & Shaji, 2015), and 16.52% in the Western countries (Volkert, Schulz, Härter, Wlodarczyk, & Andreas, 2013). A meta-analysis that included 81 articles, conducted in China, revealed a 23.6% prevalence rate of depressive symptoms among older persons (Li, Zhang, Shao, Qi, & Tian, 2014). Meanwhile, in the Chengdu City of Sichuan Province, the prevalence of depressive symptoms among community-dwelling older people was as high as 51.8% (Zhang 2012).

Depressive symptoms are associated with a series of negative health consequences, including the reduced quality of life (Ibrahim et al., 2013; Moon & Kim, 2013; Renaud & Bédard, 2013) and the increased risk of other physical illness such as anxiety, addiction, neurological, cardiovascular and digestive tract disorders, dementia (Saczynski et al.,

2010), prolonged inflammatory responses after an infection (Glaser, Robles, Sheridan, Malarkey, & Kiecolt-Glaser, 2003), hospitalization (Prina et al., 2013), and increased mortality (Cavanaugh, Furlanetto, Creech, & Powell, 2001; Wong, Mercer, Leung, & Woo, 2009). Depressive symptoms contribute to prevalence of falling among older adults (Wang et al., 2012), of which is the leading cause of global disability affecting 350 million people worldwide (Antoniades, Mazza, & Brijnath, 2014). Depressive symptoms also contribute to loneliness (Drageset, Espehaug, & Kirkevold, 2012; Savikko, Routasalo, Tilvis, Strandberg, & Pitkälä, 2005), functional decline (Evans et al., 2005), and the increase of general medical cost (Katon, Lin, Russo, & Unützer, 2003).

Depression as an invisible yet heavy load would challenge the traditional model of late-life care in China. The total annual costs of mental disorders in China accounts for more than 15% of the country's total health expenditure while China's gross domestic product of 2013 was only at 1.1% (Xu, Wang, Wimo, & Qiu, 2016). Among all mental disorders, depressive disorders are the major contributors to this financial burden. Hu, He, Zhang, and Chen (2007) revealed that the total estimated cost of depression in China was US$ 6,264 million in the year of 2002. The consequences of depressive symptoms are not only of the economic aspect but also of the familial and social aspects, this refers especially to the sufferers' caregivers. This is because the Chinese elderly have adopted the 'home complex', where they are more willing to spend their late life at home rather than in hospitals, more so in China than compared with other countries (Broad et al., 2013).

1.2.2 Under-Recognition and Under-Treatment of Depressive Symptoms among Older People

According to WHO, depressive symptoms are treatable in primary and acute care settings by using a range of psychosocial therapies and medications. However, there are less than 50% of those suffering who are diagnosed and treated (Mathers, 2008). The existence of numerous barriers increases the difficulty in delivering adequate care to those with depressive symptoms. At the patient level, the predominant barriers for seeking treatment of depressive symptoms are the lack of knowledge (Cooper et al., 2003) and the fear of stigmatization (Gum et al., 2009). Meanwhile, Tai‐Seale, McGuire, Colenda, Rosen, and Cook (2007) reported that for the healthcare professional level, the lack of knowledge and training in assessment and treatment could be the probable barriers to providing treatment of depressive symptoms. There also exists a barrier at the system level, mainly due to lack of coordination and suitable infrastructures (Montross et al., 2006). Most individuals who are under treatment for depressive symptoms receive only medication therapy. An American study involving 76,735 residents in 921 nursing homes found 23% of those diagnosed with depression received no treatment, while 74% received antidepressants, 0.5% received psychotherapy, and 2% received both (Levin et al., 2007). Pharmacologic treatment is often limited by the lack of efficacy, side effects, and drug-disease interaction, all particularly problematic when treating frail, older people (Konnert, Dobson, & Stelmach, 2009).

1.2.3 The Research Gap of Depressive Symptoms in Ya'an City

Given the ageing and economic status of Ya'an City, it is important to determine the prevalence of depressive symptoms and the quality of life of the older people in a community setting, and thus find efficient, convenient, and cost-effective ways of reducing their burden from the suffrage of depressive symptoms, so as to help achieve the goal of healthy ageing.

Compared with the expensive and side-effects-inducive pharmacologic therapy, alongside its expensive and hard-to-access therapists, a series of previous studies revealed that exercise therapy is a helpful alternative in treating depressive symptoms among the older population. These exercises include Yoga (Ross, Friedmann, Bevans, & Thomas, 2013), general exercise (Yamagata et al., 2013), and Tai Chi (Deng, 2013). Another study also suggested the use of music therapy (Choi, Lee, & Lim, 2008) in relieving depressive symptoms among the older population. However, there is one study which found exercise therapy to not have any benefit of treatment with respect to depressive symptoms (Underwood et al., 2013). Although studies on depressive symptoms are increasing, most studies have been conducted in the western countries of America, Canada, and the UK. There are only a few of such studies performed in China. Furthermore, no such study has ever been performed among the older population of Ya'an City, Sichuan Province.

A previous study which evaluated a home-based intervention suggested that older adults preferred home-based over clinic-based treatment (Gitlin, Chernett, Dennis, & Hauck, 2012). Home-based management may also lead to a better acceptance of treatment (Ciechanowski et al., 2004) due to the fewer numbers of nursing homes and inpatient care days, aside from being cost-effective (Klug et al., 2010). It is similar to a community-

based intervention, one that could cover even more participants with almost the same amount of effort. Results of the previous studies were encouraging towards such interventions, as their clinic-based evaluations highlighted the transferability and sustainability of home-based environments (Pfaff et al., 2013) and also community-based environments. Hence, it is necessary to evaluate the impact of community-based combined music and exercise therapy on depressive symptoms among older people in Ya'an City. Tai Chi is widely accepted by health professionals as a moderate intensity aerobic exercise (Wang, Collet, & Lau, 2004) which could improve the older person's physical and psychological well-being (Deng, 2013). No adverse effects by Tai Chi have been reported in prior studies (Ahn & Song, 2012). This study combines Tai Chi with music as music is shown to be useful in reducing depressive symptoms (Choi et al., 2008), and from thereon, aims to determine whether Tai Chi movements have a synergistic effect with music therapy.

1.3 Research Questions

This study attempts to answer the following questions:

1. What is the prevalence rate of depressive symptoms among community-dwelling older people in Ya'an City?
2. What are the overall quality of life and physical mobility of community-dwelling older people in Ya'an City?
3. What is the relationship between depressive symptoms, quality of life, and physical mobility among community-dwelling older people in Ya'an City?
4. What are the factors of depressive symptoms among community-dwelling older people in Ya'an City?

5. What factors determine the quality of life among community-dwelling older people in Ya'an City?
6. Do combined music and Tai Chi therapy reduce the severity of depressive symptoms among community-dwelling older adults in Ya'an City?
7. Will combined music and Tai Chi therapy be useful in enhancing the quality of life of older people with depressive symptoms?
8. Will combined music and Tai Chi therapy be useful in enhancing the mobility of older adults with depressive symptoms?

1.4 Research Objectives

1.4.1 General Objectives

The general objective of this study is to determine the effectiveness of the combination therapy of music and Tai Chi on depressive symptoms and its effectiveness to enhance the quality of life, as well as physical mobility.

1.4.2 Specific Objectives

The specific objectives of the study are:

1. To determine the prevalence rate of depressive symptoms among community-dwelling older people in Ya'an City.
2. To determine the quality of life and physical mobility of community-dwelling older people in Ya'an City.
3. To examine the relationship between depressive symptoms, quality of life, and physical mobility.

4. To identify the factors associated with depressive symptoms among community-dwelling older people in Ya'an City.
5. To identify the indicators for quality of life among community-dwelling older people in Ya'an City.
6. To determine the effect of combined music and Tai Chi therapy on depressive symptoms among community-dwelling older people with depressive symptoms in Ya'an City.
7. To determine the effect of combined music and Tai Chi therapy on the quality of life among community-dwelling older people with depressive symptoms in Ya'an City.
8. To determine the effect of combined music and Tai Chi therapy on physical mobility among community-dwelling older people with depressive symptoms in Ya'an City.

1.5 Significance of the Study

Despite the high prevalence rate of depressive symptoms among older people reported worldwide, such rates have yet to be measured in the rapidly ageing city of Ya'an. Although most studies conducted in China did focus on the prevalence rate and risk factors of depressive symptoms, there were only a few studies that evaluated the potential benefits of non-pharmacological interventions. This study, therefore, aims to fill in the crucial gaps in research regarding older citizens suffering from depressive symptoms in Ya'an City and in Southwest China of the general context.

First, this quantitative cross-sectional survey employed the randomized sampling method, thus involved 454 older people of a community setting in this city. This study revealed that the prevalence rate of depressive symptoms was 31.3%, a higher rate compared to most parts of China (Li et al., 2014). This finding should remind nursing professionals

and community nursing workers to pay more attention to older people's mental health, especially if they have symptoms of depression, and those who were from the same economic and socila background.

Second, this study concluded that sociodemographic data such as gender, marital status, living situations, income, employment, physical health, negative life events, and exercise habit have an impact on both depressive symptoms and the quality of life. To elaborate, older people of a specific set of demographic data (male; single, divorced or widowed; living alone; low monthly income; unemployed before age 55; suffer chronic health problems; exercise less or sedated; experienced negative life events within the last three years) would be more likely to report of depressive symptoms, and are more likely to have a lower level of quality of life. Furthermore, this study also revealed a significant correlation between depressive symptoms, quality of life, and physical mobility. Depressive symptoms were related to a lower quality of life and poor physical mobility. This information would prove useful for nursing professionals and social nursing workers to diagnose depressive symptoms in older people.

Third, this study has proven that the three months long, three times per week, 50-minute 24-movement Yang's Tai Chi combined with soft Chinese traditional music was effective in reducing depressive symptoms, enhancing the quality of life, and improving older people's physical mobility. With this finding, this study uncovered for the nursing professionals and social nursing workers a viable, convenient, and cost-effective way of reducing the severity of depressive symptoms among the community-dwelling older people and of enhancing their quality of life, as also delivered by non-psychologists.

1.6 Conceptual Framework

1.6.1 The James–Lange Theory

The James–Lange theory is a hypothesis on the origin and nature of emotions and is one of the earliest theories of emotion within modern psychology. It was developed independently by two 19th-century scholars, William James and Carl Lange. "The basic premise of the theory is that physiological arousal instigates the experience of a specific emotion" (Cannon, 1927). Instead of feeling an emotion and the subsequent physiological (bodily) response, the theory proposes that the physiological change is primary and emotion is then experienced when the brain reacts to the information received via the body's nervous system (Cannon, 1927). Though there are different theories about emotion, evidence was found (Plutchik & Kellerman, 2013) to support the James-Lange Theory. PET scan studies have revealed that the basic emotions elicit distinct patterns of activity in the brain. The brain's somatosensory cortex, an area of the brain associated with processing sensory information from the muscles, skin, and organs, became active during emotional responses. Figure 1.1 displays the framework of the James-Lange Theory.

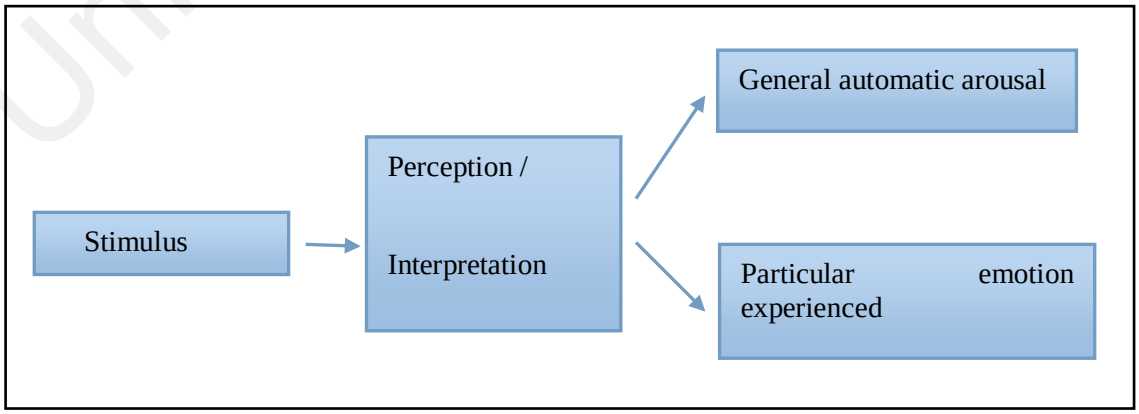

Figure 1. 1: The conceptual framework of the James–Lange theory

1.6.2 Application of the James–Lange Theory to this Study

"The biological pathways" (Rosenberg & Lenze, 2012) activated through exercise include increased central norepinephrine transmission, serotonin synthesis, metabolism, and beta-endorphins, as well as increased neurogenesis and synaptic plasticity in key regions of the brain, which involves mood. Hence, in this study, the researcher considered the combined music and Tai Chi therapy as the stimulus in the conceptual framework. The researcher also assumed that during and after therapy, the act of socialization, as well as emotions of happiness and relaxation, would be perceived by the depressed older individual then trigger in them a general automatic arousal. The older individual would consequently experience positive emotions, relieving their biological depressive symptoms. Figure 1.2 displays the conceptual framework of this study based on the James-Lange Theory.

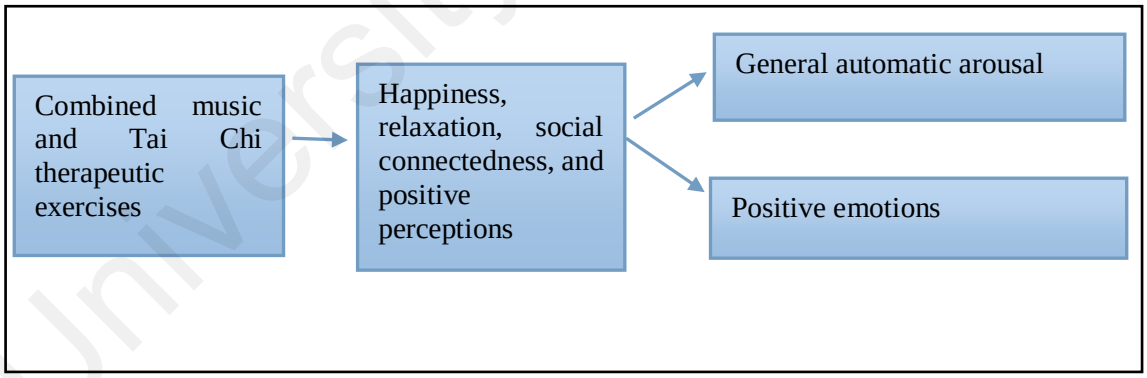

Figure 1. 2: The conceptual framework of the current study based on the James–Lange Theory (1927)

1.7 Operational Definitions

Older people

When people grow old, a number of physical changes occur to affect their appearance, physical function, and psychological status, those which would be different from younger people. There is no consensus as to what age would a person be considered 'old'. China generally uses the cutoff age of 60 years and above to refer to the older population (Silverstein, Cong, & Li, 2006). Similarly, in the context of this study, older people refer to those aged 60 years and above.

Depressive symptoms among older people

Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behaviour, feelings, and sense of well-being (Nesse, 2000). People with depressive symptoms can feel sad, anxious, empty, hopeless, worthless, guilty, irritable, ashamed or restless (Nesse, 2000). In this study, the Chinese version of the Geriatric Depression Scale (GDS) was used to screen for these depressive symptoms. According to which, a score of 11 to 25 points represents a mild to moderate depression, a score of more than 26 points represents severe depression, and a score of fewer than 10 points represents no depression (Wang 1999).

Quality of life

In general, the quality of life (QOL) is the perceived quality of an individual's daily life, that is, an assessment of their well-being or lack thereof. This includes all emotional, social, and physical aspects of the individual's life. The WHOQOL-BREF quality of life assessment is a comprehensive, validated general quality of life instrument. The Chinese version of this assessment tool was used to determine the levels of quality of life among older people.

Community-dwelling

It is only when people have lived together for a long period of time, only then could this study narrow the possible effects of environment, dietary habits, and culture into a selection of observational variables. In this study, community refers to the place where people live together. The researcher has only included the older people who lived in the targeted communities for a duration of at least a year. Only this it was assured that all participants have the same environment, dietary habits, and culture background.

Combined music and Tai Chi therapy

In this study, depressed older people were encouraged to participate in the 24-movements Yang's Tai Chi exercise, which is a traditional Chinese exercise aimed to enhance the well-being of the individual, especially the elderly. During this exercise, this researcher included Chinese folk music to the background, including tunes of 'Bubuqingfeng', 'Zuihuayuan', and 'Shanyeyouju' to induce relaxation and elevate mood, so as to relieve their depressive symptoms, thus to enhance their quality of life. The whole intervention lasted 50 minutes, which included 5-minute warm-up, 40-minute Tai Chi exercise, and 5-

minute cooldown. The elderly were asked to participate in the session 3 times per week for 3 months. The 24 movements of Tai Chi practiced during the intervention were 'Commencing', 'Part the Wild Horse's Mane, LEFT and RIGHT', 'White Crane Spreads Its Wings', 'Brush Knee and Step Forward, LEFT and RIGHT', 'Playing the Lute', 'Reverse Reeling Forearm, LEFT and RIGHT', 'Left Grasp Sparrow's Tail', 'Right Grasp Sparrow's Tail', 'Single Whip', 'Wave Hands Like Clouds', 'Single Whip', 'High Pat on Horse', 'Right Heel Kick', 'Strike to Ears with Both Fists', 'Turn Body and Left Heel Kick', 'Left Lower Body and Stand on One Leg' , 'Right Lower Body and Stand on One Leg', 'Shuttle Back and Forth, RIGHT and LEFT', 'Needle at Sea Bottom', 'Fan Through Back', 'Turn Body, Deflect, Parry, and Punch' , 'Withdraw and Push, as if Closing a Door', 'Cross Hands', and 'Closing'.

Physical mobility

Physical mobility refers to the ability of humans to move around their environment. The lack of physical mobility due to ageing, physical disability, physical or mental disorders are restrictions towards people living within narrow boundaries of academics, social, and daily routine. In this study, the Timed Up and Go test was used to assess the physical mobility of community-dwelling older people. The subjects were asked to rise from a chair with a seat height of 43cm, walk for 3 meters, turn around, and return to their chair to sit down again, wearing ordinary footwear and using customary walking aids if necessary.

1.8 Structure of the Thesis

This thesis is structured into six chapters to facilitate clarity and understanding of the study.

Chapter One: It introduces and states the focus of the study. It begins with the introduction which provides a summary of the literature related to the ageing status and the prevalence of depressive symptoms and the negative health consequences among older people. Following this, prior studies on non-pharmacologic interventions of depressive symptoms were reviewed, especially studies on Tai Chi and music therapy. The possible relationships between depressive symptoms, quality of life, and physical mobility of older people were reviewed as well. It also includes research questions that identify both variables and the relationships to be examined in this study, as well as the research objectives that provide clear direction on the study outcomes. The significance of the study rests on the hopes for its findings to provide insights on the topic to educate community-dwelling older persons, nurses, and organizations. Based on this, the study would fill the research gap in Southwest part of China, thus, to certify a cost-effective, doable and widely accepted way of management of depressive symptoms, quality of life, as well as physical mobility among community-dwelling older people in this setting.

Chapter Two: This chapter provides a critical and extensive review of literature related to the prevalence of depressive symptoms and non-pharmacological interventions to treat depressive symptoms among older people. This includes a historical overview, an examination of current trends, and a listing of significant research outcomes related to the topic of the study in order to identify the gap in the exciting literature, thus demonstrating the need for a new study with enhanced study designs. In addition, the statements of this chapter enable a more comprehensive analysis and discussion of data in the later chapters.

Chapter Three: This chapter presents the methodological approach used in this study. The study design and the pragmatic knowledge claims associated with the use of the cross-sectional method and the cluster randomized controlled method are outlined. The chapter rationales the study's selection of population and sampling, instruments, and data collection method. The ethical considerations, the process and outcomes of the pilot study, and the plans to analyze data are outlined in this chapter.

Chapter Four: The study findings are presented in this chapter. Tables, with additional descriptions, are used to report the findings of the prevalence of depressive symptoms and the factors associated with it. The findings also include the relationships between depressive symptoms, quality of life, and physical mobility. Furthermore, this chapter discusses the consequent change experienced in depressive symptoms, quality of life, and physical mobility after the intervention in detail. Finally, it presents the true effect(s) of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility with consideration of the sociodemographic variables.

Chapter Five: In this chapter findings are discussed. The discussion goes on to compare and contrast the findings of the current study to previous studies. A meaningful conclusion and the comparisons of the effectiveness of combined music and Tai Chi therapy on depressive symptoms are highlighted.

Chapter Six: Conclusions are outlined based on the overall findings and the implications and recommendations related to the practice, education, and further research of the research topic. The limitations of the study are discussed. The chapter concludes with an overview of the study findings.

1.9 Summary

Global population ageing is increasingly strenuous upon all health and social care systems. China has arguably the biggest ageing problem in the world. The absolute number of senior people in China is the largest worldwide. In addition, the population is continuing to age at an accelerated pace, one that is only matched by other superaged societies like Singapore, Korea, and Japan. In Ya'an City, where this study was taken place, the total population is reducing in size due to urban migration. The government census showed that the population had decreased from 1,522,800 to 1,507,300 between the year of 2000 to 2010, at the rate of 0.1% per year. In China's traditional culture, older people prefer to spend their later lives at home (Xu, Wang, Wimo, & Qiu, 2016). Furthermore, it is considered socially unacceptable to put one's own parents in institutional care (Xu, Wang, Wimo, & Qiu, 2016). Due to its large population and its chequered history over the past century, China's healthcare system is far from well established. It is vital for the community and home-based solutions to develop in order to ensure the deliverance of effective management strategies to the masses without the need for highly-trained health personnel, whose services are only available in major cities. This study aims to fill the research gap by determining the prevalence rate of depressive symptoms, quality of life, and physical mobility amongst community-dwelling older people in rural China, to inform social and government attention towards this comparatively poor and resource-lacked region. This study also will explore a viable, cost-effective, and self-help way to relieve depressive symptoms, to enhance the quality of life, and improve physical mobility among community-dwelling older people in the rural parts of China. Hence, with this solution, there is no need to burden the comparatively low medical care resources, yet have the ability to satisfy the elderly and their families living in home complexes.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter commences with a detailed description of the literature search. It then discusses the contents of the literature review, these include the prevalence rate of depressive symptoms, the relationship between depressive symptoms, quality of life, and physical function, the risk and protective factors of depressive symptoms, and previous studies involving music and exercise therapy for the management of depressive symptoms among older people. A critical appraisal of interventional studies on combined music and exercise therapy for depressive symptoms among older people was conducted by using the CASP checklist for RCTs at the end of this chapter.

2.2 Search Strategies and Literature Screening

2.2.1 Database Search

The literature search was conducted using the following keywords: ("geriatric" or "elderly" or "aged" or "late life" or "older" or "senior") and ("depression" or "depressive disorder" or depressed") and ("exercise" or "Locomotion" or "mobility" or "physical activity" or "Tai Chi") and ("music" or "rhythm"). Databases included were CINAHL, MEDLINE, EBSCO, VIP, WANFANG, and CNKI. The last 3 databases were Chinese databases. The search was limited to the English and Chinese languages from the year 2005 until present. No attempt was made to access any unpublished studies or other 'grey' literature. Inclusion criteria for the literature review were full-text papers published in English language or Chinese language that described depressive symptoms and music or

exercise intervention for depressive symptoms among older persons. Studies that were published in other languages, as well as studies that described depressive symptoms among non-older persons, were excluded.

2.2.2 Literature Screening for Interventional Studies

The search of keywords through the databases resulted in an initial total of 7793 papers, of which CINAHL resulted in 1980 papers, MEDLINE resulted in 2956 papers, EBSCO resulted in 1014 papers, VIP resulted in 488 papers, WANFANG resulted in 397 papers, and CNKI resulted in 958 papers. Google Scholar was also used as a supplement. All 7793 papers were first screened by their titles and abstracts to match the inclusion criteria. Thereafter, the final number of interventional papers downloaded was 151, including 134 papers from the database search and 17 papers identified through the reference list(s). From these 151 reviewed papers, 107 papers were removed for duplicates of similar content, while 27 were rejected for irrelevant content (Figure 2.1). Finally, a total number of 17 articles related to music or exercise intervention for depressive symptoms among older persons were included for this review (Table 2.1).

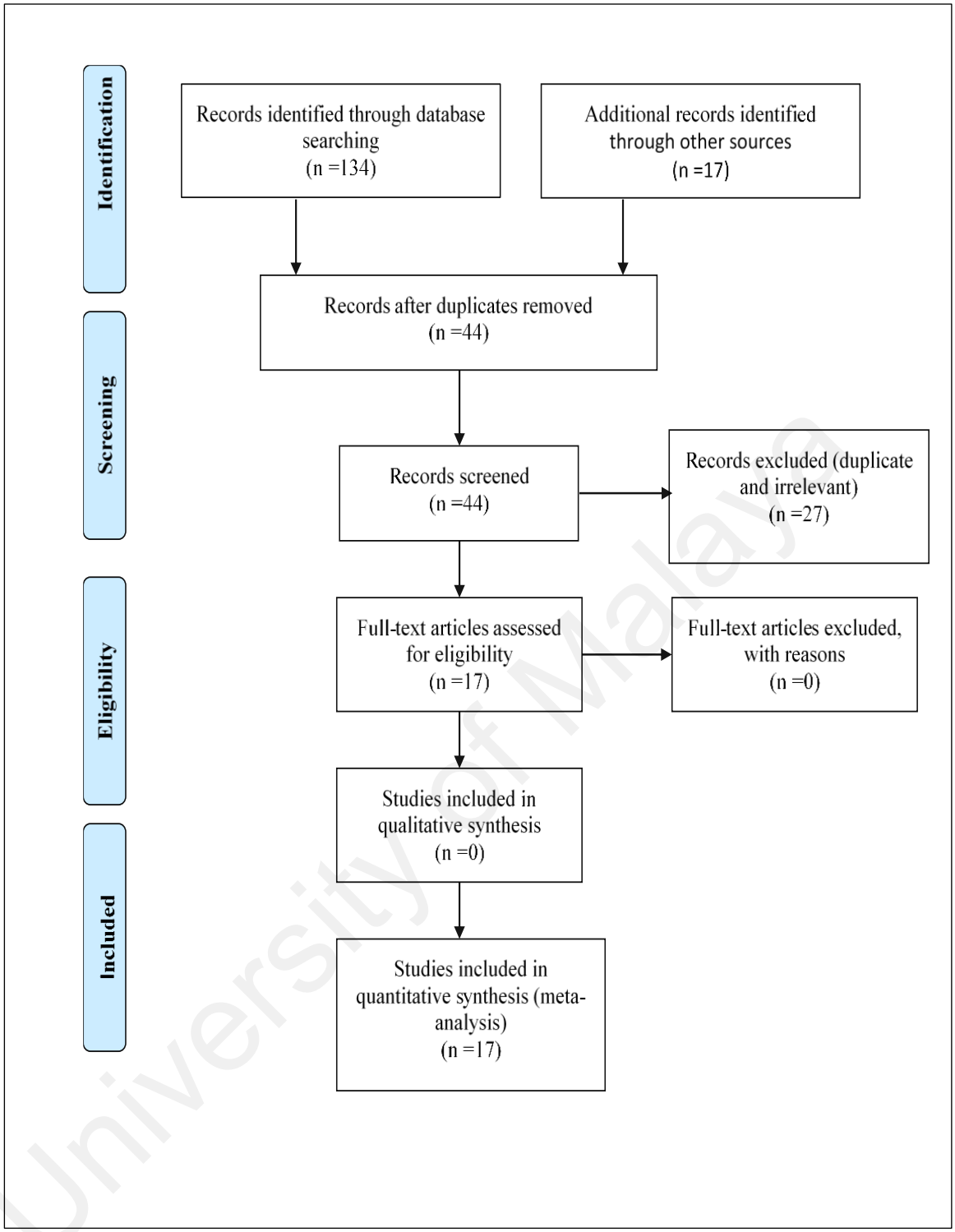

Figure 2. 1 : Summary of selection and exclusion of interventional papers

Table 2. 1: Summary of selected papers

No.	Author and year	Design and instruments	Sample, sample size, and setting	Data collection	Intervention and outcome	Limitations
1	Brenes et al (2007)	Pilot study HDRC, GDS, SF-36	Convenience sampling, 32participants, USA	Self-report, Observed by clinician	Aerobic and resistance exercise showed promise for late-life minor depression	Convenience sampling limits generalizability
2	Deng et al (2013)	RCT SAS, SDS, PSQI	Random sampling,100 participants, China.	Self-report	Outdoor Tai Chi combined with music could improve depressive levels	Not blinded limits bias
3	Chan et al (2009)	RCT GDS, SBP, DBP	Random sampling, 66 participants, Singapore	Self-report	Listening to preferred music leads to significant reduction in depression scores	Not concealed limits bias
4	Chan et al (2011)	RCT GDS-15	Random sampling, 50 participants, Singapore	Self-report	Listening to preferred music helps to reduce depression levels weekly	The intervention is not restricted at times; not blinded
5	Choi et al (2009)	Pre- and post-test interventional study GDS, MMSE, GQoL	Convenience sampling, 20 participants, South Korea	Self-report	Music training helps to improve patients' psychological symptoms	Not concealed limits bias; No control group

Table 2.1: Continued

6	Gopi et al (2016)	Pre- and post-test interventional study GDS	Purposive sampling, 30 participants, India	Self-report	Listening to music has significantly decreased the depression score	Purposive sampling; Not blinded; No control group
7	Guetin et al (2009)	RCT HAS, GDS	Random sampling, 30 participants, France	Self-report	Significant improvement in anxiety and depression were observed in the music (listening to music) group	Not blinded limits bias
8	Han et al (2010)	Quasi-experimental study AES, RMBPC	Convenience sampling, 46-participants, Singapore	Self-report	Weekly listening to music and aerobic activity could ameliorate depressive symptoms in PWD	Convenience sampling; Not blinded
9	Kerse et al (2010)	RCT GDS, MCC	Random sampling, 45 participants, New-Zealand	Self-report	Mood of participants had improved through the DELLITE activity	Sample size was small
10	Pfaff et al (2013)	RCT PHQ-9	Random sampling, 200 participants, Australia	Self-report, Clinical assessment	Home-based physical activity failed to enhance depressive symptoms	Not blinded
11	Sims et al (2006)	RCT GDS	Random sampling, 45 participants, Australia	Self-report	Community-based exercise programme helps to reduce depressive level	Sample size was small; Not blinded

Table 2.1: Continued

12	Singh et al (2005)	RCT HAM-D	Random sampling, 60 participants, Australia	Self-report	High-intensity PRT was more effective than low-intensity PRT in treatment of depressed patients	Not blinded
13	Tsang et al (2006)	RCT GDS, CGSS, GHQ-12	Random sampling, 82 participants, China	Self-report	Regular Qigong exercise could relieve depression	Sample size was small; Not blinded
14	Underwood et al (2013)	RCT GDS	Cluster random sampling, 78 participants, UK	Self-report	Group exercise did not reduce depressive symptoms in institutional older patients	Not blinded
15	Verrusio et al (2014)	RCT GDS, HAS	Random sampling, 20 participants, Italy	Self-report	Exercise training and music therapy could reduce anxiety and depressive level	Sample size was small; Not blinded
16	Williams et al (2008)	RCT CSDD, DMAS, OAS	Random sampling, 80 participants, USA	Self-report	Group-based exercise helps to improve depression among elderly with AD	Not blinded
17	Yeung et al (2012)	RCT HAM-D	Convenience sampling, 39 participants, USA	Self-report	Tai Chi improves depression among Chinese Americans	Convenience sampling; Not blinded

2.3 Literature Review

2.3.1 Prevalence Rate of Depressive Symptoms among Older People

Depressive symptoms are common among older people worldwide. According to previous studies, depressive symptoms were reported at 17% (Quach et al., 2013) to 51.8% (Zhang 2012) among community-dwelling older people. Most of the previous studies (Quach et al., 2013; Laborde‐Lahoz et al., 2015) were limited in terms of either sampling method or assessment tools, and most of which (Yaka, Keskinoglu, Ucku, Yener, & Tunca, 2014; Ibrahim et al., 2013) lack representation of the rural regions due to being conducted in urban regions.

Quach et al. (2013) conducted a population-based prospective longitudinal study which included 763 older participants aged 70 or above in Boston, America. The study was carried out during the time period between September 2005 to April 2009 and lasted for nearly four years. The study that investigated the novel risk factors for falls revealed depressive symptoms as the second outcome by measurement of the modified Center for Epidemiologic Studies Depression-Revised Scale (CESD-R), while covering all Diagnostic and Statistical Manual of Mental Disorder criteria for depression. The study defined older people who scored of more than 60 on the modified-CESD-R scale as having depressive symptoms. After the data analysis, the researcher reported a 17% of clinically significant depressive symptoms among 763 of its older participants. However, as with the average age of participants at 78 ± 5 years, the research findings are not surprising. As age has been reported to have an association with depressive symptoms, the older the person, the higher the chance of having depressive symptoms (Leal, Apóstolo, Mendes, & Marques, 2014). Another disadvantage of this study was that the

researcher did not report the method of sampling, as well as the process of data collection, thus proves difficult to rule out researcher bias.

Another population-based study that involved 10,409 adults aged over 55 years old in America disclosed a 27.5% prevalence rate of depressive symptoms which included 13.8% subsyndromal depression (SSD) and 13.7% major depressive disorder (Laborde‐Lahoz et al., 2015). The sample recruited in this study was of those participating in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) of the United States. There included two waves, wave one was between the time of 2001 to 2002, whereas wave two was held during the time from of 2004 to 2005. Laborde‐Lahoz et al. (2015) measured the depressive symptoms during wave one and the suicide attempts during wave two. The most unconventional part of this study in comparison with others was that there were no tools of scales or questionnaires used to assess the prevalence rate of depressive symptoms. In this study, SSD was defined as an endorsement of at least one core symptom of MDD, such as depressed mood or anhedonia, and four or five other non-clinically significant depressive symptoms or functional impairment. As for the two key factors of SSD, the researcher used the following methods to assess them. To evaluate the history of anhedonia, the following question was asked: "In your entire life, have you ever had a time, lasting at least 2 weeks, when you didn't care about the things you usually enjoyed?" To evaluate the history of depressed mood, the researcher asked this question: "In your entire life, have you ever had a time when you felt sad, blue, depressed, or down most of the time for at least 2 weeks?" Only when participants confirmed either a history of depressed mood or a history of anhedonia, would the questions about non-clinically significant depressive symptoms be asked. Compared with the prevalence rate of 17% in the first study (Quach et al., 2013), this study reported an even higher prevalence rate of depressive symptoms, even among a younger sample of the aged over

55 (Laborde‐Lahoz et al., 2015). However, the SSD defined in this study was based only on two core symptoms, these depressed mood and anhedonia, with consideration of other non-core symptoms. All of these symptoms assessed were gained during the face to face interviews, implying the subjective assessment of the interviewer. Limitations of this study were the lack of explanation regarding both the non-core depressive symptoms and the sampling method used in this study.

In the European country of Turkey, the prevalence rate of depressive symptoms among community-dwelling older people was reported as 18.5% (Yaka, Keskinoglu, Ucku, Yener, & Tunca, 2014). In this cross-sectional survey, Yaka et al. (2014) adopted the cluster sampling method to recruit participants which later resulted in the final number of 482 urban community-dwelling older people aged more than 65 years old. The average age of the participants was 71.7 ± 6.5 years. The depressive symptoms mentioned in this study were measured by the short version of Geriatric Depression Scale (GDS-15), combined with clinic interviews. All participants of the study were from the urban region of Turkey, thus allowing the researchers to demonstrate the association between economic status and depressive symptoms (Yaka et al., 2014). Representation of the rural community-dwelling older people was limited in this study. The sampling process and the process of data collection were also left unexplained in this study.

Meanwhile, among Asian countries, Ibrahim et al. (2013) conducted a cross-sectional study among rural elderly settlers. The study included 162 older people aged 60 years and above. The depressive symptoms in this study were measured using the Malaysian GDS-14. After the analysis of data, the researchers reported a 26% prevalence rate of depressive symptoms, including 23.5% at a mild to moderate level and 2.5% at a severe level, following the cut off value of GDS-14. In this study, all participants were from a rural

region of Malaysia, of which is under the support of the Malaysian Federal Land Development Authority. Due to the difference of culture, participants, despite living in rural regions, were not farmers but mostly retired employees. The occupation of the elderly in the Malaysian study is vastly different to the current study. Limitations of the Malaysian study include its adoption of the universal sampling method, a method less effective compared to the cluster systematic sampling method employed in this study. However, the Malaysian study is a good point of reference to this study, taking into account its comparatively similar research locale and economic situation.

Returning attention to the prevalence rate of depressive symptoms among older people in China, there have been reports of rates from as low as 3.1% (Mouni, 2001) to as high as 51.8% (Zhang 2012) in the community-dwelling setting. For a better understanding of the prevalence rate of depressive symptoms among older people in China, Li, Zhang, Shao, Qi, and Tian (2014) conducted a meta-analysis which included 81 published papers involving 88,471 subjects in total, focusing particularly on depressive symptoms. Among all subjects, 56 of them measured the symptoms of depression by the Geriatric Depression Scale (GDS-30), while another 25 measured depressive symptoms using the Center for Epidemiologic Studies Depression Scale (CES-D). According to this meta-analysis, the prevalence rate of depressive symptoms among older Chinese was 23.6% (95% CI: 20.3-27.2%). However, viewing in detail, GDS-30 was much more sensitive an instrument in detecting the depressive symptoms when compared with CES-D. The prevalence rate detected by GDS-30 was 27.3% (95% CI: 23.3-31.7%) while the prevalence rate detected by CES-D was only 16.7% (95% CI: 12.6%-21.8%), a significantly lower value.

2.3.2 Negative Health Consequences Associated with Depressive Symptoms

Depressive symptoms are associated with a series of adverse health outcomes. It was reported in Australia as a significant independent predictor of the number of hospital admissions and the total length of hospital stay (Prina et al., 2013). In China, Wong found that there was a dose-response relationship between depression with hospital admission and death (Wong, Mercer, Leung, & Woo, 2009). In the Netherlands, Prina, Deeg, Brayne, Beekman, and Huisman (2012) also found the length of hospital stay as positively associated with the severity of depressive symptoms. It was also reported that a diagnosis of depressive disorder and a history of depressive symptoms are independent predictors of inpatient death in America (Cavanaugh, Furlanetto, Creech, & Powell, 2001). A systematic review in Australia claimed that depressive symptoms affect nearly 350 million people all over the world and are the leading cause of global disability (Antoniades, Mazza, & Brijnath, 2014). Depressive symptoms have also been declared to be the third leading cause of disability in Europe (Üstün, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004). S. Y. Wong, Mercer, Woo, and Leung (2008) disclosed a dose-response relationship between the physical condition and depressive symptoms. The also found some other harmful physical consequences deriving from depressive symptoms, including the increased risk of dementia (Saczynski et al., 2010), the prolonged inflammatory responses after infection (Glaser, Robles, Sheridan, Malarkey, & Kiecolt-Glaser, 2003), and the prevalence of falling (Wang et al., 2012). Depressive symptoms have mainly been described as a consequence of loneliness (Drageset, Espehaug, & Kirkevold, 2012) but studies have figured out that it also contributes to loneliness among both community-dwelling older individuals (Savikko, Routasalo, Tilvis, Strandberg, & Pitkälä, 2005) and nursing homes residents (Prieto-Flores, Forjaz, Fernandez-Mayoralas, Rojo-Perez, & Martinez-Martin, 2011). Suicide and suicide

attempts are also common among depressed patients (Wächtler, 2009). As a result, depressive symptoms are related to the increase in the total medical care cost (Glaser et al., 2003; W. Katon, Lin, & Kroenke, 2007; W. J. Katon, Lin, Russo, & Unützer, 2003). A German study showed that the treatment of depressive symptoms could be associated with long-term cost reductions (Hamre et al., 2010).

For the current study, the focus is on the relationship between depressive symptoms, quality of life, and physical mobility. Published evidence has demonstrated the negative association between depressive symptoms and the quality of life (Glaser et al., 2003; Kolotkin et al., 2008). Visser, Aben, Heijenbrok-Kal, Busschbach, and Ribbers (2014) conducted a cross-sectional survey of 213 participants. The main purpose of this study was to find out the relative effect of depressive symptoms on health-related quality of life. In that specific study, the depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D). This questionnaire consists of 20 items concerning depressive symptoms, with scores ranging from 0 to 3. Higher scores indicated more depressive symptoms, as according to Radloff (1977), and the cutoff value of CES-D was 16. As a show of comparison, the quality of life in this study was measured using the WHOQoL-BREF. The result of the aforementioned study (Visser et al., 2014) showed a strong relationship between depressive symptoms and the quality of life. The more severe the depressive symptoms, the poorer the quality of life. The study (Visser et al., 2014) adopted the method of convenience sampling that resulted in the average age of participants at 59 ± 9.86 years. It is noteworthy that all participants in this study were survivors of stroke. The particular study design may limit its representation of other community-dwelling older people.

Depressive symptoms are also related to functional decline (Evans et al., 2005), even so, the mild to moderate depressive symptoms were proven to have an association with difficulties in performing daily activities (Glaser et al., 2003). Cronin-Stubbs et al. (2000) conducted a longitudinal population-based study, which involved 3809 community-dwelling persons aged 65 years and older. The study aimed to examine the effect of mild depressive symptoms on physical mobility. This study was carried out between the year of 1982 to 1988, with its first assessment conducted in 1982 and later succeeded with 6 annual follow-up interviews. Among the six interviews, the first, third, and last were conducted in the participants' home, while the others were conducted through the telephone. In this study, the depressive symptoms were assessed by a reduced version (10 items, ranging from 0-10) of the Center for Epidemiological Studies Depression Scale. The physical mobility was assessed by three modified self-report measures: six items from the Katz Activities of Daily Living Scale assessed the ability to perform basic self-care tasks (bathing, dressing, eating, toileting, walking across a room, and transferring from a bed to a chair); three items from the Rosow-Breslau Functional Health Scale assessed mobility and lower extremity strength (climbing stairs, walking 0.8 km, and doing heavy work around the house); four items from the Nagi Index assessed upper and lower extremity strength and basic motor functions (bending, stooping or crouching, reaching above the shoulders, writing or handling small objects, and pushing or pulling an object like a chair). This study confirmed that mild depressive symptoms in older persons were associated with reduced physical mobility, and even physical disability. The review of this study (Cronin-Stubbs et al., 2000) revealed its several strengths such as its sample size calculation and its detailed physical mobility assessment. However, due to its adoption of the convenient sampling method, the results reflected a small representation. Another reason that leads to the small representation is that, all participants in this study were aged 65 years or older, this age group is inconsistent with China's classification of

older people. In China, due to the different economic, medical service, and social status, people aged 60 years or older are defined as older people.

2.3.3 Factors Associated with Depressive Symptoms

A series of factors were reported to be associated with depressive symptoms, these include gender (Apostolopoulou et al., 2014; Regan, Kearney, Savva, Cronin, & Kenny, 2013), marital status (Kamiya, Doyle, Henretta, & Timonen, 2013)， living status (Kim & Lee, 2015), physical health (Regan et al., 2013), monthly income (Xu, Zhao, Qian, Dong, & Gu, 2015), negative life events (Marum, Clench-Aas, Nes, & Raanaas, 2014), and exercise (Paulo et al., 2016).

Apostolopoulou et al. (2014) carried out a cross-sectional survey of 132 German older people from the years of 2008 to 2010, aimed at examining the gender difference in anxiety and depressive symptoms. In this study, depressive symptoms were screened with a brief patient health questionnaire (PHQD). As the results then showed, the female gender was more likely to report depressive symptoms than those of male gender. On account of the use of convenient sampling method in this study (Apostolopoulou et al., 2014), aside from the fact that all of its participants were diagnosed with primary hyperaldosteronism, the results of this study are in need of further certification.

Another study from Italy suggested that gender is not associated with depressive symptoms among community-dwelling older people (Forlani et al., 2014). This study was conducted among 359 community-dwelling older people aged 74 years and above. The depressive symptoms were measured by use of a modified version of the Cambridge Examination for Mental Disorders of Elderly Persons-Revised. This study may have a

minor flaw in its sampling procedure because the use of convenience sampling method would have an effect on its subject representation. Besides, all participants in this study were aged 74 years and above, thus reducing the consideration for a wider range of older people, which in accordance to China's definition, refers to those aged 60 years and above.

Kamiya et al. (2013) carried out a descriptive study to examine the impact of both early and later life circumstances on depressive symptoms. The study included 8,504 community-dwelling adults aged 50 years and older, among which 3,507 participants were aged 65 years and older. The data collected in this study (Kamiya et al., 2013) were from the first wave of The Irish Longitudinal Study on Ageing (TILDA). The research findings disclosed marital status as a significant independent predictor of depressive symptoms in later life. The strengths of this study include its sample size estimation and its sound prospective longitudinal research design. Since this study was not designed to include those of an older age, the applicability of this study among older people will require further research for support.

Living alone was reported to be associated with depressive symptoms among older people in a community setting (Kim & Lee, 2015). Kim and Lee (2015) carried out their cross-sectional survey in 2012 in South Korea, aimed at examining family relations, economic status, depressive symptoms, leisure activities, health behaviour, housing, and attitudes towards social services. Their survey used the cross-sectional research design. All respondents were selected through probability sampling by using a regional directory obtained from the local government. They first addressed 6400 older people aged 65 years and above who lived alone in the targeted region, then employed the stratified random sampling method which considered 16 districts, gender, and age groups to generate the final research sample. The age groups were divided into three categories, those aged 65

years to 69 years, those aged 70 years to 79 years, and those aged 80 years and over. As a result, their sample size was 1023 older people living alone from 100 towns. After analyzing the data, Kim and Lee (2015) confirmed that the factor of living alone was associated with depressive symptoms. Although the sampling size of this study was large and its sampling method was sound, the researchers did not consider the elderly's living situation as the first outcome. In addition, they employed logistic regression to analyze data, without any control of the other factors. Therefore, further studies with better research design and more suitable method of data analysis are needed to certify this research's finding.

Physical health in this context is defined by physical diseases, of which are the disorders of the functional structure of the human body. Such physical diseases in this study pertain especially to those that either produce specific signs or symptoms or affect specific locations, of which both are not simply the direct results of physical injury. Physical disorders were confirmed to be associated with depressive symptoms among older people (Regan et al., 2013). The subjects of the study consisted of 8175 community-dwelling older people with the average age of 64 years. Data were collected from the first wave of The Irish Longitudinal Study on Aging (TILDA) between October 2009 and February 2011 using the convenience sampling method. In this study, depressive symptoms were measured by the 20-item Center for Epidemiologic Studies Depression Scale (CES-D). Physical disorders existent in this study referred to a history of the following diseases: heart attack, heart failure, angina, cataracts, hypertension, high cholesterol stroke, diabetes, lung disease, asthma, arthritis, osteoporosis, cancer, Parkinson's disease, and peptic ulcer or hip fracture. This longitudinal prospective, population-based study was convincing, despite the differences in background and population with the western region of China. Monthly income affects one's daily life in the most direct sense. Financial

security is required to create life choices and to address basic and desirable needs (Ahnquist & Wamala, 2011). Xu et al. (2015) conducted an observational cross-sectional study in the Affiliated Hospital of Nantong University in China from November 2013 to June 2014 to assess the status of depressive symptoms and to identify factors associated with the depressive symptoms. This study involved 294 consecutive patients with type 2 diabetic retinopathy from the above-mentioned hospital, obtained through the convenience sampling method. Depressive symptoms in this study were assessed by the 20-item Center for Epidemiologic Studies Depression Scale (CES-D). The strengths of this study were of its fairly large sample size and its sound statistical analysis. Its analytical process included two steps. First, a bivariate analysis including Chi-square test and Mann-Whitney U-test were used to examine the association between depressive symptoms and its factors. Variables that were shown to be significant in the bivariate analysis were included in the logistic regression analysis to identify the independent factors of depressive symptoms with odds ratios and the corresponding 95% CIs. Although this study reported a negative association between monthly income and depressive symptoms – the lower the monthly income, the more severe the depressive symptoms – the representativeness of this finding requires further certification due to the following reasons. The study's employment of convenience sampling method made its findings vulnerable to selective bias. Furthermore, the population of this study was not limited to the study's definition of older people, instead, the average age of the participants was 57.55 ± 9.64. Due to the younger age of participants, many aspects of life choices would be affected.

Negative life events refer to the life events which have an adverse effect on both physical and psychological domains of health. Most people, especially older people, experience negative life events such as divorce, financial insufficient, and the loss of a loved one throughout their lives. Marum et al. (2014) analyzed the data from the Health and Level of Living Survey conducted by Statistics Norway in 2008, of which included 4823 individuals who were selected out of 10000 people using the stratified sampling method. Among the 4823 participants, 2250 of them were men with an average age of 49.3 years, while 2573 were women with an average age of 48.2 years. This study found that negative life events were associated with psychological stress such as depressive symptoms (Marum et al., 2014), but due to the following reasons, the study's finding would beckon further research support. Although the sample size was fairly large and the stratified sampling method was adopted, the authors did not clearly state whether randomization was used, based on stratification. In addition, the participants in this study were not limited to older people, instead, participants were of the male average age of 49.3 years and the female average age of 48.2 years. In light of the study population being Norwegians and not Chinese, the findings of both this study and the present study are subjected to the differences of cultura and economic factors.

According to Erickson, Gildengers, and Butters (2013), physical activity promotes molecular and cellular changes in the brain, which would then result in volumetric/functional changes of it, ultimately translating into the improved mood or cognitive improvements. Paulo et al. (2016) considered exercise as a possible predictor of depressive symptoms in a non-interventional cross-sectional survey, of which it was reported that exercise was associated with depressive symptoms, the more frequent to exercise the less likely of the report of depressive symptoms. This study was carried out from May to August 2010 and involved 622 community-dwelling individuals aged 60

years and above in Brazil. This study adopted the randomized sampling method. The sample size was calculated based on the prevalence of frailty, with a cutoff percentage of 20%. In this study, the exercise level was assessed through the long form of the International Physical Activity Questionnaire (IPAQ), while the depressive symptoms were measured by the Geriatric Depression Scale-Short Form (GDS-SF). Multinomial Logistic Regression was used to assess the associations between exercise and depressive symptoms. Although this study had several strengths, such as sample size estimation and randomized sampling method, the representativeness of this study in China will need further certification due to the differences in environment and cultural background. Research has found that individuals who practice good sleep hygiene were prone to have better physical health and lower levels of depressive symptoms and anxiety (Gellis & Lichstein, 2009). This study was carried out in 2009. It was an internet based cross-sectional survey that involved 220 participants with the average age of 41.6 ± 12.8 years. The main purpose of this study was to assess the impact of sleep hygiene on participants, including the effects of physical health, the frequency of anxiety and depression, among which depression was the third outcome measured. In this study, sleep hygiene was assessed by a self-developed questionnaire, which included 19 items. While depression frequency was assessed by using a one-item ordinal scale across four positions, ranging from rarely or none of the time to most or all of the time. The severity of depression was also assessed on a four-point ordinal scale ranging from not at all to severe. The results of this study showed that the participants who had poorer sleep hygiene were more likely to have depressive symptoms, and even more severe depressive symptoms when with an odds ratio of 1.42. Although the positivity of the report, this study was carried among younger adults compared with the targeted older people.

Social activity is also a protective factor against depressive symptoms among older people, with there being a significant association between participating in pleasant social activities and levels of depressive symptoms (Riebe, Fan, Unützer, & Vannoy, 2012). In America, a study reported that higher social participation offered protection against depressive symptoms for older adults (Barcelos-Ferreira, Nakano, Steffens, & Bottino, 2013). Barcelos-Ferreira et al. (2013) conducted this cross-sectional survey in a community setting in Sao Paulo among 1563 older people aged 60 years and older. This study adopted a cluster random sampling method, with its depressive symptoms assessed using the D-10 questionnaire. Although the sample size was large and the sampling method was sound, the data analysis method was neither clearly reported nor was the definition of social activity reported. Hence, further studies are needed to support this finding. Another study even showed that going to the cinema was a possible protective factor against depressive symptoms (Barcelos-Ferreira et al., 2013). Most interestingly, a survey among 736 rural older Chinese disclosed that in the case of men, obesity may be a protective factor against depressive symptoms (Dong et al., 2013). There was also a study that reported the ingestion of functional foods like Talbinah to be beneficial to treat mild to moderately depressed older people (Badrasawi, Shahar, Manaf, & Haron, 2013).

2.3.4 The Effect(s) of Exercise Therapy and Tai Chi on Depressive symptoms

As the tolerability of pharmacological agents decreases with age, exercise may be particularly helpful as a possible treatment or stabilizer of mood and cognitive function in the aged. Exercise has been the most commonly evaluated for the treatment of depression. Exercise interventions that are designed primarily for the treatment of physical conditions in older persons do appear to confer psychological benefits as well, with aims to reduce depressive symptoms over the course of treatment. The effects of

exercise on reducing depressive symptoms are not dissimilar to the effects of antidepressant drugs and cognitive behaviour therapy. Exercise may be a useful low-tech intervention for people with mild to moderate depression. In particular, exercise may be helpful towards older persons and in patients who have had insufficient response to, or are intolerant of, pharmacotherapy. However, the rate of participation in physical activity tends to decrease with age, whereas symptoms of depression would rise, such as lack of motivation and lack of energy (Behrman & Ebmeier, 2014).

Exercise has long been considered as an effective alternative treatment for depressive symptoms. Biological pathways activated through exercise include increased central norepinephrine transmission, serotonin synthesis, beta-endorphins and metabolism, and increased neurogenesis and synaptic plasticity in key brain regions which are involved in mood control (Rosenberg & Lenze, 2012). Though exercise has been shown to be effective in improving depression among older people, there is no all-encompassing therapeutic exercise regimen for the treatment of anxiety and depression in clinical settings (Rosenberg & Lenze, 2012). It is generally recommended that a patient exercise at least three to four times per week for about 20 to 30 minutes during each session (Ströhle, 2009). Moderate activities like walking are just as effective as strenuous activities such as running (Dishman & Buckworth, 1996). The WHO also recommended the practice of physical activity in adults aged 65 years or above for maintenance of physical and mental well-being stating, "At least 150 minutes of moderate-intensity aerobic physical activity each week, or 75 minutes of vigorous-intensity aerobic physical activity each week, or an equivalent combination of the above. Aerobic exercise should be performed in bouts of at least 10 minutes' duration. If unable to accomplish the above, adults of this age group should be as physically active as their abilities and conditions allow" (Behrman & Ebmeier, 2014).

Mead et al. (2009) conducted a meta-analysis of twenty-eight randomized controlled trials in which exercise was compared to a standard treatment, no treatment or a placebo treatment in adults with depression. Post-natal depression was excluded. Mead et al. (2009) calculated the effect sizes for each trial using Cohen's method and a standardized mean difference (SMD) for the overall pooled effect, using a random effects model. Although the trials used a number of different tools to assess depression, the authors included only the main outcome measurements in the meta-analyses. In this review, twenty-five of the qualified trials provided data for meta-analyses. For trials comparing exercise with no treatment or a control intervention, the pooled SMD was 0.82 (95% CI - 1.12, -0.51), indicating a large clinical effect. Mead et al. (2009) concluded that exercise does improve depressive symptoms, but more methodologically robust trials should be included to obtain more accurate estimates of effect sizes and to determine risks and costs. Based on this review (Mead et al., 2009), Cooney, Dwan, and Mead (2014) did a complementary review to further determine the effectiveness of exercise in the treatment of depressive symptoms in adults compared with no treatment or a comparator intervention. This review (Cooney et al., 2014) included thirty-nine randomized controlled trials (participated by 2326 persons) until the year of 2013. The pooled SMD for the primary outcome of depressive symptoms at the end of treatment was -0.62 (95% confidence interval (CI) -0.81 to -0.42), indicating a moderate clinical effect, especially for those who do not exercise regularly (Rosenberg & Lenze, 2012).

Both the above-mentioned reviews (Cooney et al., 2014; Mead et al., 2009) had their focus on younger adults. There were a systematic review and meta-analysis conducted in 2012, published in the British Journal of Psychiatry by Bridle, Spanjers, Patel, Atherton, and Lamb (2012). This study included two randomized controlled trials and seven other meta-analyses to estimate the effect(s) of exercise on depressive symptoms among older

persons. The findings indicated that for older persons who displayed clinically meaningful symptoms of depression, the prescription of structured exercise tailored to individual ability would reduce the severity of depression, with an SMD of -0.34 (95% CI -0.67 to -0.01). Moreover, the antidepressant effect of physical activity is comparable to that found affected by medications or psychotherapy (Bridle et al., 2012). Although there showed a positive conclusion of exercise on depressive symptoms, the number of randomized controlled trials in this study were an insufficient two. Hence, for better persuasion, further studies are in need.

These conclusions of the effectiveness of exercise on depressive symptoms apply to both aerobic exercises (Brenes et al., 2007) and the resistant modes of exercises as well (Singh et al., 2005). For example, Tai Chi, a form of low impact mind-body exercise of Chinese origins, has been practised for centuries for purposes of health and fitness in the East and is currently gaining popularity in the West.

Chou et al. (2004) conducted a randomized clinical trial among Hong Kong Chinese depressed older adults to assess the impact of Tai Chi training on depressive symptoms. The participants of this study were fourteen community-dwelling depressed patients who attended a psycho-geriatric outpatient clinic in Hong Kong. Seven participants were assigned to the Tai Chi training group, while another seven participants were allocated to the control group. The Tai Chi training group participated in a Tai Chi training programme in which they were instructed to engage in three 45-minute sessions per week of Tai Chi practice, for the entire three-month intervention period. Each session consisted of a 10-minute warm-up, a 25-minute Tai Chi session (18-form of Yang's style), and a 10-minute cool-down. All sessions were led by an experienced Tai Chi practitioner. Subjects in the control group were told that their Tai Chi sessions would be delayed for

three months. The assessment tool of depressive symptoms used in this study was CES-D. This study found that Tai Chi training was able to help reduce depressive symptoms among older Chinese in Hong Kong. This study (Chou et al., 2004) has several strengths found in its randomized allocating and the blinding of grouping. However, the participants in this study were a small sample of fourteen, thus beckons the need for further studies with a larger sample size.

Wang et al. (2014) conducted a systematic review and meta-analysis of randomized controlled trials and quasi-experimental trials to assess the effect of Tai Chi on depressive symptoms, anxiety, and psychological well-being. A total of 37 randomized controlled trials and five quasi-experimental trials were included in the meta-analysis, drawn from Chinese and English databases. This analysis adopted a series of criteria to evaluate the methodological quality of RCTs, including adequate sequence generation, blinding, allocation concealment, selective reporting, completeness of outcome data, and other potential biases. The results of this meta-analysis demonstrated that Tai Chi intervention has beneficial effects for various populations with depression (ES=-5.79; 95% CI 7.06 to -4.87), with I^2=0%. Despite the positive outcomes, the randomized controlled trials included in this analysis had significant methodological limitations. For instance, for adequate sequence generation, four trials were rated at high quality. For the allocation concealment, only 1 trial was rated at high quality. These reports raise particular research issues in blinding, completeness of outcome data, selective reporting, and other potential biases respectively (F. Wang et al., 2014). Therefore, more randomized controlled trials with rigorous research design are needed to establish the efficacy of Tai Chi in improving depressive symptoms and to uncover its potential to be used in interventions for populations with various clinical conditions (Wang et al., 2014). Although there is increasing evidence showing the importance of regular mental and physical exercise to

optimize overall health and functioning in older adults (Sorrell & Sorrell, 2008), the efficacy of such exercises on depression in older people still remains controversial.

Yeung et al. (2012) conducted a randomized controlled trial among thirty-nine Chinese Americans, to assess the feasibility, safety, and efficacy of using Tai Chi for treating depressive symptoms. The depressive symptoms were assessed by the 17-item Hamilton Rating Scale for Depression. Twenty-six of the participants were randomly assigned to the Tai Chi intervention group, while the other thirty participants were allocated to a waiting list control group. The Tai Chi exercise was offered three times per week, each session lasted for fifty minutes. After a three-month intervention, the difference did not reach statistical significance. This study (Yeung et al., 2012) had a small sample size, although the use of randomization, the method in detail was not clearly explained. Moreover, the participants had an average age of 55 ± 10 years, its representation of older people requires certification from further well-designed studies.

Another cluster randomized controlled trial offering exercise programmes and staff training to nursing homes also did not find any change in depression in older people receiving the intervention (Underwood et al., 2013). This study was carried out in England, it included 78 care homes located in either northeast London or Coventry and Warwickshire. Thirty-five out of the 78 care homes were allocated to the intervention group using the cluster randomized method, while the other forty-three care home were assigned to the control group. The total number of participants in this study was 891, among which 398 were from the intervention group, the other 493 were from the control group. The measurement tool used in this study was Geriatric Depression Scale 15. The intervention package in this study included depression awareness training for care-home staff, 45-minute physiotherapist-led group exercise sessions for residents, which was

delivered twice per week, and a whole home component designed to encourage more physical activity in daily life. The controll consisted of only depression awareness training. Both researchers and participants in this study were blinded about the allocation because of the physiotherapists' activities carried out within each care home. The whole follow-up period of this study was one year. The study (Underwood et al., 2013) had a sound design, including processes of randomized allocation and blinding, as well as a large sample size. However, all participants were from care homes with as much as 20% of them being severely depressed (Underwood et al., 2013). The moderate intensity exercise may not prove effective to this frail population. Moreover, this study was focused on community-dwelling older people with just mild to moderate depressive symptoms, which should be more sensitive to the combined music and Tai Chi intervention.

Pfaff et al. (2013) carried out a community based randomized controlled trial in Australia, which included 200 adults aged 50 years or older, to evaluate the efficacy of a home-based exercise programme added to the usual medical care for the treatment of depression. The participants were randomly allocated to either receive the usual medical care alone (control group) or the usual medical care plus physical activity (intervention group). The intervention was a series of moderate-intensity aerobic exercise delivered daily at home by participants themselves lasting for 12 weeks. The measurement tool of depressive symptoms was the Montgomery-Asberg Depression Rating Scale (SIGMA). Data were collected at the baselines, the end of the 12th week, and the end of the 52nd week. As a conclusion, this study reported that its home-based physical activity intervention failed to ameliorate depressive symptoms. This study was of good research design, but the participants were aged 50 years or older, varying from the targeted population of older people. The effect of exercise might be diluted due to the fact that many of them exercised regularly, not to mention, all participants were receiving medical care. In addition, this

study did not include ongoing supervision to ensure compliance and optimal engagement, leaving its finding in need of certification. Given the research situation outlined above, exercise, including Tai Chi, may be effective in reducing depressive symptoms among older people yet the findings remain controversial. Further research with better design is required to substantiate the efficacy of exercise, including Tai Chi, on depressive symptoms among older people.

2.3.5 The Effect(s) of Music Therapy on Depression

"Music therapy can be defined as the controlled use of the influence of music on the human beings to aid psychological, physiological, and emotional integration of individuals during the treatment of an illness or disease" (Choi, Lee, Cheong, & Lee, 2009). Music is beneficial towards improving the state of mood (Saarikallio & Erkkilä, 2007) and has a high capability to induce relaxation (Gençel, 2006). It was used as a form of psychotherapy in various populations under certain conditions (Keen, 2005). Listening to music had shown efficacy in reducing depressive symptoms not only for short periods (Rosenberg & Lenze, 2012) but provides long-lasting benefits to people being treated for depression and anxiety, of which helps them to relax their minds and bodies (Cromie, 2000). There was a report about the mechanism by which music therapy works, "Music has been shown to result in neural network activation, and ultimately lead to activation of different regions of the brain if performed regularly" (Schmithorst & Holland, 2003).

Choi et al. (2009) carried out a randomized controlled trial in South Korea among patients with dementia and their caregivers, of which were all recruited from a special dementia daycare unit, to explore the effects of group music intervention on behavioural and psychological symptoms. In this study (Choi et al., 2009), the authors recruited twenty

participants with their caregivers combined together as pairs, which were then allocated randomly into either the group music intervention group or the control group. The group music intervention included activities of singing songs, analysis of libretto, making musical instruments, playing instruments such as pianos and handbells, song drawing, and songwriting. The intervention was provided as a group for fifty minutes, three times per week, for five consecutive weeks. The interventions were offered by three certified professional musical therapists, who has worked as therapists for at least three years. The music intervention comprised four phases. The first phase focused on building a rapport with the patients and caregivers; the second phase aimed at improving cognitive functions, memory and concentration ability; the third phase aimed for patients to express themselves by playing a musical instrument; and the last phase focused on providing happiness and enjoyment to participants. While patients in the control group received usual care, researchers contacted the patients each week by telephone to keep in touch. The main outcome of this study (Choi et al., 2009) was the cognitive status, assessed through the Mini-Mental State Examination (MMSE), and the depressive symptoms as the secondary outcome, measured by the Geriatric Depression Scale (GDS). According to the findings, depressive symptoms were relieved by group music intervention both among patients with dementia and their caregivers. Despite the positive findings, the sample size of this study (Choi et al., 2009) was a small sample of 20 with participants suffering from dementia. Moreover, the randomization process was not clearly stated.

Another randomized controlled trial that was carried out in France (Guetin et al., 2009) also reported music therapy to have had a valuable effect on anxiety and depression among patients with mild to moderate Alzheimer's disease. This study included thirty participants and was a single-centre, comparative, controlled, randomized study, with blinded assessment of its results. The music intervention in this study refers to the

individual receptive music method. The music was chosen based on the patients' personal tastes following an interview or questionnaire. The standard music intervention in this study lasted twenty minutes, of which was broken down into several phases gradually, with aims to bring the patient into a state of relaxation and refreshment. The music therapy was administered via headphones in the patients' homes, within their comfortable environment. An eye mask was offered to avoid visual stimuli, so as the patients could concentrate on the music intervention. In this study, depressive symptoms were also the secondary outcome measured by the Geriatric Depression Scale. After a twenty-four-week intervention, the authors found significant improvement in depressive symptoms among patients allocated to the intervention group. There are several strengths to this study, such as the practice of randomization while allocating and the process of blinding while collecting data. However, the sample size of thirty was too small, with all the participants suffering from Alzheimer disease. This leads to a lack of representation when applying the study to other older people.

Not only can music therapy relieve depressive symptoms, the act of listening to music can deliver similar results. Chan, Wong, Onishi, and Thayala (2012) conducted a randomized controlled trial in Singapore to determine the effect of music on depression levels in older people. They found out that the act of listening to music was a non-invasive, simple, and inexpensive therapeutic method to improve depressive symptoms in community-dwelling older people. This study was carried out among fifty community dwelling older people, 24 of them were allocated to the music group, while the other 26 were allocated into the control group by randomization. The music therapy in this study refers to just listening to music. Abiding by this methodology, the research nurse first introduced four different selections of music, namely Chinese, Malay, Indian, and Western slow rhythmic music. The participants then chose one type of music to be played

during that session. Each session was carried out in the participant's home one at a time, each lasted for thirty minutes. The four different types of music were carefully selected by the research teams to have the characteristic of 60 to 80 beats. The whole intervention lasted for eight weeks and the data was collected at the baseline, as well as every week after the intervention started. The assessment tool used in this study was the 15-item Geriatric Depression Scale. The sample size of this study was acceptable and the randomization was satisfactory, but the lack of blinding may result in bias in reporting and potential contamination since all participants were from the same community.

Music therapy has been proven to not only be useful in reducing depressive symptoms among community-dwelling older persons and also older persons living in nursing homes. Gopi and Preetha (2016) conducted a quasi-experimental study to assess the effectiveness of music therapy on depressive symptoms among older people in selected geriatric homes. Participants of this study were thirty older people selected using the convenient sampling technique. The intervention in this study was the act of listening to music, which was given in the form of group therapy. Each session lasted for thirty minutes, with the whole intervention period of fifteen days. The measurement tool of depressive symptoms used was the Geriatric Depression Scale. This study adopted the pre-post testing method, where data were collected twice, before and after the whole intervention. The finding of this study supported that music therapy was effective in reducing depressive symptoms among older people in geriatric homes. Despite the positive finding, the research design was quasi-experimental and the lack of randomization when allocating may result in bias. Furthermore, pre-post testing is not as strong as randomized controlled trials when explaining causality.

As mentioned above, music therapy, or even just listening to music are proven to be effective in relieving depressive symptoms among older people, regardless of whether they are community-dwelling or institutional-dwelling. Music could help older people to improve depressive symptoms not only in the short-term but also in the long-term. However, current existing trials have flaws in their study designs, such as sample size estimation, sampling method, allocation, and blinding. Therefore, further trials with larger sample size and better study design are needed to certify this encouraging finding.

2.3.6 The Effect(s) of Combined Music and Exercise Therapy on Depression

Throughout this study's literature review, only three papers were found with a focus on the combined music and exercise therapy on depressive symptoms among older people from the year of 2000 to 2017.

Verrusio et al. (2014) carried out a randomized controlled trial in Rome, Italy, among twenty-four older people. The main purpose of this study was to evaluate the impact of group combined music therapy and physical training on the subjects affected by mild to moderate depressive symptoms versus subjects treated with pharmacological therapy. In this study, the twenty-four subjects were randomly allocated to either the intervention group or the control group by a computer-generated sequence number. Subjects allocated to the intervention group received group physical exercise training combined with the act of listening to music. This intervention was offered twice a week, each session lasted 45 minutes, over a time period of six months consecutively. Subjects allocated to the control group received traditional medication to treat depressive symptoms. The measurement tool for depressive symptoms in this study was the Geriatric Depression Scale, whereas the Hamilton Anxiety Scale was used to assess the anxiety levels that accompanied

depressive symptoms. Data were collected at the baseline, three months after the intervention and six months after the intervention. In the control group, there was a significant improvement in anxiety at the sixth month, whereas, in the intervention group, there was a reduction in both anxiety and depressive symptoms at the third month and sixth month respectively. Moreover, the authors also noted that in the combined music and exercise group, there was an average reduction of tumour necrosis factor-α (TFN-α) from 57.67 ± 39.37 to 35.80 ± 26.18 pg/ml. This study (Verrusio et al., 2014) disclosed that the combined music and exercise therapy have potential to play a role in the treatment of subjects with mild to moderate depression. Further research with better study designs is required to compensate the shortcomings of this study, such as the small sample size at its pilot study level, the unclear statement of the specific kind of exercise used, and the lack of blinding.

The second study (Deng, 2013) was a cluster randomized controlled trial conducted in China, of which involved 100 community-dwelling older individuals with mild to moderate depressive symptoms. The symptoms are assessed by the Self-Rating Depression Scale. Fifty of the subjects were randomly allocated into the combined music and Tai Chi group, while the other fifty were allocated to the control group. The whole intervention lasted for a period of three months. Subjects in the combined music and Tai Chi group received group-based outdoor Tai Chi exercise offered by trainers every day, while at the same time listening to Chinese music. Each intervention session was offered after dinner, lasting up until thirty to sixty minutes according to participants' will. Meanwhile, subjects in the control group were asked to walk after dinner for no less than thirty minutes every day. Data were collected at the baseline and at the end of this study. This study (Deng, 2013) disclosed that the combined music and Tai Chi intervention could significantly reduce the severity of depressive symptoms among community-

dwelling older people and also enhance subjects' sleep hygiene. Despite the positive finding and the significant similarity of cultural background, this study has several flaws which include the absence of blinding, the lack of detailed description of randomization, and the failure to report the confidence limits in their results. All these flaws lead to the portrayal of this study being under-confident, thus further better-designed studies are needed to support this finding. The last study is a controlled naturalistic study (Han et al., 2010) carried out in Alexandra Hospital, Singapore, to explore the effects of a weekly structured music therapy and activity programme on depressive symptoms in older persons with dementia. In this study, the authors recruited forty-three patients diagnosed with Alzheimer's disease or vascular dementia by geriatricians and were receiving medical treatment and follow-up in the clinic. Twenty-eight of the subjects were allocated to the music therapy and activities programme group, where the participants were instructed to attend once a week for eight consecutive weeks to receive forty-five-minute structured activities in a group with no more than eight persons in each session. The session is combined with the act of listening to soft music while doing physical activities. Subjects allocated in the control group were placed on a waiting list until the end of the study. Data were collected twice, once at the baseline and once at the end of the intervention. Although the finding of this study (Han et al., 2010) did show that the combination of music and physical activity could significantly reduce the depressive behaviours amongst older dementia-suffering patients, its lack of randomization, sample size calculation, and blinding would undermine the confidence of this study. Furthermore, this study did not report the intensity of activities adopted, neither were there reports on the level of depressive symptoms. Better designed randomized controlled trials are needed to further explore the effect of combined music and exercise therapy on depressive symptoms among non-dementia-suffering older people.

2.4 Critical Appraisal of Trials on Combined Music and Physical Exercise Therapy

Table 2.2 summarizes the characteristics of the three previous studies which had evaluated the combined music and exercise interventions with the primary outcome of depressive symptoms among older people. The CASP randomized controlled trials checklist was used as the critical appraisal tool in this study. The checklist consists of 11-items. The first two questions are screening questions. If the answers to both are yes, then the subsequent nine questions should be answered. Only three randomized controlled trials (including pilot study) on this topic were included in this critical appraisal, one from Italy, one from China, and one from Singapore.

The first and the final trial were considered of satisfactory quality. However, due to the existing flaws in their study designs and the lack of clear description on the study population's background information, the extrapolation of the findings of these two studies on the treatment of depressive symptoms among Chinese older people need to be further certified for use in the present study. On the other hand, the second study was considered of poor quality, it lacked detailed description for its processes of randomization and blinding, of which would, in turn, affect the application and reliability of the research outcomes and conclusions. The critical appraisal has, therefore, demonstrated that there are only three small-scale studies to have ever considered the use of combined physical exercise and music therapy for the management of depressive symptoms among older people. Although these three studies have reported significant improvements in depressive symptoms, there is still the need for larger, more rigorously designed studies to be conducted to evaluate the potential benefits of this simple, low-cost intervention, which could be easily applicable to the East Asian culture. This is because Tai Chi, as a mild aerobic exercise, is already widely practised and accepted.

Table 2. 2: Critical appraisal of RCT on combined music and exercise therapy on depression

Items of CASP checklist for randomized controlled trials	Verrusio et al. 2014 (Italy)			Deng et al. 2013 (China)			Han P. et al. 2010 (Singapore)		
	Yes	Cannot tell	No	Yes	Cannot tell	No	Yes	Cannot tell	No
1. Did the trail address a clearly focused issue?	Yes			Yes			Yes		
*The population studied	Mild to moderately depressed elderly			Community-dwelling depressed elderly			Older persons diagnosed with Alzheimer's		
*The intervention conducted	Music combined with exercise therapy			Outdoor Tai Chi combined with music			Music combined with physical activity		
*The comparator conducted	Pharmacotherapy			Walking after meals			Blank waiting list		
*The outcomes considered	GDS, HAS, and comorbidity index			SDS, ASA, and quality of sleep			Disruptive and depressive behaviour, including depression		
2. Was the assignment of patients to treatments randomized?	Yes				Cannot tell			Cannot tell	

Table 2.2: Continued

*How was this carried out?	Allocated by computerized random numbers	Described as cluster randomized, but no detailed description was found	Not mentioned
*Was the allocation concealed from the researchers?	Not mentioned	Not mentioned	Not mentioned
3. Were patients, health workers, and study personnel blinded?	Cannot tell	Cannot tell	Cannot tell
*Clinicians, nurses etc.	Not mentioned	Not mentioned	Not mentioned
*Outcome assessors	Not mentioned	Not mentioned	Not mentioned
4. Were the groups similar at the start of the trail	Yes	Yes	Yes
*Other factors that might affect the outcome	Reported similar baselines of GDS, HAS, and comorbidity index	Reported similar baselines of age and education background	Reported similar baselines of age, gender, and use of psychotropic medications

Table 2.2: Continued

5. Aside from the experimental intervention, were the groups treated equally?	Yes	Yes	Yes
6. Were all of the patients who entered the trial properly accounted for in the study's conclusion?	Yes	Cannot tell	Yes
*Was the trial stopped early?	No, a flowchart was displayed	Not mentioned	No, a flowchart was displayed
*Were patients analyzed in the groups to which they were randomized?	Yes, a flowchart was displayed	Not mentioned	Yes, a flowchart was displayed
7. How large was the treatment effect?			
*What outcomes were measured?	GDS and HAS	SDS, SAS, and the quality of sleep	Depression, but not as the first outcome

Table 2.2: Continued

*Is the primary outcome clearly specified?	Yes	Yes	Yes
*What results were found for each outcome?	Significant improvements in both GDS and HAS	Significant improvements in SDS, HAS, and the quality of sleep	Significant improvements in depression
*Is there evidence of selective reporting of outcomes?	Not found	Not found	Not found
8. How precise was the estimate of the treatment effect?			
*What are the confidence limits?	GDS [-4.39 to -0.61] HAS [-7.05 to -0.33]	Not mentioned	Depression [-35.6 to -9.7]
*Were they statistically significant?	GDS [0.01] HAS [0.03]	All three outcomes were <0.01	Depression [0.019]
9. Can the results be applied in your context?	Cannot tell	Yes	Cannot tell

Table 2.2: Continued

*Do you have reason to believe that your population of interest is different to that in the trial?	Yes, my targeted population could be different	No, my targeted population might be the same	Yes, my targeted population could be different
*If so, in what way?	The income and education background were not mentioned	Not found, they were all community-dwelling elderly	Community-dwelling older persons will be different from the dementia-suffering elderly
10. Were all clinically important outcomes considered?	Yes	Yes	Yes
*Is there other information you would like to have seen?	No, all key outcomes were reported	No, all key outcomes were reported	No, all key outcomes were reported
*Was the need for this trial clearly described?	Yes, pharmacotherapy was doubted	Not enough, just stressed the importance of Tai Chi	Yes
11. Are the benefits worth the harms and costs?	Yes	Yes	Yes
*Were these addressed by the trail	Not mentioned	Not mentioned	Not mentioned

2.5 Summary

Depression is a mental disorder which is common among older adults. It leads to a series of negative health consequences, including a reduced quality of life, functional impairment, heart disease, obesity, hospitalization, and increased inpatient death.

While pharmacotherapy is commonly used to treat depressive symptoms, many parties now do not advocate the use of pharmacotherapy in mild and moderate depression due to the possibility of side effects. Non-pharmacological interventions for depressive symptoms in older individuals are getting more and more popular. These include exercise, music therapy, light therapy, psychotherapy, humour and laughter, and life story review.

It was found only three previous studies published in the English and Chinese languages about the effect(s) of combined physical exercise and music therapy on depressive symptoms among older depressed persons. All studies were of small sample size and thus of limited applicability to the target population. The researcher has, therefore, clearly presented the gap in research for the determination of the prevalence of depressive symptoms in the rural population, where ageing occurs faster than many other areas of China. Furthermore, the combined intervention of music and exercise proved beneficial towards depressive symptoms, where physical exercise and music therapy has demonstrated potential benefits in one pilot study, one quasi-experimental study, and one Chinese study. A larger, well-designed study assessing the combination of music and Tai Chi exercise therapy, is now in urgent need.

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter, the study design, research setting, study population, sampling method, sample size estimation, data collection, and data analysis methods are explained in detail. There is also the detailed discussion of the method in which sample size is determined, the sampling approach used in this study, and the procedures of both phase one and phase two. Ethical concerns of this study are also discussed in this chapter.

3.2 Study Design

This study is a quantitative study of two stages. Phase one of this study is a cross-sectional survey with an aim to determine the prevalence of depressive symptoms among community-dwelling older persons in Southwest China and to determine their quality of life and physical mobility. From thereon, the relationships between depressive symptoms, the quality of life, and physical mobility are assessed. Both the descriptive research and the correlational research were adopted in phase one. Meanwhile, in phase two, this study employed the methodology of a cluster randomized controlled trial to determine the effect(s) of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility amongst community-dwelling older persons in Southwest China.

3.2.1 Definition and the Purpose of Quantitative Research Design

Quantitative research refers to the systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques (Given, 2008). The quantitative research aims to develop theories, mathematical models, and/or hypothesis which pertain to a certain phenomenon. By reason of providing fundamental connections between mathematical expression and empirical observation in quantitative relationships, the process of measurement is very important to a quantitative research. In quantitative research, data could be any given data that are in the numerical forms of percentages, statistics, means, etc. (Given, 2008). The researcher adopted a quantitative study in hopes that the numbers will yield an unbiased result, which could then be generalized to some larger population via data analysis with the help of statistics. Compared with qualitative research, the advantages of quantitative research are its higher reliability and objectivity, as the statistics can be used to generalize a finding, thus often reducing and restructuring a complex problem to a limited number of variables (Creswell, 2013). As to this study, quantitative research was more suited to the research design because all variables planned to measure are numerical, such as sociodemographic data, Geriatric Depression Scale scores, quality of life, and the time spent on Timed Up and Go test. Moreover, limitations of time and financial support were also important reasons for this study to adopt the quantitative research design.

3.2.2 Types of Quantitative Research Design

There are four different types of quantitative methods, the descriptive research, the correlational research, the casual-comparative/quasi-experimental research, and the experimental research. Only the descriptive research, the correlational research, and the

experimental research are explained below, because they were included in the current study. While, the other type of quantitative methods, the quasi-experimental research was excluded due to irrelevance.

Descriptive research is used to describe characteristics of a population or phenomenon being studied. It mainly addresses the "what" question. For example, “What is the prevalence rate of depressive symptoms among community-dwelling older people in Southwest China?”, rather than answering questions about how/when/why the characteristics occurred (Shields & Rangarajan, 2013). The researcher does not usually begin with a hypothesis but is likely to develop one after collecting data. The analysis and synthesis of the data provide the test of the hypothesis. The advantage of descriptive research is that it provides a multifaceted approach for data collection, whereas the primary weakness of a descriptive research is the lower confidentiality. Other disadvantages of the descriptive research include vulnerability to subjectivity and error (Shields & Rangarajan, 2013).

Correlational research is considered, at times, to be a type of descriptive research, as in this type of study, no variables are manipulated. The correlational research attempts to determine the extent of a relationship between two or more variables using statistical data. In this type of design, relationships between and among a number of facts are sought and interpreted. This type of research will recognize trends and patterns in data, but it does not go as far as to prove causes for these observed patterns in its analysis. Cause and effect is not the basis of this type of observational research. Only data, relationships, and distributions of variables are studied in this research type. Variables are not manipulated, they are only identified and studied as they occur in a natural setting.

Experimental research is often called true experimentation, as it uses the scientific method to establish the cause-effect relationship among a group of variables that make up a study. Subjects are randomly assigned to experimental treatments rather than identified in naturally occurring groups. Experimental research consists of a control group in which the researcher would only test one effect at a time. Experimental research is the most efficient way to draw casual conclusions as, except the intervention, all other variables are controlled. Due to the controlled environment, better results are often achieved. Experimental research is valid, as the results can be verified and checked. Despite its advantages, experimental research also has its limitations (Christensen, 2004). Due to the strict control which may not be present in real environments, the reactions of participants may not be true indicators when reflected in their natural environment. Human error often plays an important role in the validity of such designs. Extraneous variables are also often hard to control. Not to mention, ethical standards must be strictly adhered to while carrying out an experimental research.

3.2.3 Quantitative Design of This Study

This study adopted the quantitative research design, in which descriptive research, correlational research, and experimental research were employed. The descriptive research was used to detect the current status of depressive symptoms, quality of life, and physical mobility of community-dwelling older people. The researcher chose the descriptive research with the knowledge that it could answer the "what" question, thus helping us to better determine the prevalence rate of depressive symptoms, the current level of participants' quality of life, and their level of physical mobility. The correlational research was used to determine the relationships between depressive symptoms, the quality of life and physical mobility. The correlational research was also used to help us

to explore the correlation between sociodemographic data and depressive symptoms via observation free of manipulation (Shields & Rangarajan, 2013). Furthermore, the descriptive study was chosen to aid in providing us basic information for further research questions. Based on the result of the relationship between exercise habit and depressive symptoms retrieved from the descriptive study, a cluster randomized controlled trial was carried out to measure the effect(s) of combined music and Tai Chi therapy on depressive symptoms, the quality of life, and physical mobility amongst community-dwelling older persons, who were affected by mild to moderate depressive symptoms, in Southwest China. Experimental research was chosen because it was the most efficient way to draw causal conclusions. It was certainly the most efficient way to certify the effect(s) of combined music and Tai Chi therapy in this study (Christensen, 2004).

3.2.4 Phases of This Study

The study consisted of two phases:

Phase 1 is a cross-sectional survey using descriptive research to better determine the current prevalence rate of depressive symptoms, quality of life, and physical mobility of the community-dwelling older people in Southwest China. The correlational research was used to explore the relationships between depressive symptoms, quality of life, and physical mobility, as well as to find out the indicators of those three variables. All the findings in phase 1 are used to provide basic information for phase 2, to further ascertain the hypothesis of this study.

Phase 2 is a cluster randomized controlled trial with the aim to certify the effect(s) of combined music and Tai Chi therapy in reducing depressive symptoms, in enhancing the quality of life, and in improving physical mobility among the participants. The phases of this study are as displayed in Figure 3.1.

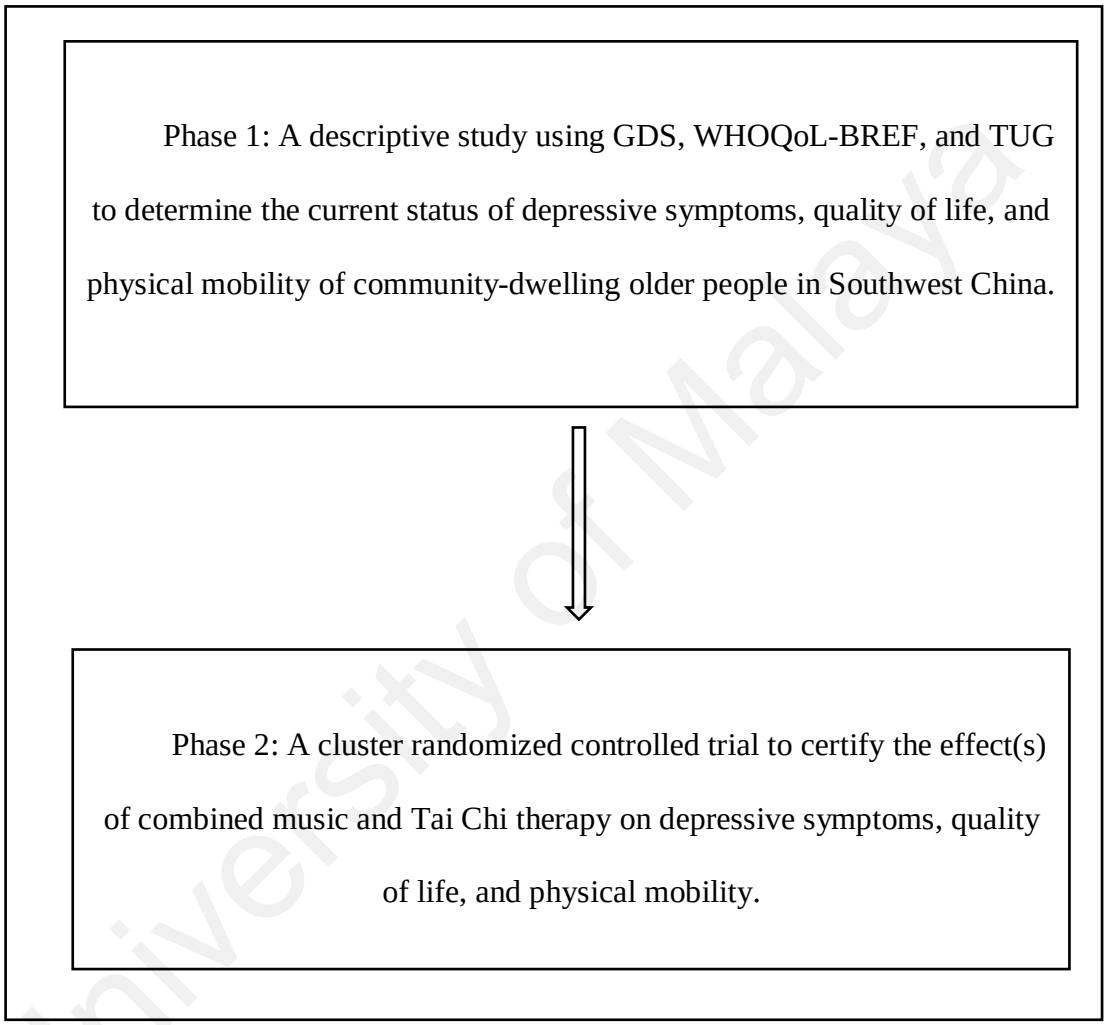

Figure 3. 1: Phases of this study

3.3 Study Setting

Study setting refers to the environment in which a study is carried out. This study was carried out in 8 communities in Ya'an City, Sichuan Province, China. In the city of Ya'an, there are 16 communities in total. Due to the vast location and issues of transportation, it was time-consuming and a financial burden to cover all 16 communities, thus half of the

total were included in this study randomly. All 8 of the selected communities were from the same city, thus substantiates a representation of the least developed region in China. All communities in this study were founded for more than ten years, thus have the same economic status, cultural background, social support and medical service system, as well as medical insurance system.

3.4 Study Population

Population refers to the people who are potential subjects of a particular study. It is also a complete set of elements – persons or objects – that possess some common characteristics defined by the sampling criteria established by the researcher (Yacoub, Alkharabsheh, Zaitoun, & Al-Atiat, 2013). The target population comprises of the entire group of people or objects to which the researcher wishes to generalize the study findings upon (Yacoub et al., 2013). In descriptive studies, it is customary to define a study population and then make observations on a sample taken from it. Study populations may be defined by geographic location, age, sex, with additional definitions of attributes and variables such as occupation, religion, and ethnic group (Banerjee et al., 2007).

In the current study, the participants of both phase 1 and phase 2 were those aged over 60 years in the eight selected communities in Ya'an City. These targeted participants dwelled in the southwestern part of China. Due to the remote distance and mountainous territory, the economy was not as developed as other parts of China. Meanwhile, due to the comparable traffic block, the cultural communication of participants with other regions of China was also blocked to a certain level. In other words, the poor economic status and conservative culture make this population unique in its characteristics.

The sample size for phase 1 was 460 whereas the sample size for phase 2 was 118. The full list of names of the communities in Ya'an was first obtained from the civil affairs bureau. The eight communities were selected through randomization using a computer-generated random number sequence.

3.5 Sample Size Estimation

Sample size refers to the number of sampling units which are to be included in the sample. Sample size calculation refers to the process by which the researcher calculates the optimum number of participants required for the study to be able to arrive at scientifically valid results (Kadam & Bhalerao, 2010), as it is crucial in any clinical or empirical study. Usually, the sample size for any study depends on the following matters (Kirby, Gebski, & Keech, 2002): the acceptable level of significance, the power of the study, the underlying event rate of the population, and the standard deviation of the population.

The significance level also denotes as alpha or α and is the probability of rejecting the null hypothesis when it is true. For example, a significance level of 0.05 indicates a 5% risk of concluding that a difference exists when there is no actual difference.

The beta level (β) (often simply called beta) is the probability of making a Type 2 error (accepting the null hypothesis when the null hypothesis is false). It is directly related to power, of which refers to the probability of rejecting the null hypothesis when the null hypothesis is false. In the current study, the researcher prefers to ensure that the beta level is at 0.10 or less.

The power of study of statistical significance is defined as the probability that it will reject a false null hypothesis. Statistic power is inversely related to beta or the probability of making a Type 2 error. In short, power = 1-β. Statistic power is the likelihood that a study will detect an effect when there is an effect to be detected. If statistic power is high, the probability of making Type 2 error, or concluding there is no effect when, in fact, there is one, goes down. Statistical power is affected chiefly by the size of the effect and the size of the sample used to detect it. Bigger effects are easier to detect than smaller effects; while larger samples offer greater test sensitivity than smaller samples.

3.5.1 Sample Size Estimation for the Cross-Sectional Survey

For this part, sample size calculation was based on the prevalence rate of depressive symptoms in Sichuan Province in China from a previous study (Zhang 2012). The formula below was used to calculate the sample size (Xiao, 2003).

$$n = u^2 \pi(1-\pi) / \delta^2$$

In this study, the researcher would like a confidence level of 95%, so α would equal 1-0.95 or alpha equals 0.05. Based on this, u^2 is 1.96^2. π refers to the prevalence rate of depressive symptoms according to the previous study. As Zhang (2012) carried out a survey in the province similar to this study, Sichuan province, his participants were also community-dwelling older people. Therefore, his results were adopted, a prevalence rate of depressive symptoms in Sichuan Province of 51.8% (Zhang 2012). From thereon, π equals 0.518 and (1-π) equals 1-0.518 or 0.482. The researcher would also like a variance of the population of 0.05, hence, δ^2 equals 0.05^2. These values are then placed into the formula:

$$n = 1.96^2 \times 0.518 \times (1\text{-}0.518)/0.05^2$$

$$n \approx 384$$

An additional 20% was added to account for drop-outs (Kadam & Bhalerao, 2010). So, the final sample size for phase 1 was 460.

3.5.2 Sample Size Estimation for the Cluster Randomized Controlled Trial

For this phase, the sample size calculation was as well based on the results of the previous study. The following formula was used to calculate sample size.

$$n_1 = n_2 = 2[\frac{u_\alpha + u_\beta}{\delta / \sigma}]^2 + \frac{1}{4}u_\alpha{}^2$$

Shi (2007) carried a randomized controlled trial in China, of which disclosed the mean GDS score of older persons in China as 9.88 ± 6.63. After the intervention, the difference in mean score of GDS was 3.97. An alpha value of 0.05 was preferred for this study, hence, u_α equals 1.645. The researcher assumed β at the level of 0.1, hence, u_β equals 1.282. These values are then placed into the formula:

$$n_1 = n_2 = 2[\frac{1.645+1.282}{3.97/6.63}]^2 + \frac{1}{4}1.645^2 \approx 49$$

$$n = n_1 + n_2 = 98$$

An additional 20% was added to account for drop-outs (Kadam & Bhalerao, 2010). So, the final sample size for phase 2 was 118.

3.6 Sampling Method

Sampling is concerned with the selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population (Parahoo, 2014). There are several types of sampling methods, including simple random sampling, systematic sampling, stratified sampling, and cluster sampling (Parahoo, 2014). In this study, the researcher adopted the methods of cluster sampling and systematic sampling.

3.6.1 Sampling Method of Phase 1

For phase one, cluster systematic sampling method was adopted to recruit participants because of its simplicity and its ability to make sure that the population was evenly sampled. Systematic sampling (also known as interval sampling) relies on the arrangement of the study population according to some ordering scheme and then selecting elements at regular intervals through that ordered list (Gundersen & Jensen, 1987). Systematic sampling involves a random start and then proceeds with the selection of every *k*th element from then onwards. In this case, *k*=(population size/sample size) (Gundersen & Jensen, 1987). In this study, the researcher first chose 8 communities out of 16 randomly by computerization and obtained the list of qualified older people from the Social Work Bureau and the community health service centres. Secondly, the researcher arranged the qualified older people in sequence for each community. Thirdly, each older person was numbered as according to the sequence. Fourthly, the researcher fixed the interval of sample selecting at 100. Finally, the researcher selected a random start number using the computer generalized number, then selected participants from the start point and at every interval of 100.

3.6.1.1 Inclusion and Exclusion Criteria for Phase 1

The inclusion criteria for the participants of phase 1 were people aged over 60 years, who had been living in the targeted communities for at least one year and are mentally and adequately alert to complete the questionnaires as judged by trained researchers.

The exclusion criteria for phase 1 were people who refused participation in this study, bedridden, suffer severe hearing or visual impairment that would lead to difficulty in completing questionnaires, experienced a stroke or cardiovascular event within the past 6 months, and have other conditions present that would lead to the inability to perform the survey.

3.6.1.2 Sampling Selection Process of Phase 1

First, the researcher selected the community and obtained the name list of qualified older people in each community respectively. By using the random sequence number generated via computer, eight communities were selected: Huaxinjie, Hanbei, Yaoqiao, Qiangjiang South, Tuqiao, Shangba, Yucai, and Weijiagang. The researcher then checked the health records obtained from the office of each community, thence selected the potential participants. The final number of qualified elderly in the eight communities were: 9,843 from Huaxinjie, 6,620 from Hanbei, 3,133 from Yaoqiao, 5,874 from Qiangjiang South, 2,089 from Tuqiao, 6,007 from Shangba, 7,219 from Yucai, and 5, 571 from Weijiagang.

Secondly, the researcher sequenced and numbered the older people in each community respectively. Thirdly, the interval between the selected individuals was calculated. As the total population was 46356, the targeted sample size was 460. Hence, the interval of phase 1 was 46356/460, at an interval of about 100.

Then, the researcher decided a random start number for each community using the computer generalized number. As a result, the start number for each community was number 7. Thus, the participants numbered 7, 107, 207 etc. in each community were recruited respectively.

The participants for phase 1 were: 98 from Huaxinjie, 66 from Hanbei, 31 from Yaoqiao, 58 from Qiangjiang South, 20 from Tuqiao, 60 from Shangba, 72 from Yucai, and 55 from Weijiagang. The total potential participants were 460 (Figure 3.2).

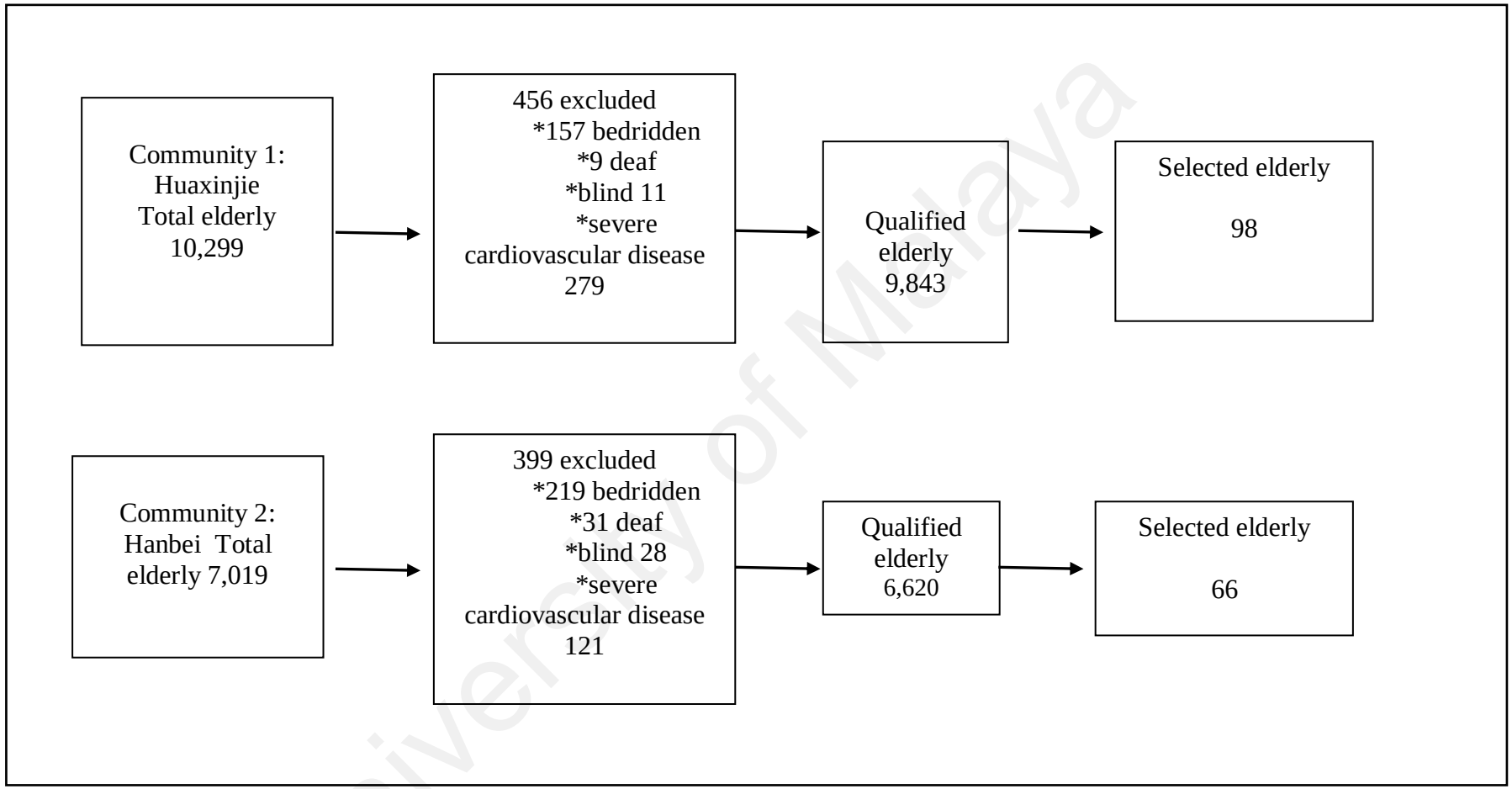

Figure 3. 2: Sample selection process of phase 1

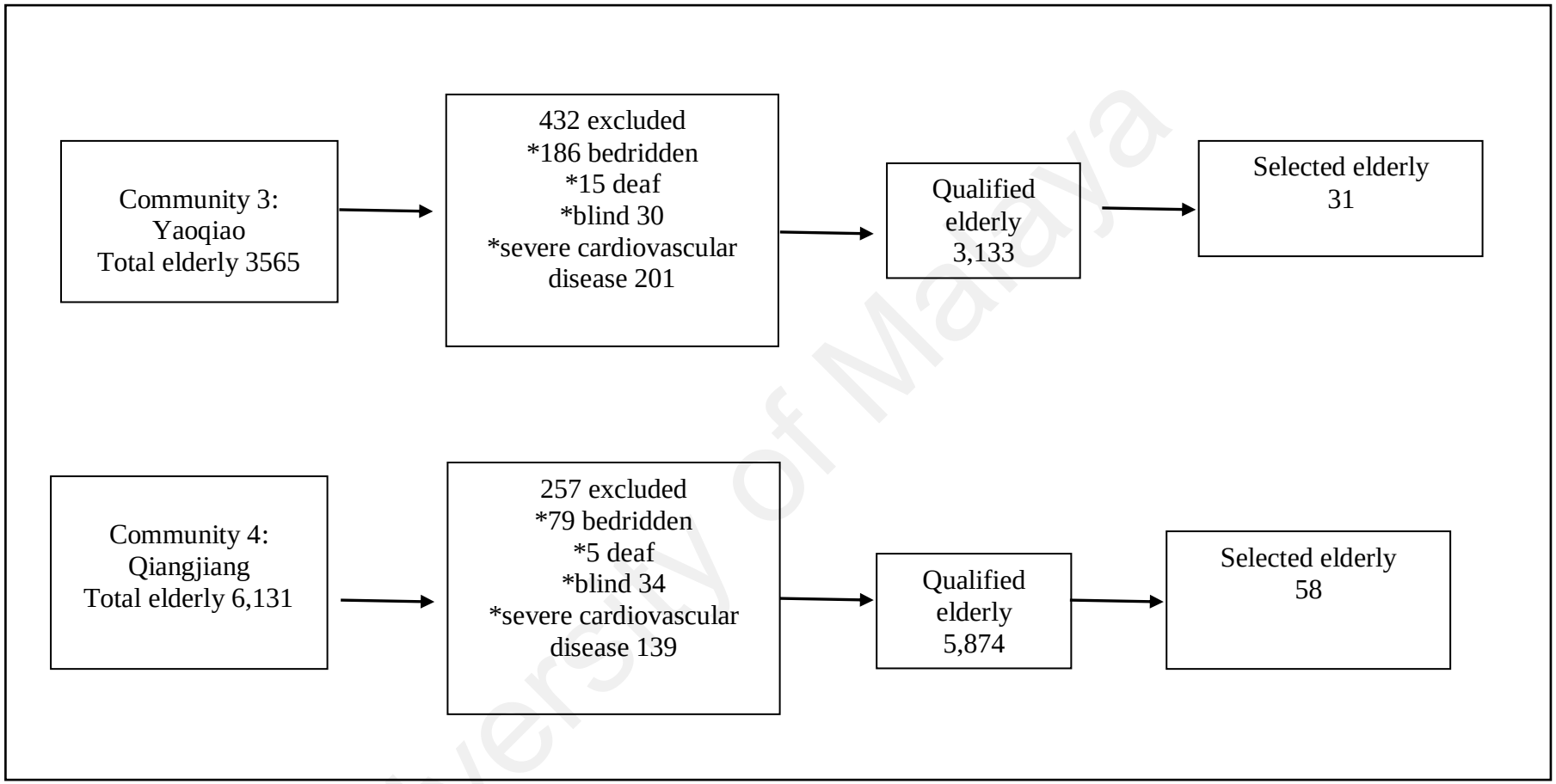

Figure 3.2: Sample selection process of phase 1 continued

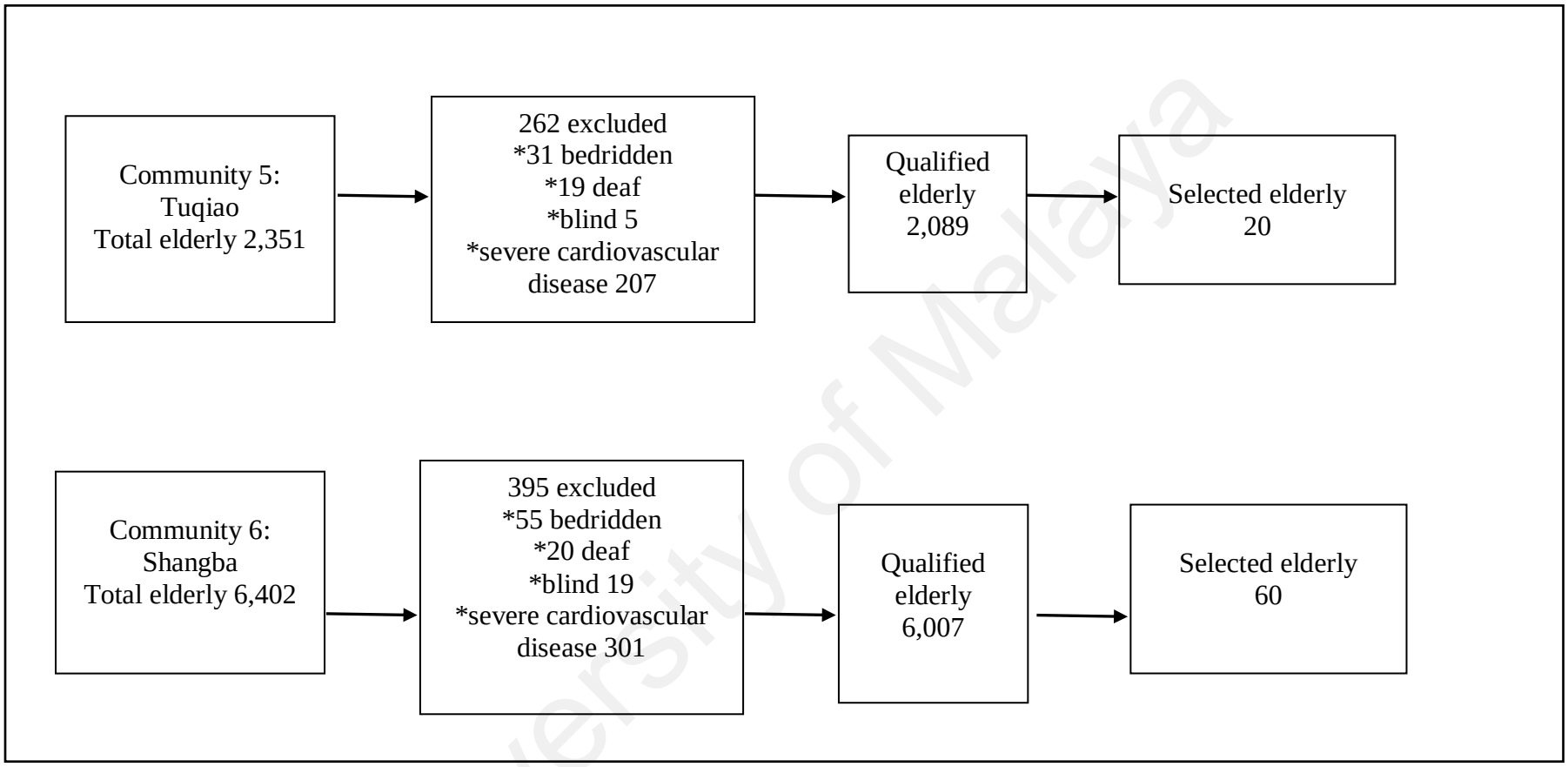

Figure 3.2: Sample selection process of phase 1 continued

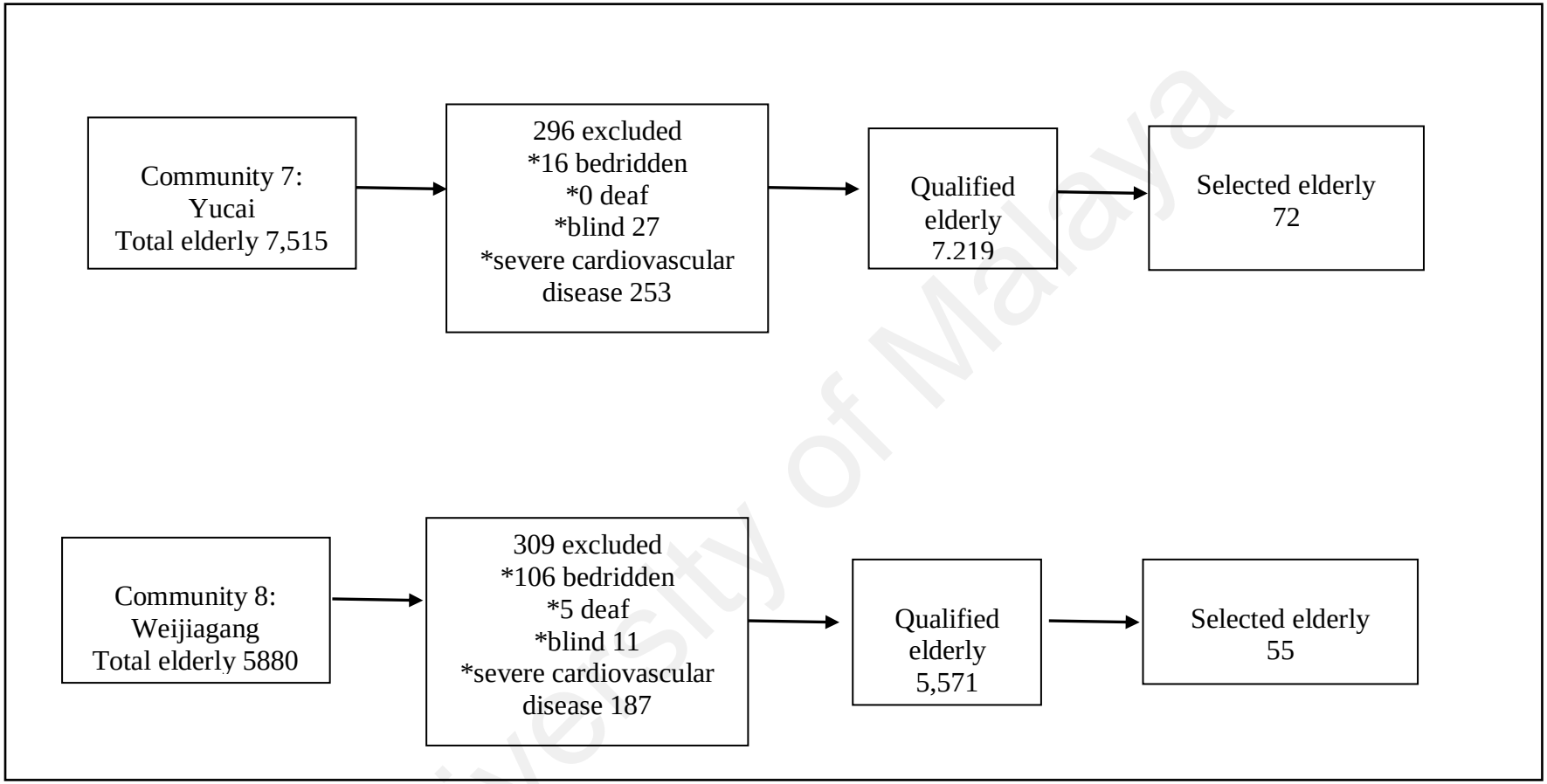

Figure 3.2: Sample selection process of phase 1 continued

3.6.2 Sampling Method of Phase 2

For phase 2, cluster sampling was adopted as well. In this sampling method, participants are selected in groups clustered by geography or by time periods (Gundersen & Jensen, 1987). Cluster sampling is a cost-effective sampling method. More importantly, the researcher chose this sampling method to apply to the study with consideration to the intervention being carried out in a community setting. It is by grouping participants together in each community, would avoid possible contaminations.

3.6.2.1 Inclusion and Exclusion Criteria for Phase 2

The inclusion criteria for phase 2 were constructed based on phase 1, of which included older individuals with GDS scores between 11 and 25, as well as those who agreed to take part in the whole intervention process.

The exclusion criteria for phase 2 were also based on phase 1, of which excluded older individuals with GDS scores of 26 and over (severe depression), older people with GDS scores of 10 and below (no depression), older individuals receiving medication therapy for depression, older people who exercise 3 times per week and over, and older individuals who have other conditions that lead to the inability to participate in the Tai Chi exercise.

3.6.2.2 Sampling selection process for phase 2

The targeted participants for phase 2 were 118 qualified older individuals selected through cluster sampling. First, the researcher coded the eight communities from phase 1: No. 1 Huaxinjie community, No. 2 Hanbei community, No. 3 Yaoqiao community, No.

4 Qiangjiang community, No. 5 Tuqiao community, No. 6 Shangba community, No. 7 Yucai community, and No. 8 Weijiagang community. Second, these 8 communities were input into the excel software, which in turn generated the numbers 1 and 2 randomly for each community. 1 represented the treatment group while 2 represented the control group, with each number fixed to be presented four times. The four communities in the treatment group included Huaxinjie community, Tuqiao community, Yucai community, and Weijiagang community. The other four communities of Hanbei community, Yaoqioa community, Qiangjiang community, and Shangba community formed the control group. Third, the researcher recruited participants in each community based on the inclusion and exclusion criteria mentioned above. As there were only 114 qualified individuals in the communities, all of them were recruited. The number of participants in the treatment group was 58, while the number of participants in the control group was 56, both numbers were more than 49. Hence, the total number of participants in phase 2 of this study was 114 (Figure 3.3).

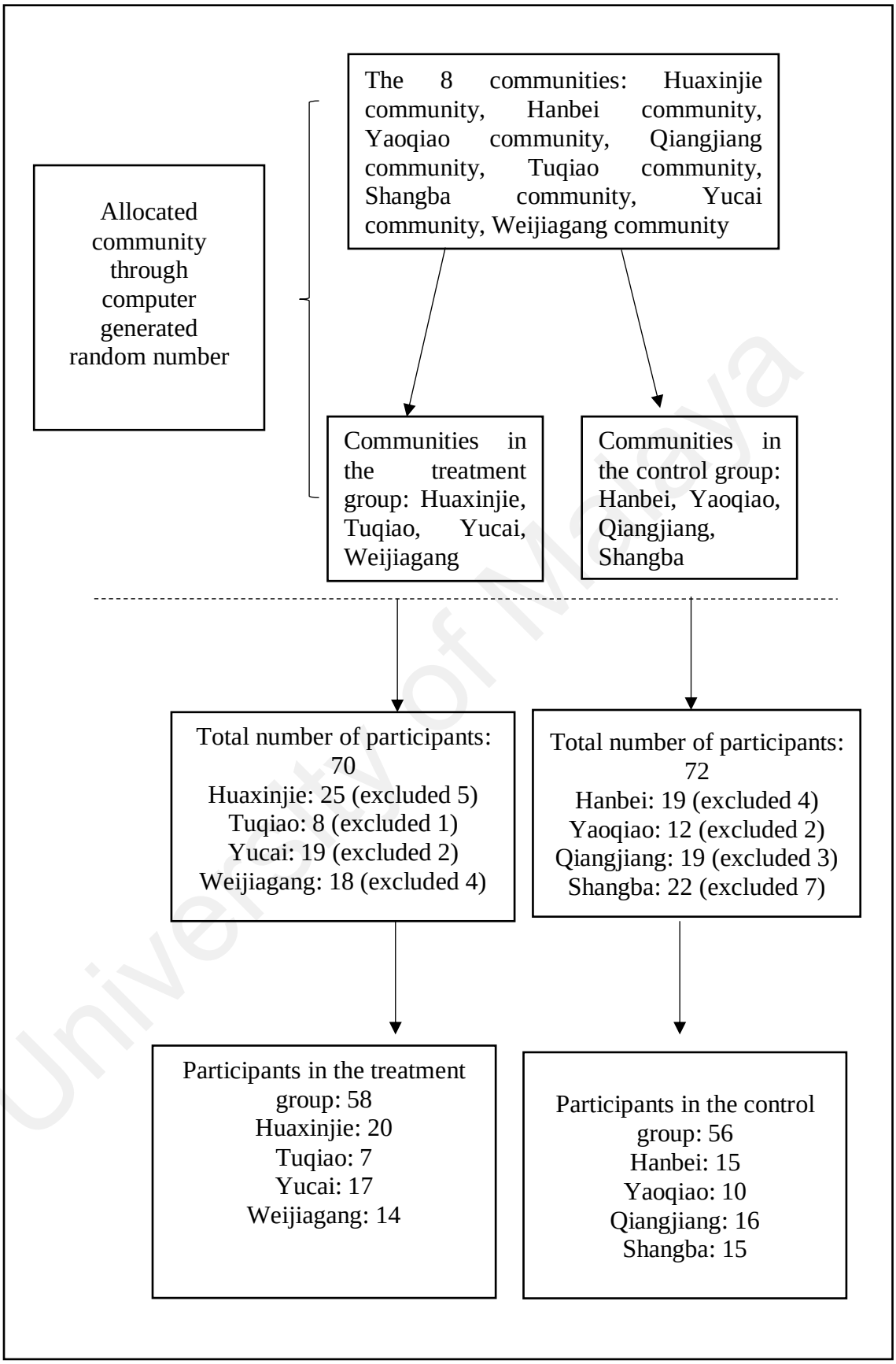

Figure 3. 3: Sample selection process of phase 2

3.7 Study Instruments or Tools

Two scales and one tool were used in this study to collect data, of which include the Geriatric Depression Scale (GDS) Chinese version, the abbreviated World Health Organization Quality of Life questionnaire (WHOQoL-BREF) Chinese version, and the Timed Up and Go test. A self-developed sociodemographic data acquisition form was used to collect the information of participants as well.

3.7.1 Geriatric Depression Scale (GDS) Chinese Version

Geriatric Depression Scale (GDS) Chinese version (Appendix A) is a 30-item scale used to screen the depressive symptoms among older people. Each item of GDS prompts the answers "yes" or "no". The total score of GDS is 30, scores 0 – 10 mean no depression, scores 11 – 20 suggest mild depression, scores 21 – 25 suggest moderate depression, and scores 26 – 30 suggest severe depression (Wang 1999). The GDS is widely used in China, with the Cronbach's α coefficient of 0.94 (Wang 1999). In this study, older people who obtained a score equal or more than 11 were considered to be depressed. In phase two, the researcher included those who obtained a score between 11 to 25, as scores of more than 25 indicate severe depressive symptoms. Individuals who obtained a score over 25 in this study were referred for further clinical assessment.

3.7.2 WHOQoL-BREF

WHOQoL-BREF includes 24 items grouped into 4 domains. These items consist of the physical (7 items), the psychological (6 items), the social (3 items), and the environmental (8 items). In addition, there are two general items regarding health conditions which would be analysed independently in the present study. The Chinese version of

WHOQOL-BREF (Appendix B) is considered to be the standard tool of measurement in China (SYSU, 1999). Higher scores indicate a better quality of life. WHOQoL-BREF has been validated in China, with a Cronbach's α coefficient of 0.892 (Liu et al., 2013).

Each item of WHOQoL-BREF comes attached with a five-point Likert scale. Generally speaking, a higher score indicates a better quality of life (Liu et al., 2013). In the current study, the raw score of each domain was converted into percentage scale maximum (% SM) according to the guideline provided by WHO, for better comparison with other 0 – 100 scales. Participants' satisfaction was quantified with each item. There were at least 50% of the respondents rating items as satisfied/ very satisfied. To further elaborate, four scales were defined in this study: dissatisfaction (<50%), bare satisfaction (50%-65%), moderate satisfaction (66%-74%), and highest satisfaction (≥75%) (Olusina & Ohaeri, 2003). The threshold of wellbeing in each domain and facet of WHOQoL-BREF was considered upon the achievements of 70% to 80% of the percentage scale maximum (De Civita et al., 2005).

3.7.3 Timed Up and Go Test

Timed Up and Go test (TUG) is a useful tool to measure the functions of physical mobility, especially those related to balance and risk of fall (Nygard, Matre, & Fevang, 2016). In the current study, the researchers used TUG to measure the physical mobility of community-dwelling older people. When applying TUG, the following equipment was required: stopwatch, standard chair, the measured distance of 3 meters. The operation instructions used in this study were, "My commands for this test are going to be 'ready, set, go'. When I say go, I want you to stand up from the chair. You may use the arms of the chair to stand up or sit down. Once you are up, you may take any path you like, but I

want you to move as quickly as you feel safe and comfortable until you pass this piece of tape (or end of marked course) with both feet. Turn around and walk back to the chair. I will stop the clock when your back touches the back of the chair." Meanwhile, the instructions for this researchers were, "Start timing on the word 'GO' and stop timing when the subject is seated again correctly in the chair with their back resting on the back of the chair. The subjects are to wear their regular footwear, may use any gait aid that they would normally use during ambulation, but may not be assisted by another person. There is no time limit. They may stop and rest (but not sit down) if they need to." There is no official cutoff for TUG, but previous studies implied the following cutoffs. A score of ≥ 14 seconds indicates a high risk of falls (Nygard et al., 2016). Bischoff et al. (2003) recommended that TUG should be a screening tool to determine whether an in-depth mobility assessment and early intervention, such as prescription of a walking aid, home visit, or physiotherapy, is necessary. For community-dwelling older women between 65 and 85 years of age, they should be able to perform TUG in 12 seconds or less (Bischoff et al., 2003), whereas the cutoff for men should be even shorter.

3.7.4 Sociodemographic Data Acquisition Form

Sociodemographic data were collected through a standardized data collection form, which included the following items: age, gender, marital status, living with family or not, health status, monthly income, work history, negative life events in the recent 3 years, exercise habit, and educational background. This form was self-developed under the guidance of nursing and statistic professionals. The researcher included the items mentioned above as referred to the results of previous studies which focused on the indicators of depressive symptoms (Appendix C).

3.8 Ethical Considerations

Ethical approval was obtained from the Ethics Committee of Affiliate Hospital of Ya'an Vocational College (Appendix D) prior to conducting the study. Written informed consent forms were obtained after clear and detailed explanations about the objectives of the study, and after the participants were assured of the confidentiality of the study. Anonymity was established through the use of codes, rather than the participants' names. The procedure of this study was also explained to the participants to obtain their cooperation. Participation was entirely voluntary, and participants had the right to withdraw from the study at any point without penalty. Free blood pressure and random blood sugar assessments, as well as 45 Yuan worth of supermarket vouchers, were offered as incentives to encourage participation.

3.9 Pilot Study

To fully understand the potential problems that may arise during the data collection period, the pilot study of phase 1 was carried out in two communities not selected for phase 1, they were Qingjiang and Sanyayuan. The convenience sampling method was used as it made samples easy to obtain. 50 older people completed the GDS, WHOQOL-BREF, and sociodemographic data collection forms, as well as complete the Timed Up and Go test. Data were collected from 15 January 2016 to 20 January 2016 by 5 registered nurses who worked in the Affiliated Hospital of Ya'an Vocational College. They were trained before tasked to collect data, thus they fully understood the aim of the pilot study. For obtaining data on depressive symptoms, all 50 older people were asked to complete the Geriatric Depression Scale. No concerns with regards to comprehension and administration of the scale were reported. Among the 50 older individuals surveyed, 18

(36%) fulfilled the criterion for mild to moderate depression. Among the 18 individuals, 12 (67 %) were female. No individual was found to be severely depressed in the pilot study. For obtaining data on the quality of life, all 50 older people were made to complete the WHOQoL-BREF questionnaire. No concerns with regards to comprehension and administration of the questionnaires were reported. The raw scores of participants were converted into 0 – 100 percentage scale maximum (% SM) for each domain. The average score of the physical domain, psychological domain, social relationship domain, and the environmental domain were 54.71 ± 15.937, 57.57 ± 12.145, 52.38 ± 16.219, and 57.13 ± 15.131 respectively.

For obtaining data on physical mobility, all 50 older people were asked to complete the Timed Up and Go test under the observation of the researchers. No concerns with regards to comprehension and administration of this procedure were reported. No accidents were reported during this procedure either. The average time spent by the participants on the TUG test was 11.29 ± 4.728, with the minimum time at 5 seconds and the maximum time at 18 seconds.

3.10 Data Collection

Data were collected at two stages. Phase 1 included the use of GDS, WHOQoL-BREF, and the self-developed sociodemographic acquisition form. The researcher also assessed the elderly's physical mobility using TUG. Phase 2 included the GDS, WHOQoL-BREF, and TUG, with each of them under repeated assessment throughout the process of this study.

3.10.1 Phase 1

Data collection in phase 1 was carried out during the period of 1 March 2016 to 2 April 2016, thus lasted 1 month and 1 day. Data were collected by 12 registered nurses, among which 7 of them worked in the Affiliated Hospital of Ya'an Vocational College and another 5 of them worked at the Nursing Department of Ya'an Vocational College. All 12 accessors were trained for guidance, instruction, procedure, and purpose of this study.

Making appointments: First, the nurses called the participants at their contact number as recorded by the community office to make an appointment. Data were collected when at the participants' homes or anywhere within the community as according to the participants' wishes.

Meeting participants: After making an appointment, the accessors went to the appointed location at the agreed time to meet with the participant.

Getting written consent: Before data collection, the accessors introduced themselves to the participants, also to show that they were certificated to carried out this study. They would then work to build a trust relationship to get full cooperation from the participants. Then, the procedures, purposes, estimated time cost by the study were explained to the participants. Attendance was fully voluntary and participants were told they have the right to withdraw at any stage of this study. They were also assured of the study's confidentiality. Thence, the written consent was obtained from them before the data collection.

Handing out and retrieving assessment tools: The researchers then handed the participants the assessment tools of GDS and WHOQoL-BREF one by one. The participants were asked to fill in all the scales and questionnaires independently. The assessment tools were collected back once they were finished. Among participants with low levels of literacy, the researchers would read out the items and record the answers on their behalf, practising objectivity.

Assessing physical mobility: Finally, the accessors instructed the participants to complete the TUG test.

The average time of data collection was about 20 minutes. During phase 1, the accessors distributed 460 sets of assessment tools, retrieved 454 sets back which had been fully answered. Six participants, among the 460, refused to continue in the midst of data collection, thus the response rate of phase 1 was 98.70%. After retrieving back the set of assessment tools, the nurses checked the elderly's blood pressure and blood sugar levels free of charge as an incentive for participating and as a show of appreciation for their help. The procedure of data collection of phase 1 is displayed in Figure 3.4.

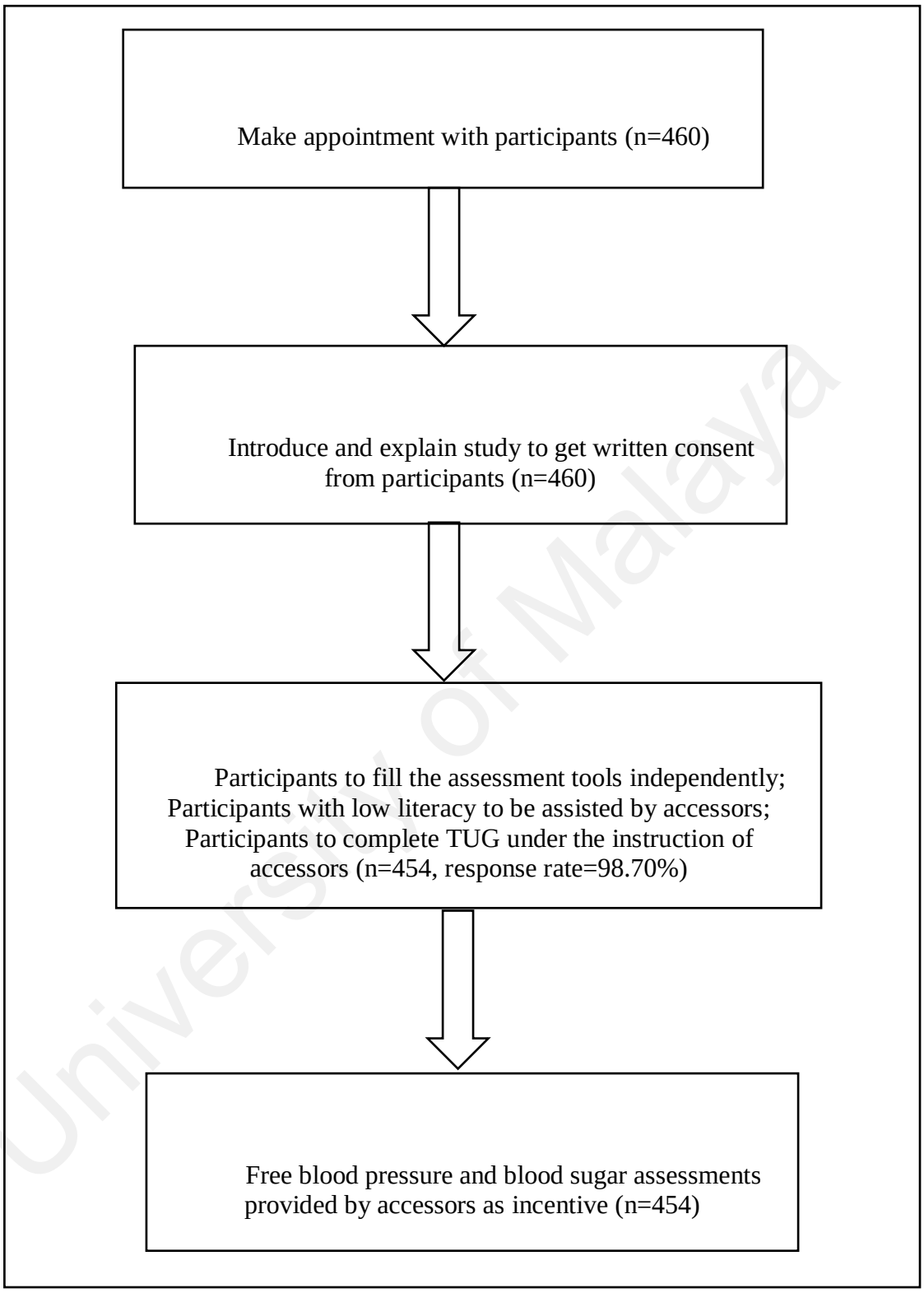

Figure 3. 4: Procedure of data collection of phase 1

3.10.2 Phase 2

The tools used for data collection in phase 2 were the same as phase 1. The accessors in phase 2 were also the same persons as phase 1 but without knowledge of the grouping situation in case of subjective bias during data collection.

Intervention: For the intervention group, participants received the group-based combined music and Tai Chi therapy. For this study, the researcher chose the 24-movements Yang's Tai Chi exercise, which is the most popular form of Tai Chi exercise amongst older people in China. The 24 movements of the Tai Chi in this study were: 'Commencing', 'Part the Wild Horse's Mane, LEFT and RIGHT', 'White Crane Spreads Its Wings', 'Brush Knee and Step Forward, LEFT and RIGHT' 'Playing the Lute', 'Reverse Reeling Forearm, LEFT and RIGHT', 'Left Grasp Sparrow's Tail', 'Right Grasp Sparrow's Tail', 'Single Whip', 'Wave Hands Like Clouds', 'Single Whip', 'High Pat on Horse' 'Right Heel Kick', 'Strike to Ears with Both Fists', 'Turn Body and Left Heel Kick', 'Left Lower Body and Stand on One Leg' , 'Right Lower Body and Stand on One Leg', 'Shuttle Back and Forth, RIGHT and LEFT', 'Needle at Sea Bottom', 'Fan Through Back', 'Turn Body, Deflect, Parry, and Punch', 'Withdraw and Push, as if Closing a Door', 'Cross Hands', and 'Closing' respectively. While practicing Tai Chi, Chinese folk music was played in the background. Tunes included "Bubuqingfeng", "Zuihuayuan", and "Shanyeyouju". The combination of music and Tai Chi is aimed to help older people to relax and enhance their mood, so as to relieve their depressive symptoms, which would then enhance their quality of life. The whole intervention session was 50 minutes, including a 5-minute warming up, a 40-minute Tai Chi exercise, and a 5-minute cooldown. The elderly were asked to participate in this

session 3 times per week for 3 months. The intervention was offered by trained researchers on a fixed schedule. As the intervention was an outdoor, group-based combined music and Tai Chi therapy, participants were told that if it rains, the researchers would inform them of the new time or of the new venue via phone call or text, two hours in advance.

Control: For the control group, selected participants received routine health education provided by the community nurses once a month, as per usual. The health education provided by community nurses were mostly about the reason and prevention for hypertention, diabetes, as well as depression.

Assessment: At the end of the first month of intervention, participants in the intervention group were asked to fill both GDS and WHOQoL-BREF and to perform TUG once again just after the last session of therapy. The method was the same as in phase 1. After completing the data collection, participants were each given a voucher valued at 15 RMB as an incentive. Meanwhile, participants in the control group were also asked to fill both GDS and WHOQoL-BREF and to perform TUG once again at the end of the first month after the start of phase 2. The procedure was the same as in phase 1. The researcher also provided each of the participants with a free voucher valued at 15RMB as an incentive. The same procedures were repeated at the end of the second and the third month. The time period of phase 2 was from 5 April 2016 to 5 July 2016, and thus data were collected on 5 May, 5 June and 5 July 2016.

Lost to follow-up: During phase 2, there were 7 participants lost to follow up in total, 3 of them lost to follow up in the intervention group (one quit at the first month by reason of disease, another two refused to continue with the study by the second month), while 4

participants lost to follow up in the control group (two refused to continue at the final data collection, one lost to follow up by reason of relocation to another city by the second month, another one by reason of injury due to a traffic accident by the last month). Hence, the final sample in the data analysis stage was 107 in total, among which 55 were in the intervention group, and 52 were in the control group. The procedure of data collection of phase 2 is displayed in Figure 3.5.

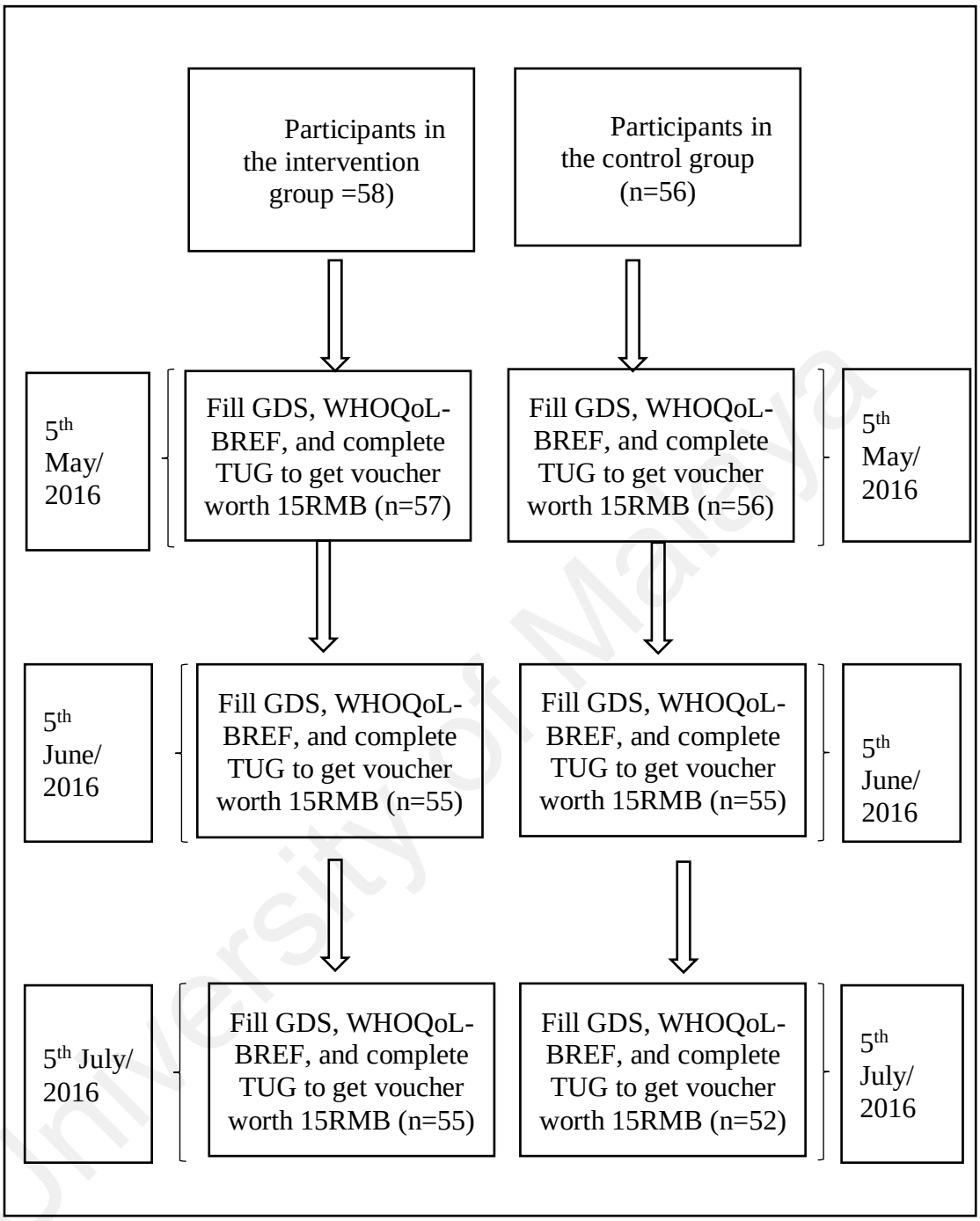

Figure 3. 5: Procedure of data collection of phase 2

3.11 Data Analysis

Data were analysed by using the software SPSS, version 22.0. Both descriptive and inferential statistics were measured.

3.11.1 Descriptive Statistics

Frequency and proportion, mean and standard deviation were used to describe the demographic data as well as the scores of GDS, WHOQoL-BREF, and Timed Up and Go test.

3.11.2 Inferential Statistics

Smart PLS was used to determine the indicators which influence depressive symptoms and quality of life, and Pearson correlation was applied to determine the relationship between depression, quality of life, and physical mobility. The independent t-test and Chi-square test were used to examine the baseline differences between the intervention group and the control group. The Split-plot ANOVA test was used to compare the scores of WHOQOL-BREF, GDS, and TUG between the two groups. The one-way repeated ANOVA measurement was performed to conduct in-group comparisons of GDS, WHOQoL-BREF, and TUG. The planned data analysis is described in Table 3.1.

Table 3. 1: Planned data analysis of the current study

Objectives	Variables	Tests
To determine the prevalence rate of depressive symptoms among community-dwelling older people.	GDS	Descriptive (Mean, Standard Deviation, Frequency, Proportion)
To determine the quality of life and physical mobility of community-dwelling older people.	WHOQoL-BREF TUG	Descriptive (Mean, Standard Deviation, Frequency, Proportion)
To examine the relationship between depressive symptoms, quality of life, and physical mobility.	GDS WHOQoL-BREF TUG	Pearson correlation
To identify indictors for depressive symptoms.	GDS Sociodemographic data	Smart PLS
To identify indictors for the quality of life.	GDS Sociodemographic data	Smart PLS
To determine the effect(s) of combined music and Tai Chi therapy on depressive symptoms.	GDS	Split-Plot ANOVA Independent T-test Chi-Square test One-way repeated ANOVA
To determine the effect(s) of combined music and Tai Chi therapy on the quality of life.	WHOQoL-BREF	Split-Plot ANOVA Independent T-test Chi-Square test One way repeated ANOVA
To determine the effect(s) of combined music and Tai Chi therapy on physical mobility.	TUG	Split-Plot ANOVA Independent T-test Chi-Square test One-way repeated ANOVA

3.12 Summary

The researchers first collected data from a cluster systematic sample of 460 older participants, using the assessment tools of GDS, WHOQoL-BREF questionnaire, Timed Up and Go test, and a self-developed sociodemographic data acquisition form. Thus, the researchers were able to determine the current status of the prevalence rate of depressive symptoms, quality of life, and physical mobility among the targeted population. Based on the results of phase 1, the researchers then used the cluster sampling method to select 4 communities out of 8 as the intervention group, while the other 4 communities were allocated to the control group. Thence, the researchers screened the samples based on the inclusion and exclusion criteria, where 114 participants qualified. 58 participants made up the intervention group whereas another 56 made up the control group. The participants in the intervention group received a 45-minute group-based combined music and Tai Chi therapy three times per week, lasting three consecutive months. Participants in the control group received a monthly health education delivered by the community nurse as per usual. GDS, WHOQoL-BREF, and TUG were assessed repeatedly at the end of each month respectively. During phase 1, 6 older people withdrew from the study. Later, during the third month of phase 2, 3 participants in the intervention group and 4 participants in the control group lost to follow up. The number of participants included in the data analysis stage was 454 in phase 1 and 107 in phase 2. The researchers then adopted suitable statistics to analyze the data collected, including mean and SD, proportion, independent T-test, smart PLS, one-way repeated ANOVA measurement, Split-Plot ANOVA, Chi-square test, and Pearson's correlation.

CHAPTER 4: RESULTS

4.0 Introduction

This chapter presents the results of both the cross-sectional survey and the randomized controlled trial. Research findings such as sociodemographic data, the prevalence rate of depressive symptoms, levels of quality of life and physical mobility are displayed in the results of phase 1. Research findings such as the effect(s) of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility are displayed in the results of phase 2.

4.1 Results of Cross-Sectional Survey (Phase 1)

For the cross-sectional survey, the sociodemographic data of community-dwelling older persons are first displayed. These data include age, sex, living condition, marriage status, employment before 55 years old, educational background, exercise habit, negative life events within the past 3 years etc. The scores of GDS and QoL, and the results of the Timed Up and Go test are also shown. Statistics such as mean and SD, as well as proportion, are adopted to describe the different variables. To conclude the chapter, the potential indicators of GDS and QoL, derived from the collected sociodemographic data are listed. The relationships between GDS, QoL, and physical mobility are also displayed in this chapter.

4.1.1 Sociodemographic Data of Participants

A total of 454 older persons participated in this cross-sectional study. They were aged in the range from 60 to 93 years old (72.19 ± 7.543). More than half of the participants were female (65.0%, n=295), married (64.8%, n=294), and living with a family member (62.6%, n=284). Nearly three-quarters among them were not well educated, of which had an educational background of junior high and below (74.4%, n=338). More than four-fifths of them had chronic health problems (83.0%, n=377), and nearly two-fifths of them experienced negative life events within the past three years. Other sociodemographic data taken into consideration were monthly income, employment before 55 years old, and exercise habit. Table 4.1 presents the sociodemographic data of all older persons engaged in phase 1. Figure 4.1 displays the source of income of participants.

Table 4. 1: Sociodemographic data of participants in phase 1

Variables	**Participants N=545 n (%)**	**Mean ± SD (min, max)**
Age		72.19 ± 7.543 (60, 93)
Monthly income (USD)		240.24 ± 117.01 (114.29, 857.14)
Gender		
Male	159 (35.0)	
Female	295 (65.0)	
Marital status		
Married	294 (64.8)	
Divorced, widowed, and single	160 (35.2)	
Living with family		
Yes	284 (62.6)	
No	170 (37.4)	
Chronic health problems		
Yes	377 (83.0)	
No	77 (17.0)	
Employed before 55		
Yes	333 (73.3)	
No	121 (26.7)	

Table 4.1: Continued

Experienced negative life events	
Yes	176 (38.8)
No	278 (61.2)
Exercise habit	
Never	75 (16.5)
Occasionally	108 (23.8)
Sometimes	79 (17.4)
Often	123 (27.1)
Always	69 (15.2)
Educational background	
Junior high and below	338 (74.4)
High school and above	116 (25.6)

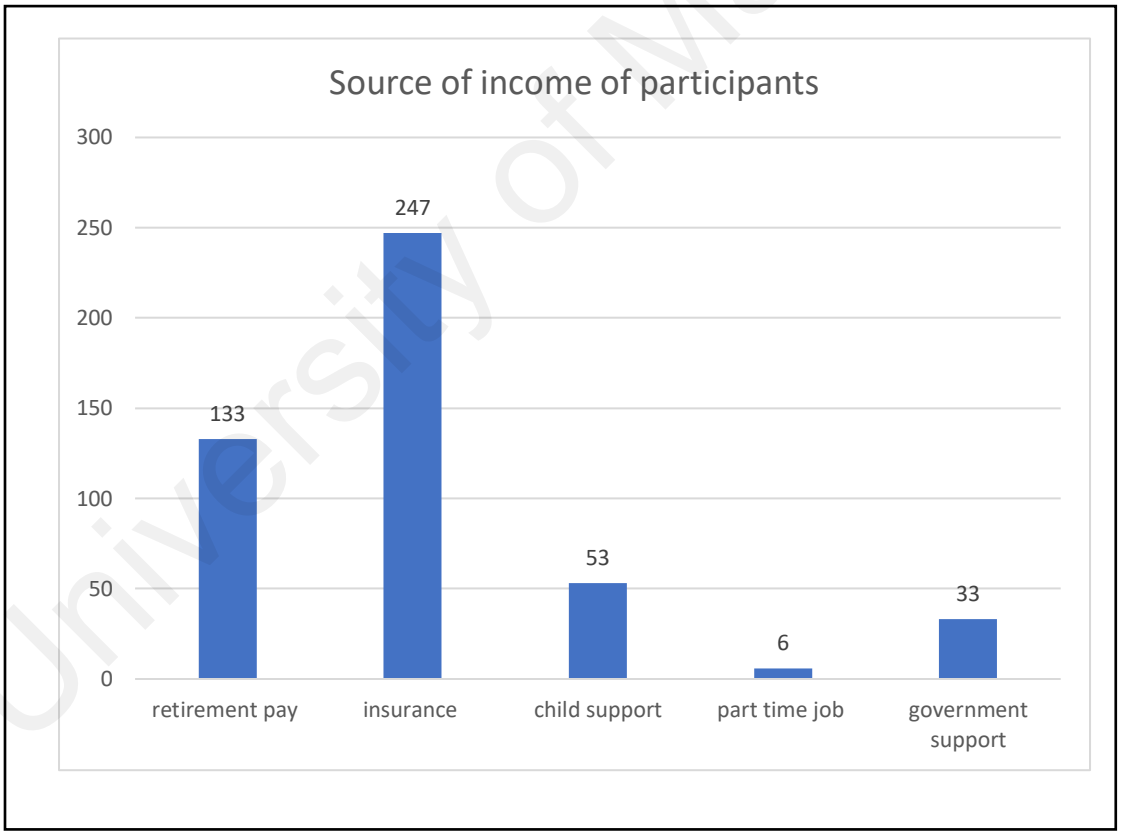

Figure 4. 1: Source of income of participants

4.1.2 Prevalence Rate of Depressive Symptoms

All participants had completed the GDS with scores ranging from 0 to 28 points (8.85 ± 6.051). The total score of GDS is 30, of which scores of 0 to 10 indicate no depression, scores of 11 to 20 indicate mild depression, scores of 21 to 25 indicate moderate depression, and scores of 26 and above indicate severe depression (Wang 1999). In this study, the overall prevalence rate of depression was 142 out of 454 (31.3%), among which 105 participants (73.9%) scored between 11 to 20, 30 participants (21.2%) scored between 21 to 25, and 7 participants (4.9%) scored between 26 to 28. Table 4.2 presents the prevalence of depression at its average score of the current study. Table 4.3 presents the depressive level of the current study.

Table 4. 2: Scores of GDS among participants in phase 1

Item	**Mean ± SD (min, max)**	**N=454 n (%)**
Score of GDS	8.85 6.051 (0, 28)	
Scores of 0 – 10 (no depression)	5.46 ± 2.582 (0, 10)	312 (68.7)
Scores of 11 – 30 (has depression)	16.30 ± 4.649 (11, 28)	142 (31.3)

Table 4. 3: Depressive levels of participants in phase 1

Item	**Mean ± SD (min, max)**	**N=142 n (%)**
Mild depression (11 – 20)	13.91 ± 2.386 (11, 20)	105 (73.9)
Moderate depression (21 – 25)	22.27 ± 1.285 (21, 25)	30 (21.2)
Severe depression (26 – 30)	26.57 ± 0.787 (26, 28)	7 (4.9)

4.1.3 Quality of Life of Participants

4.1.3.1 Score of Each Item of Whoqol-BREF

WHO-QoL BREF was used to determine the participants' quality of life. WHOQoL BREF includes 24 items grouped into 4 domains, which places emphasis on the physical, psychological, social, and environmental domains. In addition, there were two general items about health conditions which were analysed independently. The total score of quality of life among the participants ranged from 47 to 123 (82.44 ± 13.483). While the two general items' score of the participants ranged from 2 to 10 (6.39 ± 1.161). Table 4.4 displays each item of WHOQoL-BREF in detail.

Table 4. 4: Detailed score of each item of WHOQoL-BREF（N=454）

Item	Mean	Standard Deviation	Min	Max
Total score of WHO-QoL BREF	82.44	13.483	47	123
Overall quality of life and general health	6.39	1.616	2	10
*How would you rate your quality of life?	3.30	0.966	1	5
*How satisfied are you with your health?	3.10	0.921	1	5
Physical health	22.00	4.008	9	32
*To what extent do you feel that physical pain prevents you from doing what you need to do?	3.12	0.928	1	5
*How much medical treatment do you need if any to function in your daily life?	2.91	0.908	1	5
*Do you have enough energy for your everyday life?	3.06	0.761	1	5
*How well are you able to get around?	3.27	0.906	1	5
*How satisfied are you with your sleep?	3.01	1.053	1	5
*How satisfied are you with your ability to perform your daily living activities?	3.31	0.881	1	5
*How satisfied are you with your capacity for work?	3.32	0.854	1	5
Psychological	19.32	3.633	9	30
*How much do you enjoy life?	3.24	0.867	1	5
*To what extent do you feel your life to be meaningful?	3.17	0.834	1	5
*How well are you able to concentrate?	3.11	0.799	1	5
*Are you able to accept your bodily appearance?	3.17	0.734	1	5
*How satisfied are you with yourself?	3.41	0.861	1	5
*How often do you have negative feelings such as poor mood, despair, anxiety or depression?	3.21	1.175	1	5
Social relationships	9.70	1.942	3	15
*How satisfied are you with your personal relationships?	3.37	0.835	1	5
*How satisfied are you with your sex life?	3.01	0.921	1	5
*How satisfied are you with the support you get from your friends?	3.33	0.863	1	5
Environment	25.51	4.544	13	38
*How safe do you feel in your daily life?	3.17	0.751	1	5
*How healthy is your physical environment?	3.22	0.818	1	5
*How available to you is the information you need for your day-to-day life?	2.93	0.729	1	5
*To what extent do you have the opportunity for leisure activities?	2.94	0.909	1	5
*How satisfied are you with the conditions of your place of living?	3.32	0.928	1	5
*How satisfied are you with your access to health services?	3.44	1.001	1	5
*How satisfied are you with your means of transport?	3.38	0.960	1	5

4.1.3.2 The Percentage Scale Maximum of Whoqol-BREF

When converted into Percentage Scale Maximum (% SM), the average scores of the physical, psychological, social, and environmental domains were 53.7 ± 14.4 (ranged from 6 to 88), 55.6 ± 15.1 (ranged from 13 to 100), 55.9 ± 16.3(ranged from 0 to 100), and 56.4 ± 14.2 (ranged from 19 to 94) respectively. Table 4.5 displays the % SM of each domain of WHOQoL-BREF.

Table 4. 5: Percentage scale maximum of WHOQoL-Bref of each domain (N=454)

Domains	Mean	Standard deviation	Minimum	Maximum
Physical	53.69	14.355	6	88
Psychological	55.64	15.145	13	100
Social	55.86	16.292	0	100
Environmental	56.44	14.211	19	94

4.1.3.3 Frequency Distribution of Whoqol-Bref Items

There were at least 50% of the respondents rating items as satisfied/ very satisfied. To further elaborate, four scales were defined in this study: dissatisfaction (<50%), bare satisfaction (50%-65%), moderate satisfaction (66%-74%), and highest satisfaction (≥75%) (Olusina & Ohaeri, 2003). The results showed that highly satisfied items of WHOQoL-Bref include 'ability to get around', 'leisure opportunity', and 'condition of place of living'; dissatisfied items were 'general health', 'need for treatment', 'money', 'support from friends', 'access to health services', 'no physical pain', 'sex life', 'sleep', 'available information for health', and 'no negative mood'. The other 13 items of WHOQoL-Bref were either at levels of moderate satisfaction or bare satisfaction. Table 4.6 presents the frequency distribution of each item of WHOQoL-BREF.

Table 4. 6: Frequency distribution of WHOQoL-BREF items (N=454)

Highly satisfied		Moderately satisfied		Barely satisfied		Dissatisfied	
Item	**%**	**Item**	**%**	**Item**	**%**	**Item**	**%**
Ability to get around	75.4	Ability to concentrate	67.6	General quality of life	57.7	General health	40.1
Leisure opportunity	82.7	Safety in daily life	71.5	Capacity for work	56.9	Need for treatment	31.4
Condition of living	77.9	Transport	73.8	Personal relationships	62.7	Money	46.9
		Bodily appearance	66.1	Enjoyment of life	60.1	Friends' support	49.7
		Energy	74.3	Meaningful life	64.5	Access to health services	39.7
		Physical environment	69.2	Self-satisfaction	59.8	No physical pain	48.5
				Activity of daily living	64.9	Sex life	39.5
						Sleep	48.5
						Information for health	40.6
						No negative mood	57.3

Note: Frequency <50% indicates dissatisfaction, 50%-65% indicates bare satisfaction, 66%-74% indicates moderate satisfaction, and ≥75% indicates highest satisfaction

4.1.4 Physical Mobility of Participants

Timed up and Go test (TUG) was used to detect the physical mobility of older persons in phase 1. The average time of TUG of the participants was 12.11 ± 3.745 seconds, with a range of at least 4 to at most 25 seconds. Table 4.7 presents the result of TUG in this study.

Table 4. 7: Result of TUG in phase 1 (N=454)

Item	Mean	Standard Deviation	Minimum	Maximum
TUG	12.11	3.754	4	25

4.1.5 Relationships Between Depressive Symptoms, Quality of Life, and Physical Mobility

In this study, the Pearson's correlation was computed to assess the relationship between depressive symptoms, quality of life, and physical mobility. Based on the results of the study, there is a strong negative correlation between depressive symptoms and the quality of life ($r=-0.657$, $p<0.001$), which indicates that higher levels of quality of life are related to lower prevalence of depressive symptoms (Table 4.8). The study results also showed that there is a moderately positive correlation between depressive symptoms and the time taken to complete the TUG test ($r=0.511$, $p<0.001$), which suggests that the worse the physical mobility, the higher the prevalence of depressive symptoms (Table 4.8). According to the results, there is also a moderately negative correlation between the quality of life and the time taken to complete the TUG test ($r=-0.530$, $p<0.001$), which suggests that worse physical mobility is related to the worse quality of life (Table 4.8).

Table 4. 8: The relationships between GDS, WHOQoL-BREF, and TUG (N=454)

Pearson's correlation coefficient	Depression	Quality of life	TUG
Depression	1.000		
Quality of life	-0.657**	1.000	
TUG	0.511**	-0.530**	1.000

**Correlation is significant at the 0.01 level (2-tailed)

4.1.6 The Indictors of Depressive Symptoms

In this study, there were both categorical data, such as gender, living with family etc., and continuous data, such as monthly income and age. Therefore, we chose the Structural Equation Modeling PLS (Smart PLS) to calculate the indictors of depressive symptoms. Smart PLS is one of the most prominent software applications for partial, least structural equation modelling. We chose Smart PLS to develop a model which describes the relationship between all the observed variables and depressive symptoms.

Variables in SEM are endogenous and exogenous. The endogenous variables have at least one path leading to it and represent the effects of other variables, whereas an exogenous variable has one path pointing outwards and away from it. To assess the PLS-SEM model, some basic elements are evaluated in this study. Firstly, Smart PLS generates T-statistics for significance testing between independent and dependent variables. Only when T-statistics are larger than 1.96, will the loading then be significant. Secondly, the coefficient of determination (R^2) is assessed to explain the targeted endogenous variable variance. R^2 is determined in such a way that a value of above or equal to 0.70 is strong, a value between 0.50 and 0.70 is moderate, while a value of less than 0.50 is weak.

In the current study, depressive symptoms were the dependent variable, while sociodemographic data such as age, gender, marital status, living with family, chronic

health problems, monthly income, negative life events, employed before 55, exercise habit, and educational background were the independent variables. In the initial model, all variables had a T-statistic larger than 1.96, with the exception of age, employed before 55, and educational background (Table 4.9).

Table 4. 9: T-statistics of path coefficients for GDS and sociodemographic data

Sociodemographic data	➡Depressive symptoms	T-statistics
Age	➡ Depressive symptoms	0.359
Gender	➡ Depressive symptoms	2.620*
Maritus	➡ Depressive symptoms	5.569*
Living with family	➡ Depressive symptoms	2.856*
Chronic health problems	➡ Depressive symptoms	4.665*
Employed before 55	➡ Depressive symptoms	1.888
Negative life events	➡ Depressive symptoms	3.663*
Monthly income	➡ Depressive symptoms	7.604*
Exercise habit	➡ Depressive symptoms	11.563*
Educational background	➡ Depressive symptoms	0.139

*Significant at P<0.05

The three variables of a T-statistic less than 1.96 were removed. In the final model, R^2 was 0.504 for the dependent variable of depressive symptoms. This meant that the 7 independent variables (gender, marital status, monthly income, living with family, chronic health problems, negative life events, and exercise habit) were responsible towards 50.4% of the variance in depressive symptoms (Figure 4.2). The results showed that exercise habit (β=-0.382, t=11.563, P<0.05) affected depressive symptoms the most, followed by monthly income (β=-0.254, t=7.604, P<0.05), marital status (β=-0.231, t=5.569, P<0.05), negative life events (β=-0.148, t=3.663, P<0.05), chronic health problems (β=-0.139, t=4.665, P<0.05), living with family (β=-0.111, t=2.856, P<0.05), and finally, gender (β=-0.086, t=2.620, P<0.05).

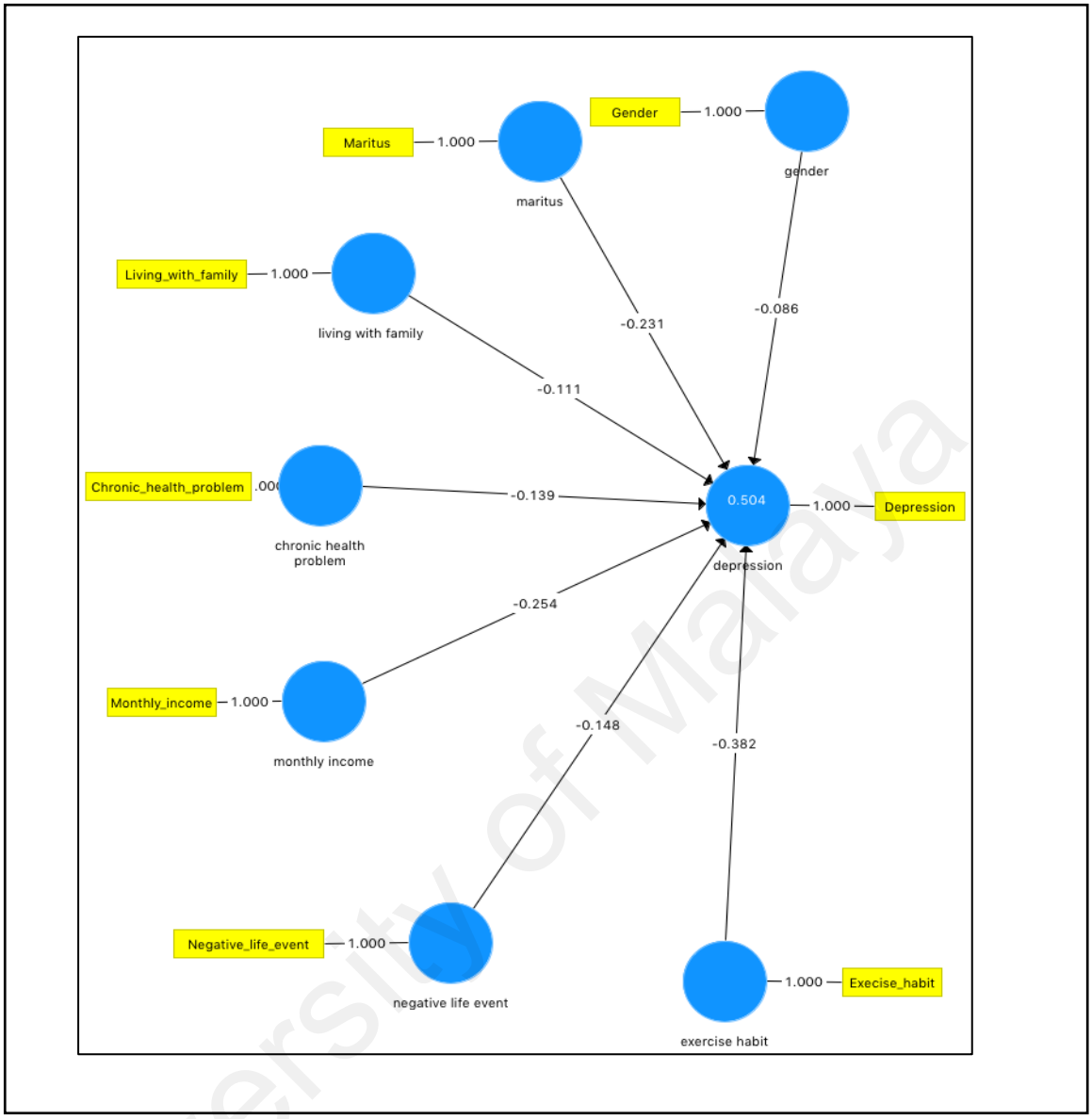

Figure 4. 2: Regression weights of relationships between all variables in GDS

According to the results for the female gender, being married, living with family, no chronic health problems, no negative life events, having higher monthly income, and exercising more were the protective factors against depressive symptoms. Whereas for the male gender, being divorced or widowed, living alone, suffering chronic health problems, having experienced negative life events, having lower monthly income, and exercising less were the risk factors for depressive symptoms.

4.1.7 The Indictors of Quality of Life

Similarly, in the assessment of the indicators of depressive symptoms, there are both categorical data and continuous data when assessing the indicators of the quality of life as well. Hence, the researcher chose, yet again, the Structural Equation Modeling PLS to calculate the impactors of depressive symptoms through the Smart PLS software 3.2.

In the proceedings of data analysis, the quality of life was the dependent variable while sociodemographic data such as age, gender, marital status, living with family, chronic health problems, monthly income, negative life events, employed before age 55 years, exercise habit, and educational background were the independent variables. In the initial model, all variables had a T-statistic larger than 1.96, with the exception of age, gender, and educational background (Table 4.10).

Table 4. 10: T-statistics of path coefficients for WHOQoL-BREF and sociodemographic data

Sociodemographic data	➡Quality of life	T-statistics
Age	➡ Quality of life	0.891
Gender	➡ Quality of life	0.803
Marital status	➡ Quality of life	2.795*
Living with family	➡ Quality of life	2.638*
Chronic health problems	➡ Quality of life	3.564*
Employed before age 55	➡ Quality of life	2.337*
Negative life event	➡ Quality of life	2.222*
Monthly income	➡ Quality of life	4.934*
Exercise habit	➡ Quality of life	10.038*
Educational background	➡ Quality of life	0.937

*Significant at P<0.05

The three variables of a T-statistic less than 1.96 were removed. In the final model, R^2 was 0.376 for the dependent variable of the quality of time. This meant that the 7 independent variables (marital status, monthly income, living with family, chronic health problem, negative life event, employed before 55 years and exercise habit) were responsible towards 37.6% of the variance in the quality of life (Figure 4.3). The results showed that exercise habit (β=0.382, t=10.038, P<0.05) affected quality of life the most, followed by monthly income (β=0.182, t=4.934, P<0.05), chronic health problems (β=0.128, t=3.564, P<0.05), marital status (β=0.124, t=2.795, P<0.05), negative life events (β=0.097, t=2.222, P<0.05), employed before age 55 (β=0.096, t=2.337, P<0.05), and finally, living with family (β=0.093, t=2.638, P<0.05).

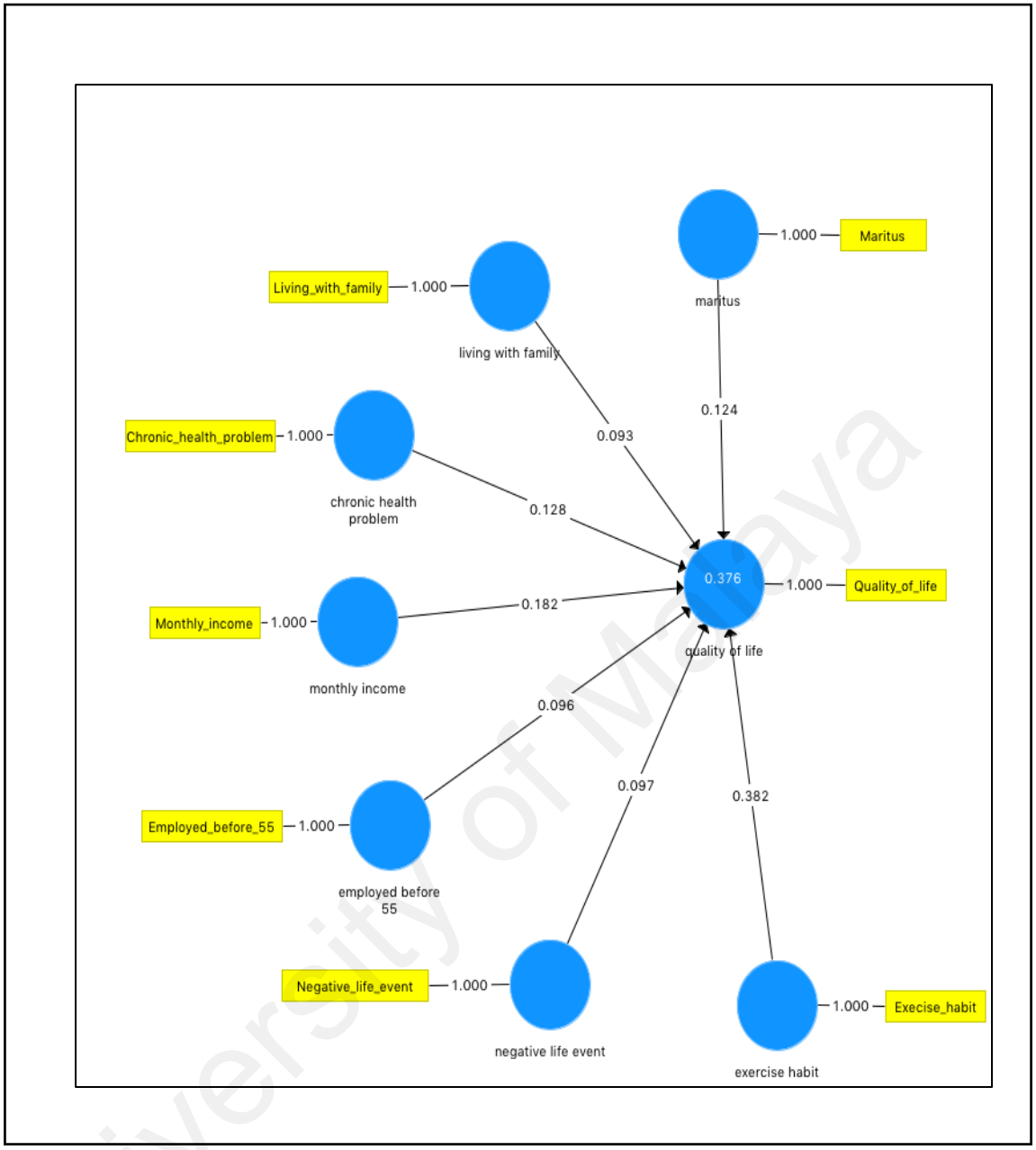

Figure 4. 3: Regression weights of relationships between all variables in WHOQoL-BREF

Aaccording to the results, married, living with family, no chronic health problems, no negative life events, higher monthly income, employed before 55 years, and more exercise were the protective factors against the quality of life. While divorced or widowed, living alone, having chronic health problems, experiencing negative life events, lower monthly income, not employed before 55 years, and less exercise were the risk factors for quality of life.

4.2 Results of Cluster Randomized Controlled Trial (Phase 2)

One hundred and seven participants completed the cluster randomized control stage, among which 55 were from the intervention group, while 52 were from the control group. For the statistical analysis, the researcher first did a baseline comparison between the experimental group and the control group, results are as displayed, followed by the comparison of the differences in depressive symptoms, quality of life, and physical mobility between the two groups after 3 months of intervention. For the baseline comparison, independent T-test and Chi-square test were used. In the treatment effect stage, Split-Plot ANOVA was chosen as the measurement tool. A treatment effect would be detected if a significant interaction effect occurred. The split-plot ANOVA is one of the most efficient quantitative research methods for testing the causal hypothesis.

4.2.1 Baseline Comparison of Variables in Two Groups

The baseline for a randomized controlled trial is the point of when the intervention begins. Apart from the factor of treatment, there exist other factors which will affect the comparison's outcome. Therefore, in this study, baseline comparison was conducted making sure that the only effective variable is the treatment. In the current study, treatment refers to the combined music and Tai Chi therapy. It was ensured that all other variables were comparable at the very beginning. As listed below, the variables include age, gender, marital status, living with family, chronic health problems, monthly income, employed before age 55 years, negative life events, exercise habit, educational background, and scores of GDS and WHOQoL-BREF, as well as the result of TUG. For continuous variables such as age, monthly income, scores of GDS and WHOQoL-BREF, as well as the results of TUG, independent T-test was chosen to compute the comparison.

According to the results, the difference of all the above-mentioned variables between the two groups was non-significant. Table 4.11 presents the baseline comparison of continuous data. The four domains and two independent items of the quality of life will be analysed separately, as displayed in Table 4.11.

Table 4. 11: Baseline comparison of continuous data (N=107)

Variables	Mean(*SD*)		Mean difference	t	*P*
	Treatment (n=55)	Control (n=52)			
Age	71.84 (7.297)	71.75 (8.201)	0.086	0.58	0.954
Monthly income	179.22 (57.66)	179.72 (51.46)	-0.499	-0.47	0.962
GDS	15.84 (4.479)	15.75 (3.945)	0.086	0.106	0.916
WHOQoL-BREF	69.91 (11.893)	69.19 (4.887)	0.717	0.403	0.687
General items of WHOQoL-BREF	4.87 (1.656)	4.38 (1.123)	-0.512	-1.861	0.066
Physical health	18.25 (3.307)	18.69 (1.976)	-0.438	-0.825	0.411
Psychological health	16.53 (3.248)	15.81 (1.869)	0.720	1.394	0.166
Social relationships	8.53 (1.999)	8.52 (1.350)	0.008	0.024	0.981
Environment	21.73 (4.240)	20.79 (2.013)	0.939	1.449	0.150
TUG	15.38 (3.200)	14.77 (3.227)	0.613	0.986	0.327

For categorical data such as gender, living with family, marital status, chronic health problems, employed before age 55 years, negative life events, exercise habit, and educational background, Chi-square test was adopted to execute the comparison. As the results show, there was no statistic difference between the treatment group and the control group in all the variables mentioned above. Table 4.12 presents the coding of variables in the statistic stage. Table 4.13 presents the baseline comparison of the Chi-square test.

Table 4. 12: Coding of variables in the statistics

Variable	Coding
Gender	1=male , 2=female
Marital status	1=divorced or widowed, 2=married
Living with family	1=no, 2=yes
Chronic health problems	1=with, 2=without
Negative life events	1=yes, 2=no
Employed before age 55	1=no, 2=yes
Educational background	1=junior high and below, 2=high school and above
Exercise habit	1=never, 2=seldom, 3=sometimes, 4=often, 5=always

Table 4. 13: Baseline comparison computed by Chi-square test (N=107)

Variables	n (%)		χ^2	*P*	*df*
	Treatment (n=55)	Control (n=52)			
Gender			0.681	0.409	1
Male	19 (34.5)	22 (42.3)			
Female	36 (65.5)	30 (57.7)			
Marital status			0.001	0.976	1
Divorced or widowed	34 (61.8)	32 (61.5)			
Married	21 (38.2)	20 (38.5)			
Living with family			0.003	0.959	1
No	23 (41.8)	22 (42.3)			
Yes	32 (58.2)	30 (57.7)			
Chronic health problems			0.403	0.525	1
With	54 (98.2)	50 (96.2)			
Without	1 (1.8)	2 (3.8)			
Negative life events			0.189	0.664	1
Yes	34 (61.8)	30 (57.7)			
No	21 (38.2)	22 (42.3)			
Employed before age 55			0.054	0.816	1
No	21 (38.2)	21 (40.4)			
Yes	34 (61.8)	31 (59.6)			
Educational background			0.390	0.532	1
Junior high and below	44 (80.0)	44 (84.6)			
High school and above	11 (20.0)	8 (15.4)			
Exercise habit			2.735	0.255	2
Never	15 (27.3)	10 (19.2)			
Seldom	24 (43.6)	31 (59.6)			
Sometimes	16 (29.1)	11 (21.2)			

4.2.2 Treatment Effect of Combined Music and Tai Chi Therapy on Depressive Symptoms

For the current study, repeated assessments were undertaken. Hence, Split-plot ANOVA was adopted to calculate the difference between groups over time. The split-plot ANOVA is one of the most efficient quantitative research methods for testing the causal hypothesis. A treatment effect will be detected if a significant interaction effect occurred. To address the research question of "Does combined music and Tai Chi therapy reduce the severity of depressive symptoms among rural community-dwelling older adults in Southern China?", Split-plot ANOVA analysis was conducted. As the results of the analysis show, interaction effects occurred between time and group ($F(3,315)=69.661$, $P<0.001$). Table 4.14 presents the difference between the change in mean value over time and the interaction between groups. Figure 4.4 displays the mean plot to indicate that there was no significant difference between groups at baseline and that the control group did not change over time. However, the mean score of the treatment group decreased as time passed. This indicates that the combined music and Tai Chi therapy had effectively reduced the severity of depressive symptoms among these community-dwelling older participants.

Table 4. 14: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on GDS (N=107)

Depressive symptoms	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	15.84 (4.479)	15.75 (3.945)		
1 month after intervention	14.84 (4.446)	15.62 (3.902)	69.661 (3,315)	<0.001
2 months after intervention	14.27 (4.544)	15.63 (3.951)		
3 months after intervention	13.31 (4.375)	15.65 (3.945)		

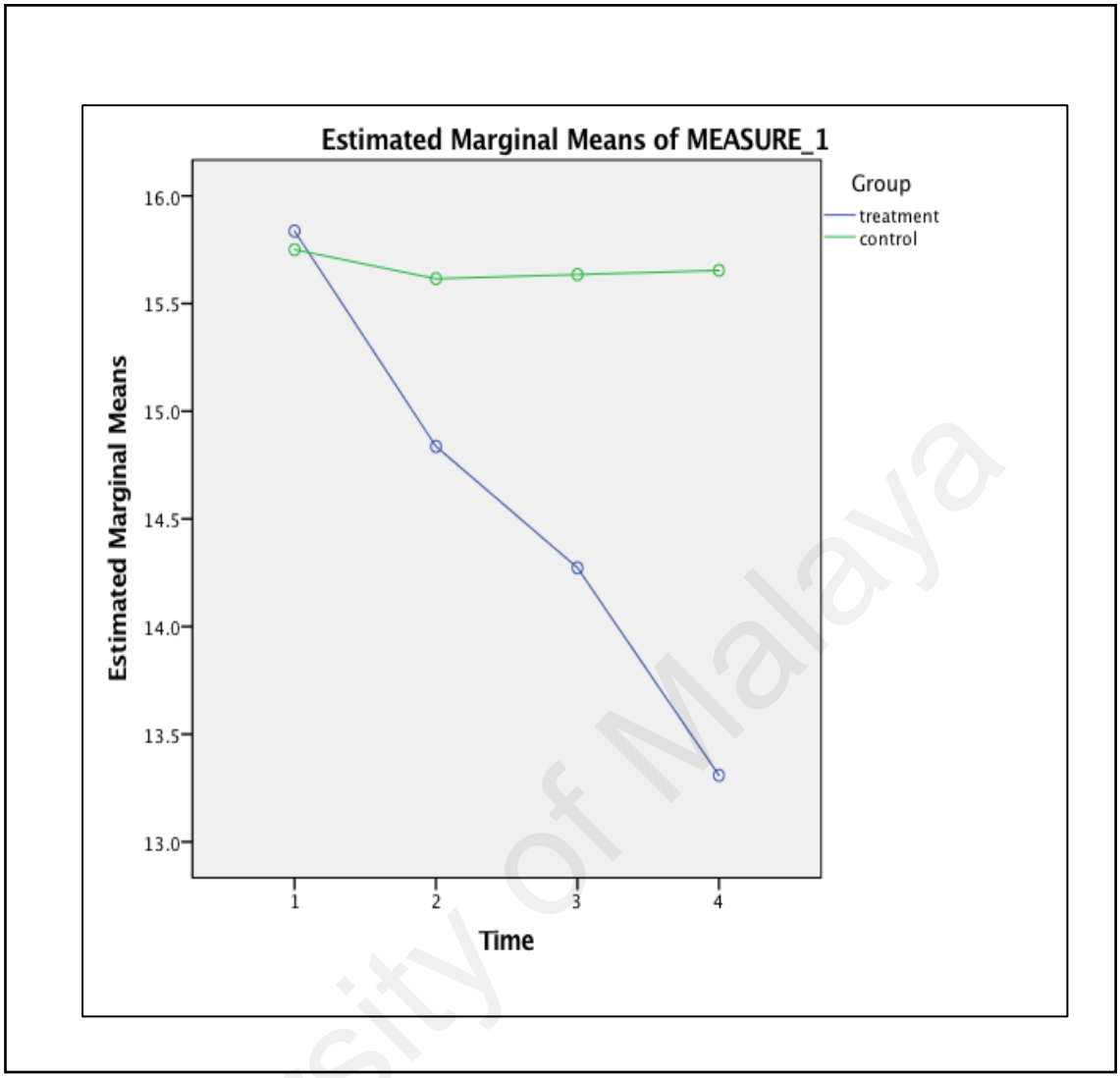

Figure 4. 4: The change of mean plot of GDS over time in two groups

Apart from the comparison between the groups, any significant change in depressive symptoms for each group over time was observed. The one-way repeated measures of ANOVA were conducted to determine the changes within each group. As shown in Table 4.15, the depressive symptoms of the older participants had been significantly reduced in the treatment group (Wilks' Lambda=0.246, F(3,52)=53.010, P<0.001). Meanwhile, in the control group (Table 4.15), participants' depressive symptoms did not change over time (Wilks' Lambda=0.859, F(3,49)=2.691, P=0.056).

Table 4. 15: The change of GDS within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean(SD)	Wilks' Lambda	F(3,52)	P	Mean(SD)	Wilks' Lambda	F(3,49)	P
Baseline	15.84 (4.479)				15.75 (3.945)			
1month after intervention	14.84 (4.446)	0.246	53.010	<0.001	15.62 (3.902)	0.859	2.691	0.056
2months after intervention	14.27 (4.544)				15.63 (3.951)			
3months after intervention	13.31 (4.375)				15.65 (3.945)			

4.2.3 Treatment Effect of Combined Music and Tai Chi Therapy on Quality of Life

For the quality of life, this study employed the assessment tool of WHOQoL-BREF. WHOQoL-BREF includes 24 items grouped into the 4 domains of physical, psychological, social, and environmental. In addition, there were two general items regarding health conditions that were analysed independently. The researcher computed the analysis to address the research question, "Will combined music and Tai Chi therapy be useful in enhancing the quality of life of older people with depressive symptoms?" According to the analysis results, there is a significant interaction between time and group in either the total score of WHOQoL-BREF ($F(3,315)=112.213$, $P<0.001$) or the scores of every domain of this questionnaire. Table 4.16 presents the difference between the changes of mean value over time and the interaction between both groups. Figure 4.5 displays the mean plot to indicate that there is no significant difference between the groups at baseline and that the control group did not change over time.

However, the quality of life of the treatment group as a whole has increased significantly over time. This indicates that the combined music and Tai Chi therapy has effectively enhanced the quality of life of the community-dwelling older participants.

Table 4. 16: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on WHOQoL-BREF (N=107)

Quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	69.91 (11.893)	69.19 (4.887)		
1 month after intervention	73.05 (11.007)	69.19 (4.971)	112.213 (3,315)	<0.001
2 months after intervention	75.44 (10.304)	69.37 (4.847)		
3 months after intervention	81.44 (9.026)	69.31 (4.845)		

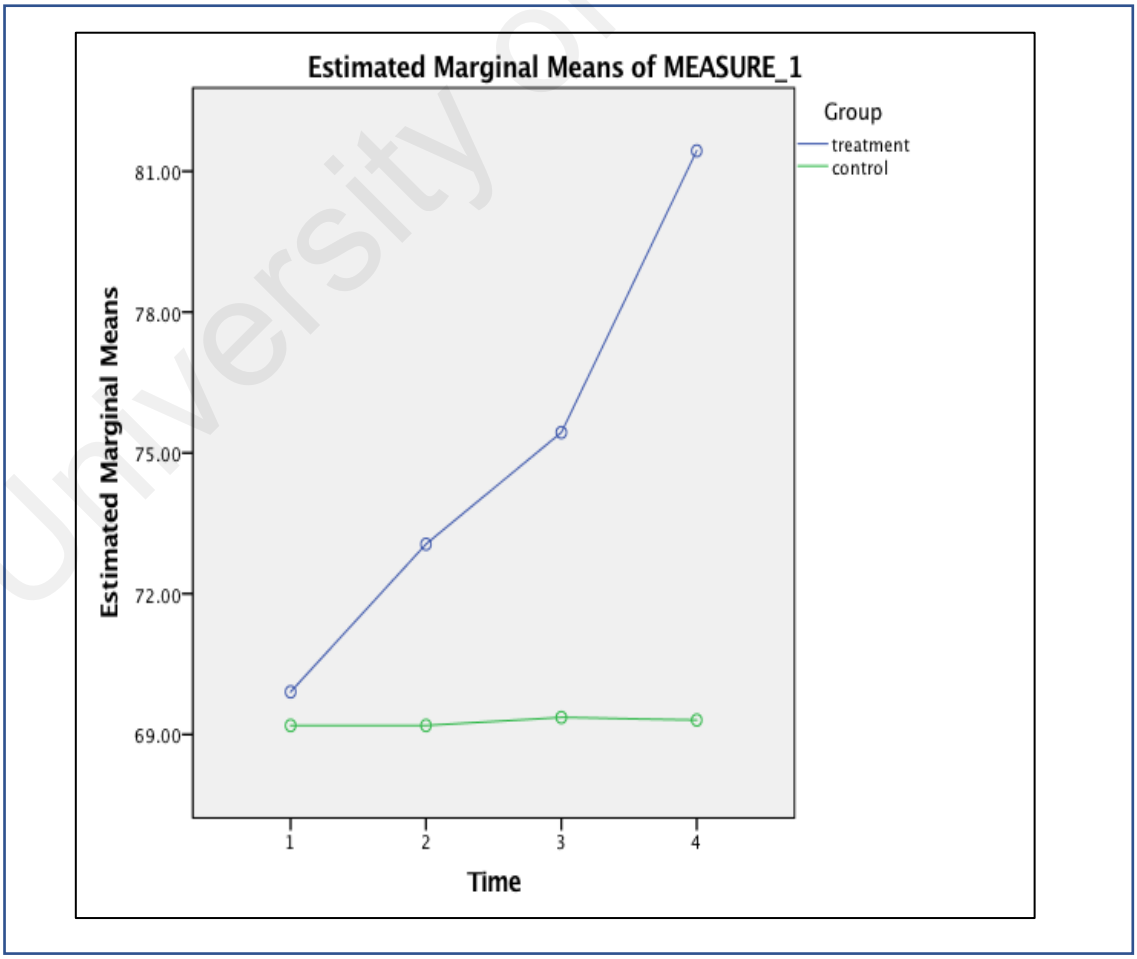

Figure 4. 5： The change of mean plot of WHOQoL-BREF over time in two groups

The result of analysis within each group using the one-way repeated ANOVA measurements showed that the quality of life of older participants from the treatment group had significantly been enhanced (Wilks' Lambda=0.267, F(3,52)=47.485, P<0.001) (Table 4.17). Meanwhile, in the control group (Table 4.175), participants' quality of life did not change over time (Wilks' Lambda=0.870, F(3,49)=2.451, P=0.074).

Table 4. 17*:* The change of WHOQoL-BREF within groups (N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	**Wilks' Lambda**	**F (3,52)**	**P**	**Mean (SD)**	**Wilks' Lambda**	**F (3,49)**	**P**
Baseline	69.91 (11.893)				69.19 (4.887)			
1 month after intervention	73.05 (11.007)				69.19 (4.971)			
2 months after intervention	75.44 (10.304)	0.267	47.485	<0.001	69.37 (4.847)	0.870	2.451	0.074
3 months after intervention	81.44 (9.026)				69.31 (4.845)			

For results on the two general items and four different domains of quality of life, the Split-plot ANOVA indicated an interaction between the groups. To further elaborate, the two general items scored F(3,315)=53.255, P<0.001, the physical health domain scored F(3,315)=51.080, P<0.001, and the psychological domain scored F(3,315)=34.006, P<0.001. The social relationships domain scored F(3,315)=60.106, P<0.001 while the environment domain scored F(3,315)=25.274, P<0.001. Table 4.18 to Table 4.22 present the interaction between groups. Figure 4.6 to Figure 4.10 display the mean plot to indicate that there is no significant difference between groups at baseline and that the control group did not change significantly over time. However, both the two general items and the other four domains of quality of life did increase in the treatment group significantly over time.

This indicates that the combined music and Tai Chi therapy has effectively enhanced the quality of life in every domain of the community-dwelling older participants.

Table 4. 18: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on two general items of WHOQoL-BREF (N=107)

Two general items of quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	4.87 (1.656)	5.38 (1.123)		
1 month after intervention	5.64 (1.520)	5.40 (0.955)	53.255 (3,315)	<0.001
2 months after intervention	6.25 (1.294)	5.40 (0.955)		
3 months after intervention	7.00 (1.000)	5.44 (0.958)		

Table 4. 19: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on the physical health domain of WHOQoL-BREF (N=107)

Physical domain of quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	18.25 (3.307)	18.69 (1.976)		
1 month after intervention	18.56 (3.126)	18.85 (2.023)	51.080 (3,315)	<0.001
2 months after intervention	19.95 (2.697)	18.87 (2.068)		
3 months after intervention	21.80 (2.556)	18.94 (1.924)		

Table 4. 20: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on the psychological domain of WHOQoL-BREF (N=107)

Psychological domain of quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	16.53 (3.248)	15.81 (1.869)		
1 month after intervention	16.75 (3.164)	16.13 (1.804)	34.006 (3,315)	<0.001
2 months after intervention	16.75 (3.164)	16.23 (1.733)		
3 months after intervention	18.87 (2.855)	16.19 (1.761)		

Table 4. 21: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on the social relationships domain of WHOQoL-BREF (N=107)

Social relationships domain of quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	8.53 (1.999)	8.52 (1.350)		
1 month after intervention	9.91 (1.295)	8.52 (1.321)	61.106 (3,315)	<0.001
2 months after intervention	9.91 (1.295)	8.56 (1.243)		
3 months after intervention	9.91 (1.295)	8.52 (1.321)		

Table 4. 22: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on the environment domain of WHOQoL-BREF (N=107)

Environment domain of quality of life	Mean (SD)		F (*df*)	*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	21.73 (4.240)	20.79 (2.013)		
1 month after intervention	22.16 (4.008)	21.02 (2.192)	25.274 (3,315)	<0.001
2 months after intervention	22.55 (4.149)	21.02 (2.128)		
3 months after intervention	24.13 (3.215)	21.00 (2.178)		

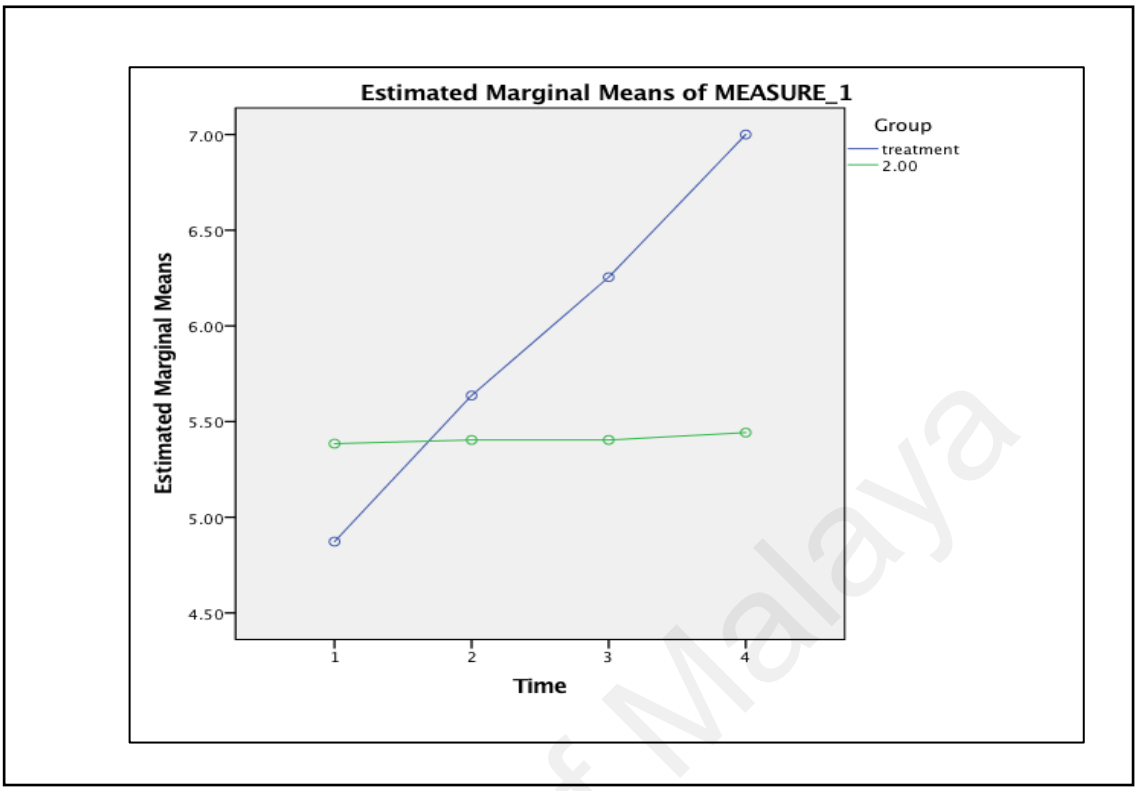

Figure 4. 6: The change of mean plot of two general items of WHOQoL-BREF between groups over time

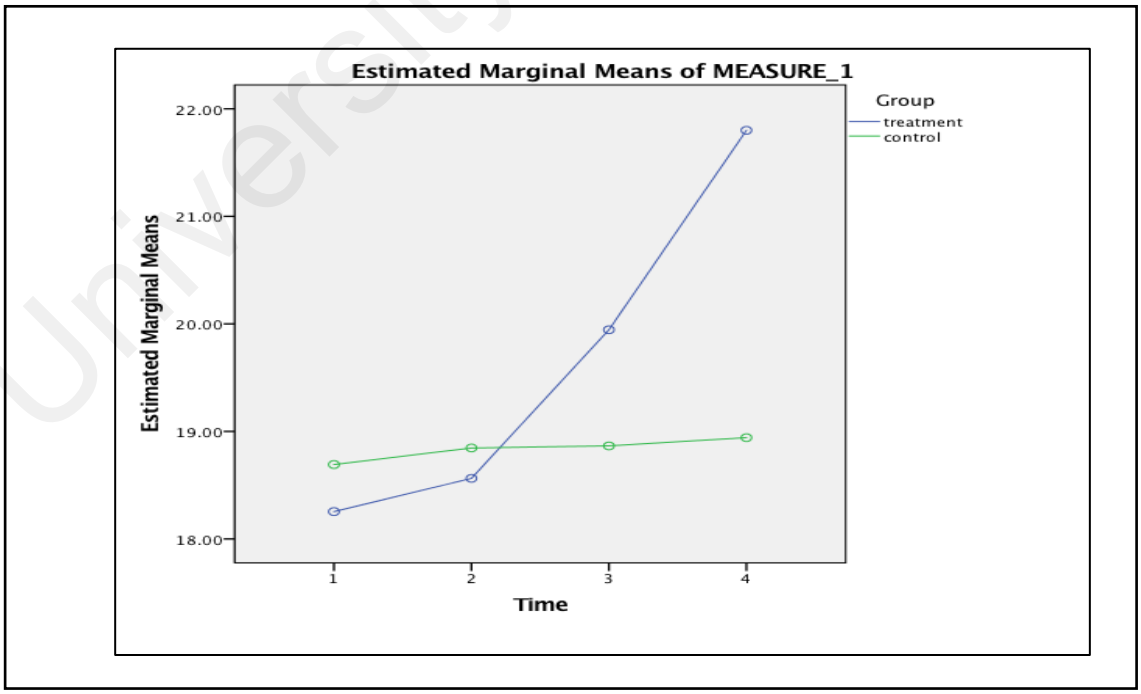

Figure 4. 7: The change of mean plot of physical health domain of WHOQoL-BREF between groups over time

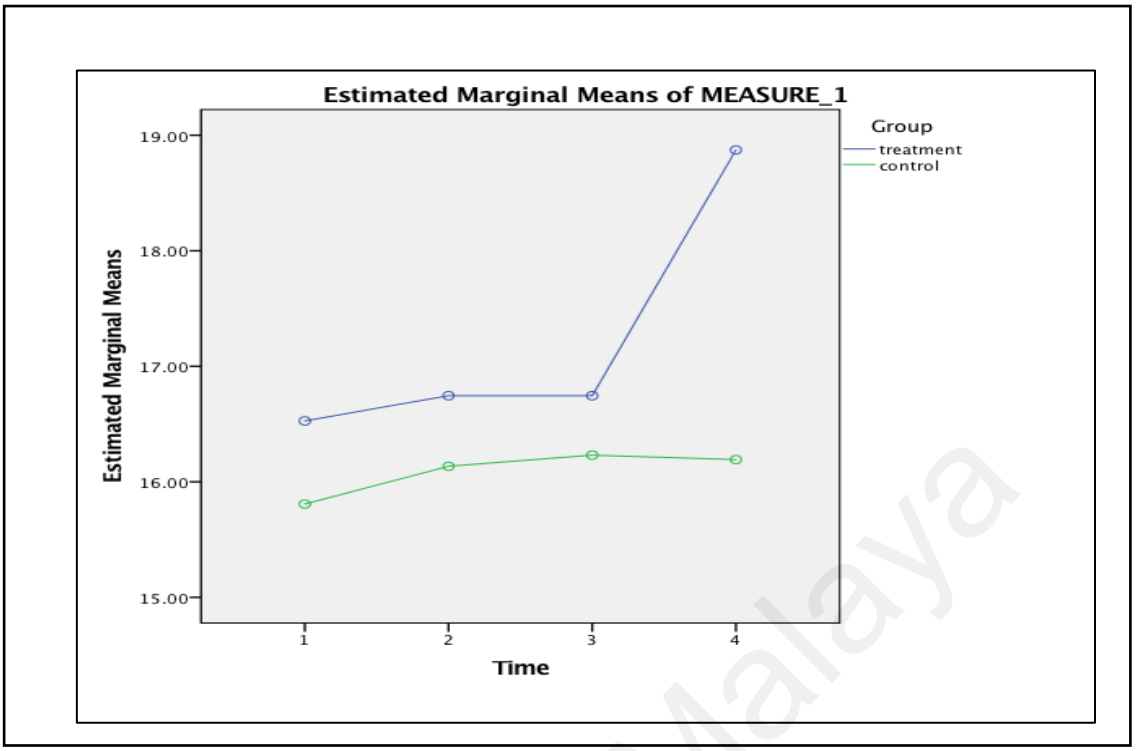

Figure 4. 8: The change of mean plot of psychological domain of WHOQoL-BREF between groups over time

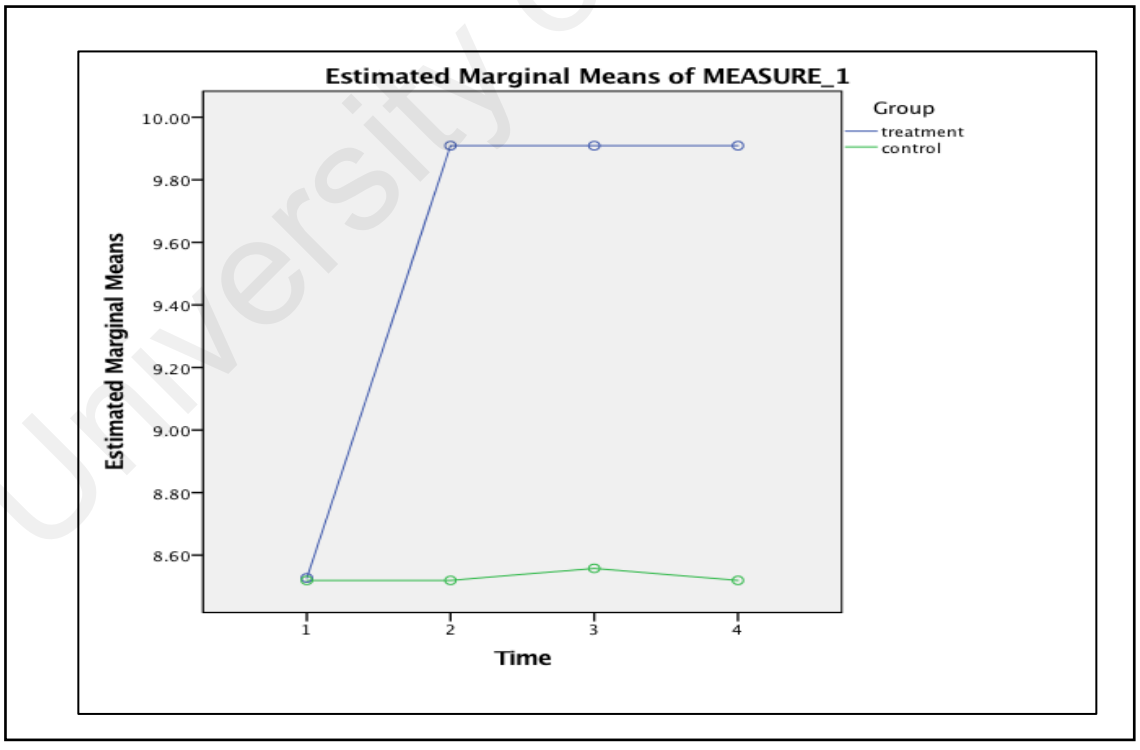

Figure 4. 9: The change of mean plot of social relationships domain of WHOQoL-BREF between groups over time

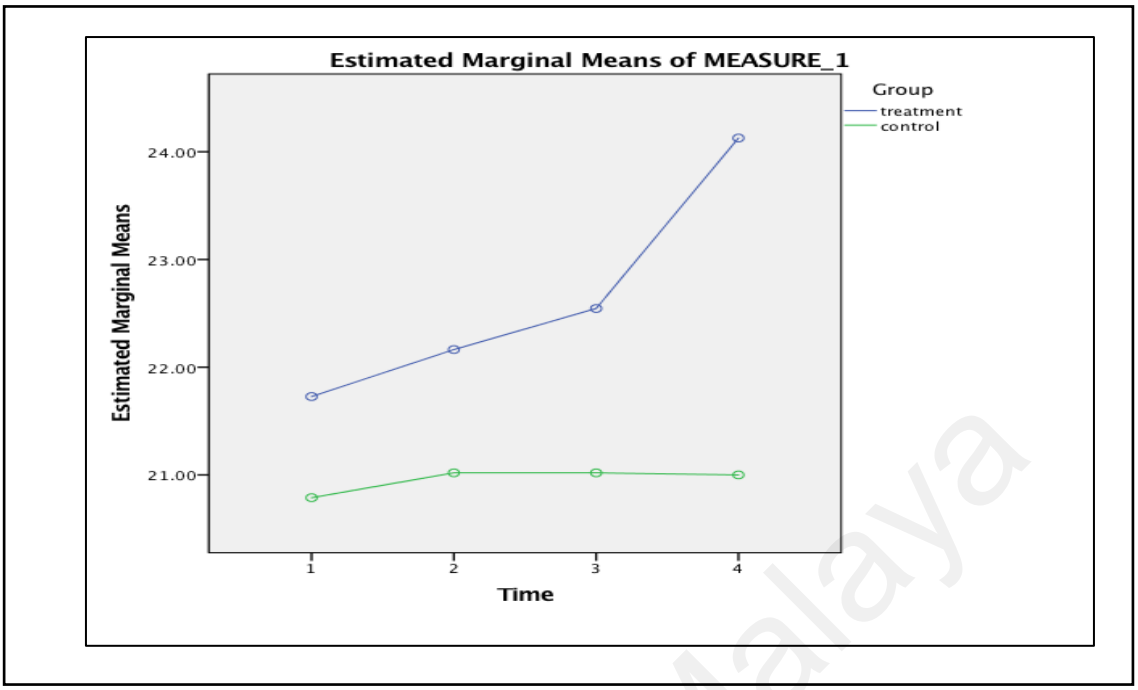

Figure 4. 10: The change of mean plot of environment domain of WHOQoL-BREF between groups over time

According to the one-way repeated measures ANOVA test, all domains and the two general items of quality of life had significantly increased for participants in the treatment group. The two general items scored Wilks' Lambda=0.326, F(3,52)=39.915, P<0.001. The physical health domain scored Wilks' Lambda=0.370, F(3,52)=29.512, P<0.001, the psychological domain scored Wilks' Lambda=0.499, F(3,52)=26.588, P<0.001, the social relationships domain scored Wilks' Lambda=0.429, F(3,52)=71.801, P<0.001, and the environment domain scored Wilks' Lambda=0.374, F(3,52)=29.002, P<0.001. No significant improvement was found in the control group except in the physical health domain (Wilks' Lambda=0.843, F(3,49)=3.032, P=0.038) and the psychological domain (Wilks' Lambda=0.810, F(3,49)=3.821, P=0.015). Table 4.23 to Table 4.27 display the differences that occurred in every domain within the groups.

Table 4. 23：The change in the two general items of WHOQoL-BREF within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	Wilks' Lambda	F(3,52)	P	Mean (SD)	Wilks' Lambda	F(3,49)	P
Baseline	4.87 (1.656)				5.38 (1.123)			
1 month after intervention	5.64 (1.520)				5.40 (0.955)			
2 months after intervention	6.25 (1.294)	0.326	35.915	<0.001	5.40 (0.955)	0.978	0.368	0.777
3 months after intervention	7.00 (1.000)				5.44 (0.958)			

Table 4. 24：The change in the physical health domain of WHOQoL-BREF within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	Wilks' Lambda	F(3,52)	P	Mean (SD)	Wilks' Lambda	F(3,49)	P
Baseline	18.25 (3.307)				18.69 (1.976)			
1 month after intervention	18.56 (3.126)				18.85 (2.023)			
2 months after intervention	19.95 (2.697)	0.370	29.512	<0.001	18.87 (2.068)	0.843	3.032	0.038
3 months after intervention	21.80 (2.556)				18.94 (1.924)			

Table 4. 25：The change in the psychological domain of WHOQoL-BREF within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	Wilks' Lambda	F(3,52)	P	Mean (SD)	Wilks' Lambda	F(3,49)	P
Baseline	16.53 (3.248)				15.81 (1.869)			
1 month after intervention	16.75 (3.164)				16.13 (1.804)			
2 months after intervention	16.75 (3.164)	0.499	26.588	<0.001	16.23 (1.733)	0.810	3.821	0.015
3 months after intervention	18.87 (2.855)				16.19 (1.761)			

Table 4. 26：The change in the social relationships domain of WHOQoL-BREF within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	Wilks' Lambda	F(3,52)	P	Mean (SD)	Wilks' Lambda	F(3,49)	P
Baseline	8.53 (1.999)				8.52 (1.350)			
1 month after intervention	9.91 (1.295)				8.52 (1.321)			
2 months after intervention	9.91 (1.295)	0.429	71.801	<0.001	8.56 (1.243)	0.962	0.651	0.585
3 months after intervention	9.91 (1.295)				8.52 (1.321)			

Table 4. 27： The change in the environment domain of WHOQoL-BREF within groups(N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	Wilks' Lambda	F(3,52)	P	Mean (SD)	Wilks' Lambda	F(3,49)	P
Baseline	21.73 (4.240)				20.79 (2.013)			
1 month after intervention	22.16 (4.008)				21.02 (2.192)			
2 months after intervention	22.55 (4.149)	0.374	29.002	<0.001	21.02 (2.128)	0.945	0.959	0.420
3 months after intervention	24.13 (3.215)				21.00 (2.178)			

4.2.4 Treatment Effect of Combined Music and Tai Chi Therapy on Physical Mobility

To address the research question of "Will combined music and Tai Chi therapy be useful in enhancing the mobility of older adults with depression?" the results of the Split-plot ANOVA test are examined. According to the result of the analysis, there is a significant interaction between time and between groups over time ($F(3,315)=43.169$, $P<0.001$). Table 4.28 presents the difference of change in mean value over time and the interaction between groups. Figure 4.11 displays the mean plot to indicate that there is no significant difference between the groups at baseline whereas the control group showed no change over time. However, the physical mobility of the treatment group improved significantly over time. This indicates that the combined music and Tai Chi therapy has effectively enhanced the physical mobility of the community-dwelling older participants.

Table 4. 28: Split-plot ANOVA analysis for the effect of combined music and Tai Chi therapy on TUG (N=107)

Physical mobility	Mean (SD)			*P*
	Treatment group (n=55)	Control group (n=52)		
Baseline	15.38 (3.200)	14.77 (3.227)		
1 month after intervention	14.02 (2.557)	14.67 (3.154)	43.169 (3,315)	<0.001
2 months after intervention	12.33 (2.597)	14.63 (3.100)		
3 months after intervention	11.56 (2.115)	14.58 (2.953)		

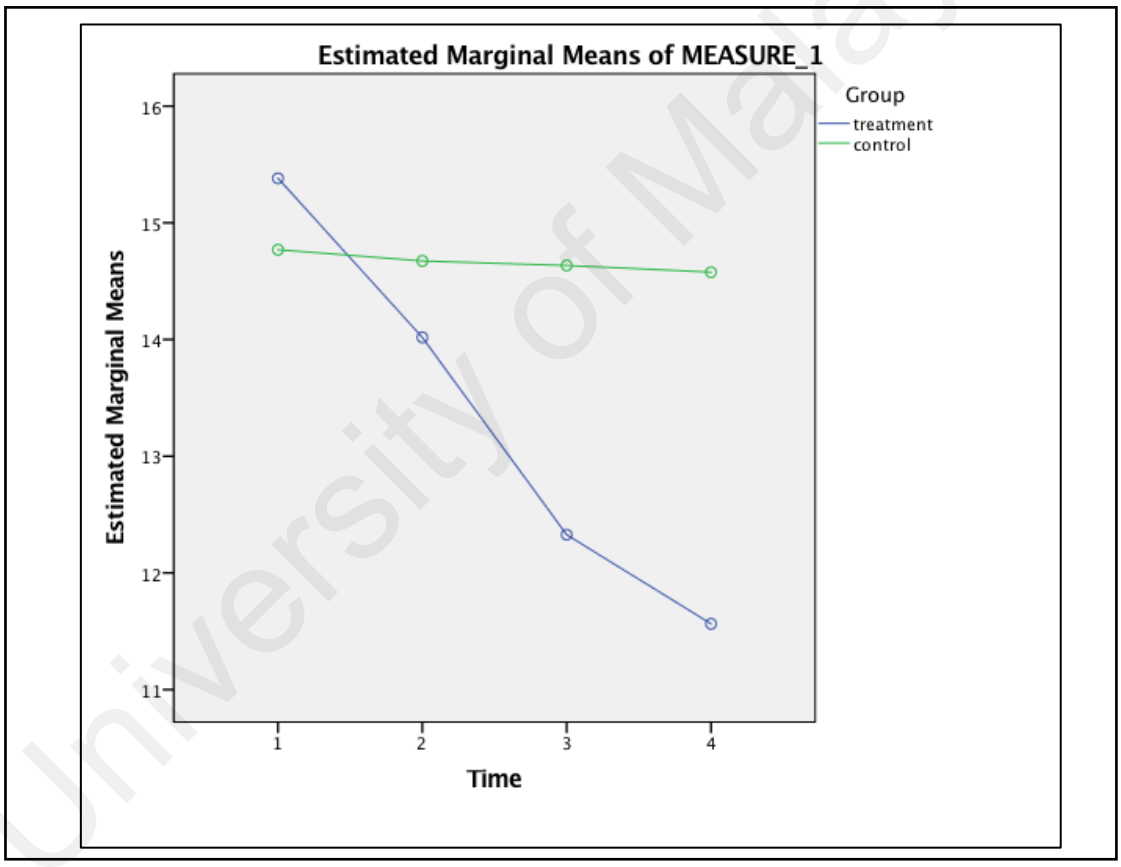

Figure 4. 11: The change of mean plot of TUG between groups over time

The result of the analysis within each group using the one-way repeated ANOVA measurement showed that the physical mobility of older participants from the treatment group had been significantly enhanced (Wilks' Lambda=0.371, F(3,52)=29.446, P<0.001) (Table 4.29). Meanwhile, in the control group (Table 4.29), participants' physical mobility did not change significantly over time (Wilks' Lambda=0.874, F(3,49)=2.353, P=0.083).

Table 4. 29: The changes in TUG within groups (N=107)

Time point	Treatment group (n=55)				Control group (n=52)			
	Mean (SD)	**Wilks' Lambda**	**F (3,52)**	**P**	**Mean (SD)**	**Wilks' Lambda**	**F (3,49)**	**P**
Baseline	15.38 (3.200)	0.371	29.446	<0.001	14.77 (3.227)	0.874	2.353	0.083
1 month after intervention	14.02 (2.557)				14.67 (3.154)			
2 months after intervention	12.33 (2.597)				14.63 (3.100)			
3 months after intervention	11.56 (2.115)				14.58 (2.953)			

4.2.5 True Effect of Combined Music and Tai Chi Therapy on Depressive Symptoms, Quality of Life, and Physical Mobility

Despite positive findings of the current study, the true effect of combined music and Tai Chi on depressive symptoms, quality of life and physical mobility are susceptible to the effects of sociodemographic data such as age, gender, marital status, living with family, chronic health problems, negative life events, employment before age 55 years, monthly income, exercise habit, and educational background. Thus, we adopted the Split-Plot ANOVA to measure the true effect of combined music and Tai Chi therapy on depressive

symptoms, quality of life, and physical mobility, with controlled sociodemographic data of age, gender, marital status, living with family, chronic health problems, negative life events, employment before age 55 years, monthly income, exercise habit, and educational background. The analysis confirmed the true effect of the combined music and Tai Chi therapy on depressive symptoms as F=41.725, P<0.001, R^2=0.574, quality of life as F=42.063, P<0.001, R^2=0.576) and physical mobility as F=22.990, P<0.001, R^2=0.426. Table 4.30 to Table 4.32 present the true effect of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility respectively.

Table 4. 30: True effect of combined music and Tai Chi therapy on GDS with controlled sociodemographic data (N=107)

Effect	F	df	P	R^2
Treatment*age	1.852	3,93	0.143	0.056
Treatment*gender	0.639	3,93	0.592	0.020
Treatment*marital status	0.752	3,93	0.524	0.024
Treatment*living with family	1.363	3,93	0.259	0.042
Treatment*chronic health problems	0.515	3,93	0.673	0.016
Treatment*monthly income	0.519	3,93	0.670	0.016
Treatment*employed before age 55	0.779	3,93	0.509	0.025
Treatment*negative life events	1.267	3,93	0.290	0.039
Treatment*exercise habit	1.584	3,93	0.199	0.049
Treatment*educational background	2.699	3,93	0.050	0.080
Treatment*group	41.725	3,93	<0.001	0.574

Table 4. 31: True effect of combined music and Tai Chi therapy on WHOQoL-BREF with controlled sociodemographic data (N=107)

Effect	F	df	P	R^2
Treatment*age	0.085	3,93	0.968	0.003
Treatment*gender	1.194	3,93	0.316	0.037
Treatment*marital status	0.730	3,93	0.537	0.023
Treatment*living with family	1.209	3,93	0.311	0.038
Treatment*chronic health problems	0.050	3,93	0.985	0.002
Treatment*monthly income	0.217	3,93	0.884	0.007
Treatment*employed before age 55	0.176	3,93	0.913	0.006
Treatment*negative life events	0.298	3,93	0.827	0.010
Treatment*exercise habit	0.361	3,93	0.782	0.012
Treatment*educational background	0.369	3,93	0.775	0.012
Treatment*group	42.063	3,93	<0.001	0.576

Table 4. 32: True effect of combined music and Tai Chi therapy on TUG with controlled sociodemographic data (N=107)

Effect	F	df	P	R^2
Treatment*age	0.116	3,93	0.951	0.004
Treatment*gender	0.360	3,93	0.782	0.011
Treatment*marital status	1.508	3,93	0.218	0.046
Treatment*living with family	1.982	3,93	0.122	0.060
Treatment*chronic health problems	0.008	3,93	0.999	0.000
Treatment*monthly income	0.341	3,93	0.796	0.011
Treatment*employed before age 55	0.547	3,93	0.652	0.017
Treatment*negative life events	0.853	3,93	0.469	0.027
Treatment*exercise habit	1.232	3,93	0.303	0.038
Treatment*educational background	0.822	3,93	0.485	0.026
Treatment*group	22.990	3,93	<0.001	0.426

4.3 Summary

This chapter first presented the results of the cross-sectional survey in phase 1, followed by the results of the cluster randomized controlled trial in phase 2.

To address the first research question of "What is the prevalence rate of depressive symptoms of community-dwelling older people?", the researcher used its proportion to describe the prevalence rate of depressive symptoms. 142 participants out of 454 were revealed to have depressive symptoms, and thus the prevalence rate of depressive symptoms was 31.3%. Among those, 105 participants (73.9%) were mildly depressed, 30 participants (21.2%) were moderately depressed, and 7 participants (4.9%) were severely depressed.

To address the second research question of "What are the overall quality of life and physical mobility of community-dwelling older people?", both mean and standard deviation were used to describe the levels of quality of life and physical mobility, of which were assessed using the measurement tools of WHOQoL-BREF and TUG. The total score of quality of life among the participants ranged from 47 to 123 (82.44 ± 13.483). The

score of general items by the participants ranged from 2 to 10 (6.39 ± 1.616). When converted into Percentage Scale Maximum (% SM), the average score was 53.7 ± 14.4 (ranged from 6 to 88), 55.6 ± 15.1 (ranged from 13 to 100), 55.9 ± 16.3 (ranged from 0 to 100), and 56.4 ± 14.2 (ranged from 19 to 94) for the domains of physical, psychological, social relationship, and environment respectively. The average score of TUG by the participants was 12.11 ± 3.745, with the time ranging from at least 4 to at most 25 seconds.

To address the third research question of "What is the relationship between depressive symptoms, quality of life, and physical mobility among community-dwelling older people?", Pearson's correlation was used to assess the relationship between these three variables mentioned above. Based on the results of the study, there is a strong negative correlation between depressive symptoms and the quality of life ($r=-0.657$, $p<0.001$), which indicated that higher levels of quality of life are related to lower prevalence of depressive symptoms. The study outcome also showed that there is a moderately positive correlation between depressive symptoms and the time taken to complete the TUG test ($r=0.511$, $p<0.001$), which meant the worse the physical mobility, the higher prevalence of depressive symptoms. According to the results, there is also a moderately negative correlation between the quality of life and the time taken to complete the TUG test ($r=-0.530$, $p<0.001$), which indicated that poor physical mobility was related to a poor quality of life.

To address the fourth research question of "What are the factors of depressive symptoms among community-dwelling older people?", the researcher chose the Structural Equation Modeling PLS to calculate these factors. The results showed that exercise habit affected depression the most ($\beta=-0.382$, $t=11.346$, $P<0.05$), followed by monthly income ($\beta=-0.254$, $t=8.043$, $P<0.05$), marital status ($\beta=-0.231$, $t=5.498$, $P<0.05$), negative life events

(β=-0.148, t=3.583, P<0.05), chronic health problems (β=-0.139, t=4.805, P<0.05), living with family (β=-0.111, t=2.976, P<0.05), and finally, gender (β=-0.086, t=2.615, P<0.05).

Furthermore, the Structural Equation Modeling PLS was also chosen to address the fifth research question of "What factors determine the quality of life among community-dwelling older people?" The results showed that exercise habit affected depression the most (β=0.382, t=9.999, P<0.05), followed by monthly income (β=0.182, t=4.970, P<0.05), chronic health problems (β=0.128, t=3.608, P<0.05), marital status (β=0.124, t=2.687, P<0.05), negative life events (β=0.097, t=2.270, P<0.05), employed before age 55 (β=0.096, t=2.353, P<0.05), and finally, living with family (β=0.093, t=2.549, P<0.05). In the phase of the cluster randomized controlled trial, the researcher addressed the remaining three research questions through the exploration of the effect(s) of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. The research results indicated that the treatment had significantly reduced depressive symptoms (F(3,315)=69.661, P<0.001), enhanced the quality of life (F(3,315)=112.213, P<0.001), and improved physical mobility (F(3,315)=43.169, P<0.001). The two general items and the other four domains of the quality of life were also computed in detail. In addition, the researcher also displayed the mean plots to show the interaction between groups over time. The one-way repeated ANOVA measurements were used to compute changes in depressive symptoms, quality of life, and physical mobility within each group. All three variables improved significantly for those in the treatment group, whereas those in the control group experienced no significant changes.

Considering the effects of the sociodemographic data on the true effect of the intervention on depressive symptoms, quality of life, and physical mobility, the researcher exerted an extent of control over the sociodemographic data while computing the Split-Plot ANOVA

test. The analysis confirmed the true effect of the combined music and Tai Chi therapy on depressive symptoms as $F=41.725$, $P<0.001$, $R^2=0.574$, the quality of life as $F=42.063$, $P<0.001$, $R^2=0.576$, and the physical mobility as $F=22.990$, $P<0.001$, $R^2=0.426$.

CHAPTER 5: DISCUSSION

5.1 Introduction

The aim of this chapter is to discuss the findings of this study and to compare them with the findings of previous studies. This chapter also provides rationales for the results and explains how the results would add new knowledge to the present field of nursing.

5.2 The Prevalence Rate of Depressive Symptoms Among Community-Dwelling Older Persons in Southwest China

This study determined the prevalence rate of depressive symptoms among community-dwelling older persons in Southwest China at 31.3%. Most of the participants displayed symptoms of mild to moderate depression, with only 4.9% of these depressed older persons experiencing severe depressive symptoms. The findings are consistent with some of the previous studies that were carried out in China. According to the meta-analysis that included 81 articles, the prevalence of depressive symptoms among older persons in China is at 23.6% (Li, Zhang, Shao, Qi, & Tian, 2014). Meanwhile, Yunming et al. (2012) reported the prevalence of depressive symptoms amongst community-dwelling older persons in Xi'an China at a rate of 27.0%. This particular finding is the closest to the study. The researcher has reason to believe as such because both Xi'an and Sichuan fall within the region of western China. It is noticed that in the study by Yunming et al. the prevalence of depressive symptoms was slightly lower than that of this study. This minor difference in percentages may be due to the occurrence of urban migration in Ya'an City, where this study was carried out. Another study revealed the prevalence rate of depressive symptoms in Shanghai as at 35.1% (Wang, Song, Chen, Wang, & Ling, 2015), a

percentage much higher than 31.3%. However, it is important to note that the participants in Wang's study were all older persons suffering from Type II diabetes, and thus may be the factor to result in higher prevalence of depression. On the other hand, there conducted a population-based study which included 4945 Chinese older persons that revealed a 39.86% prevalence rate of depressive symptoms (Yu, Li, Cuijpers, Wu, & Wu, 2012). This particular study adopted the Center for Epidemiologic Studies Depression Scale as its measurement tool instead of the Geriatric Depression Scale as in this study. Other studies from various countries disclosed different prevalence rates of depressive symptoms amongst older persons. For example, Japan rates at 16.9% (Yoshida et al., 2015), Singapore rates at 21.1% (Tiong, Yap, Huat Koh, Phoon Fong, & Luo, 2013), India rates at 39.1% (Nakulan, Sumesh, Kumar, Rejani, & Shaji, 2015), while the Western countries rate at 16.52% (Volkert, Schulz, Härter, Wlodarczyk, & Andreas, 2013). In comparison to the findings, the older persons in China reported a higher prevalence of depressive symptoms than other developed countries, but a lower prevalence than other developing countries such as India. This report is consistent with another finding of this study, that the economic status is an essential predictor of depressive symptoms.

5.3 Quality of Life of Community-Dwelling Older Persons in Southwest China

The results of this study indicate the total mean score of the quality of life at 82.44 ± 13.483, the mean score of %SM at 53.7 ± 14.4 (ranged from 6 to 88), 55.6 ± 15.1 (ranged from 13 to 100), 55.9 ± 16.3 (ranged from 0 to 100), and 56.4 ± 14.2 (ranged from 19 to 94) for the physical, psychological, social relationship, and environment domains respectively. The total score of the quality of life is much lower compared with the study from Finland, which they reported a total score of 100.31 ± 11.8 (Rantakokko, Portegijs, Villjanen, Iwarsson, & Rantanen, 2013). The findings resemble more to the findings of a

study carried out in rural Brazil (Gambin, Molzahn, Fuhrmann, Morais, & Paskulin, 2015). In this particular study, the score of the physical health domain was 63.5 ± 12.2, the score of the psychological domain was 67.3 ± 9.2, the score of the social relationship domain was 74.5 ± 11.4, and the score of the environment domain was 64.7 ± 8.3. Although the two studies were from different countries, their participants share a similarity in locale, they were all from the rural parts of a developing country. Hence, this factor may be the reason why these findings are similar. Compared to another study (Liang, 2016) carried out from the same province of Sichuan, China, the quality of life demonstrated in this study was a much higher rate. Liang reported that the physical, psychological, social, and environmental domains of the quality of life for the study were 39.88 ± 22.41, 39.83 ± 23.73, 42.00 ± 25.77, and 39.62 ± 22.57 respectively. The variance in research findings may be due to the difference in the background of the participants. While this study may have involved community-dwelling older persons, Liang's study involved participants who were all survivors of two earthquakes. Chingu, Duncan, and Amosun (2013) from Malawi also reported similar results to this study (25.2 ± 5.1, 17.2 ± 4.1, 9.3 ± 1.8, and 19.6 ± 3.8), although their scores were not converted to raw scores. In comparison, their environmental domain result is much lower than this study.

5.4 Physical Mobility of Community-dwelling Older Persons in Southwest China

The results of this study revealed that the average time that the participants spent on completing the Timed Up and Go test, were 12.11 ± 3.745 seconds. The finding was similar to the study by Kwok et al. (2011) that was carried out in Hongkong, 12.9 ± 6.9 seconds and the study by Chen from Taiwan (Chen & Tang, 2016), 12.0 ± 5.0 seconds. Furthermore, the findings from current study were also similar to another study from America, 11.48 ± 5.29 seconds (Kelley, Aaron, Hynds, Machado, & Wolff, 2014), and

Spain, 11.5 ± 5.3 seconds (Benavent-Caballer et al., 2016).Thus, the physical mobility of older people in this study was nothing different.

5.5 The Indictors of Depressive Symptoms

According to the results of current study, it is revealed that gender, marital status, living situation, chronic health problems, negative life events, economic status, and exercise habit have the ability to affect the prevalence of depressive symptoms.

The study findings have supported that the female gender as one of the protective factors against depressive symptoms whereas the male gender as one of the risk factors for depressive symptoms. What is meant by this statement is the claim that males are more likely to develop depressive symptoms than the females, at least pertaining to this study. The findings on the subject matter were relatively similar to Jang's result of a study carried out in South Korea (Jang et al., 2009). The particular study disclosed that males living alone have high risks of developing depressive symptoms, despite the study's finding differing from other previous studies. There are two studies of such. Regan, Kearney, Savva, Cronin, and Kenny (2013) analysed 8175 older adults in Ireland whose results indicated the female as more likely to have depressive symptoms than the male, as is similar the results of another study from Germany (Apostolopoulou et al., 2014). The two aforementioned studies were from European countries, whereas this study was carried out in the rural parts of China. Therefore, the difference of the participants' cultural backgrounds may be the cause to lead to the variance in findings. In accordance with the Chinese tradition, it is the responsibility of the male to support the whole family, especially in the practice of tradition by the population of rural China (Zimmer, 2003). Hence, that may be the reason as to why males, more often than not, experience higher

levels of stress than females. On the contrary, there are also studies which have disclosed that gender has no impact on depression whatsoever (Forlani et al., 2014; Takkinen et al., 2004).

The results of this study indicated that married older persons were less likely to develop depressive symptoms compared to those who were single, divorced or widowed. The findings were consistent with a previous finding (Takkinen et al., 2004). As to our understanding, older persons who are married have the privilege to receive support beyond the physical (social, mental, emotional) from their spouse and are able to provide similar support in return. Hence, they need not be burdened with navigating through life experiences alone and are empowered through the feelings of self-worth when others would rely on them. This companionship would enable them to feel connected compared to those who live devoid of relationship and thus affect their mood, which in turn would further affect their response to this study.

This study disclosed that older persons who lived with family members were less likely to develop depressive symptoms compared to those who lived alone. The findings are coherent to a previous study (Kim & Lee, 2015). Similar to reasons stated earlier under marital status, the human being is not made to exist alone. The family is the most fundamental structure of a community. One is needed to interact and to feel a sense of belonging, even more so when at a stage of life of such vulnerability. Moreover, a study from Japan goes to the extent to report the practice of eating alone as connected to depression (Tani, Sasaki, Haseda, Kondo, & Kondo, 2015). This finding may perhaps support this finding indirectly.

According to the findings of this study, it is revealed that the health situation of the participants had affected their self-reporting depressive symptoms. It is shown that older persons suffering from chronic health problems were more likely to report of depressive symptoms compared to those who were not suffering from any chronic health problems. Previous studies also reported that a better health condition was connected with a lower risk of depressive symptoms (Kim & Lee, 2015; Takkinen et al., 2004). From here on, it is learned that both physical health and psychological health have the ability to impact each other, which would explain as to why those older persons with chronic health problems were more likely to report of depressive symptoms. On the other hand, there is another deduction as to why those with chronic health problems would be more likely to report of depressive symptoms. These older persons with chronic health problems would require having a larger expenditure to cover the cost of their treatments, especially when the targeted country of China is facing the contradict of a higher demand yet a lower supply of medical resources. This financial responsibility will certainly aggravate their psychological burden, manifesting itself in the forms of depressive symptoms.

The study's results showed that older persons who have had experiences of negative life events within the past three years were at higher risk to suffer from depressive symptoms compared to those who have none. This finding are congruent with the findings of other research studies (Ballas & Dorling, 2007; Marum, Clench-Aas, Nes, & Raanaas, 2014). Generally speaking, negative life events would consequently require the affected older persons to adjust their behaviours within their daily lives to adapt to these unfortunate changes. It is especially in such moments of an overloading of changes, occurring within a short period of time, that it may severely burden the individual's ability to cope (Thoits, 2010). When coping with negative life events, a number of internal and external factors

are needed, of which these factors may function as buffers for the older persons' mental wellbeing (Marum et al., 2014).

The results of current study revealed that older persons who had higher monthly income were less likely to report of depressive symptoms. This finding was similar to a number of previous studies (Ahnquist & Wamala, 2011; Ballas & Dorling, 2007; Takkinen et al., 2004). Economic problems greatly restrain the older persons' life choices and create a substantial amount of uncertainty for them, their families, and their current and future prospects (Ahnquist & Wamala, 2011). This concern is especially true for the participants of this study, as all of them were from the rural regions of China. It is logical to deduce as such because finance plays a large role being involved in a range of daily life decisions. Therefore, financial concerns are likely to constitute a consistent or recurrent daily hassle to society, what more, to a population with the uncertainty of monthly income.

According to the findings, older persons who exercise more would report of themselves suffering from fewer depressive symptoms. On the contrary, older persons who exercise less throughout their week would have a higher risk of having depressive symptoms, a finding which is in congruence with previous findings (Blake, Mo, Malik, & Thomas, 2009; Paulo et al., 2016; Vallance et al., 2011). Depressive symptoms are related to the subsequent declines in the practice of physical activity as well as an increased engagement in sedentary behaviour (Roshanaei-Moghaddam, Katon, & Russo, 2009). When older persons are engaged in appropriate exercise, their physical health and social relationship are as well promoted (Meneguci, Sasaki, Santos, Scatena, & Damião, 2015), which may act as a protector of psychological health.

5.6 The Indictors of Quality of Life

According to the results of this study, the indictors of marital status, living situation, health, negative life events, economic status, employed before age 55 years, and exercise habit have affected the participants' quality of life.

This study had revealed that older persons who were married had a higher level of quality of life compared to those who were single, divorced or widowed. Previous studies have confirmed the same effect of marital status on the quality of life (Han, Park, Kim, Kim, & Park, 2014). Furthermore, married people were also reported to have improved mental health compared to those who were single, divorced, or bereaved (Bierman, 2009). Much of the psychological impact may be due to the lack or the absence of a social relationship developed with the spouse.

As this study has shown, older persons who were found to be living with family have a better quality of life compared to those who do not live with their family and live alone. The finding was congruent with the findings of previous studies (Ladusingh & Ngangbam, 2016; Van Minh, Ng, Byass, & Wall, 2012). Among which, one of the former studies was carried out in India and another was carried out in Sweden. As to our understanding, the reason why living with family could improve the quality of life may be that one would have the daily privilege of the company, social connection, and support from family members. On the other hand, there were also studies which disclosed the fact of living with family to have no impact on the quality of life (Yamout et al., 2013; Yoon, Kim, Lim, Lee, & Choi, 2015). Both studies with the above results were studies from developed countries of South Korea and America.

The difference in results may be due to the difference in cultures and lifestyles between the developing countries the and developed countries. In accordance with the Chinese tradition, living with family is one of the most important aspects to keep to in one's life. One may further to state that living with family is an important criterion towards happiness in life.

As this study had disclosed, older persons without chronic health problems had a better quality of life compared to those who suffered from chronic health problems. This finding is consistent with the findings of a few previous studies. A study carried out in South Korea (Yoon et al., 2015) reported that diseases such as cancer would impact the health-related quality of life. Meanwhile, in the general vicinity of Asia, it was also reported that the quality of life was related to chronic health problems (Thumboo et al., 2003). Moreover, a systematic review which included 31 studies and 22,335 patients disclosed that chronic health problems such as rheumatoid arthritis would impact the quality of life (Matcham et al., 2014).

According to the findings, those who have had experiences of negative life events within the past three years were shown to have been effected in the aspect of quality of life. Within the context of this study, an older person who has had no negative life events reported a better quality of life than those who had. This finding is consistent with Marum's study (Marum et al., 2014), that involved a population-based study in Norway that included more than 10,000 participants. This particular study found that negative life events were related to both psychiatric health and the quality of life. The findings were also congruent with other previous studies (Gardner & Oswald, 2006; Grote, Bledsoe, Larkin, Lemay Jr, & Brown, 2007).

The study concluded that older persons who received higher monthly incomes would have better qualities of life. Previous studies have had the same results, not only pertaining to the studies conducted in Asia (Ladusingh & Ngangbam, 2016; Van Minh et al., 2012) but in western countries as well (Ahnquist & Wamala, 2011).

As this study had disclosed, older persons who were employed before the age of 55 years had a better quality of life than those who were not employed. This finding is congruent with previous findings (Luhmann, Hofmann, Eid, & Lucas, 2012; Wanberg, 2012; Yamout et al., 2013). Being employed before the age of 55 years may help the older person to adapt to changes in life and may contribute to long-term effects on life satisfaction (Lucas, Clark, Georgellis, & Diener, 2004). Life satisfaction could be explained by probable reason where being unemployed would lead to feelings of helplessness and reduced self-esteem (Kokko & Pulkkinen, 1998).

According to this study, the practice of exercising more frequently every week was positively related to a better quality of life. This is consistent with previous studies (Ladusingh & Ngangbam, 2016; Yamout et al., 2013). Exercise may help older persons to get them into a better mood and feel socially connected. It is perhaps when exercising, one focuses the mind on the physical activity at hand, and thus neglects the worries and burdens which would trouble them when not. Hence, a frequent habit of exercise is correlated to the reports of a better quality of life.

5.7 Relationships Between Depressive Symptoms, Quality of Life, and Physical Mobility

According to the findings of this study, there is a strong correlation between depressive symptoms and the quality of life, a moderate correlation between depressive symptoms and physical mobility, as well as a moderate correlation between the quality of life and physical mobility. Older persons with depressive symptoms would have worse quality of life and lower physical mobility, which extends to those older persons who have worse quality of life to have worse physical mobility. A study that was carried in the western region of China reported similar results (Cao et al., 2016), of which had a similar study population with this study. There are also other studies from different countries which disclosed similar results (Hajek et al., 2015; Paulo et al., 2016; Rauf & Ali, 2015).

5.8 Impact of Combined Music and Tai Chi Therapy on Depressive Symptoms

This study disclosed that combined music and Tai Chi therapy was effective in reducing the severity of depressive symptoms among community-dwelling older persons in Southwest China. The average score of GDS had been reduced from 15.84 (4.479) before treatment to 13.31 (4.375) after 3 months worth of intervention.

Tai Chi was reported to be a safe exercise treatment to be practised amongst older persons with depressive symptoms (Yeung et al., 2012). Several studies have disclosed the positive impact of Tai Chi on depressive symptoms among older adults, not only in China (Chou et al., 2004) but also in America (Lavretsky et al., 2011). In China, Chou et al. (2004) allocated 14 older participants into two groups, where the treatment group accepted a 45-minutes Tai Chi intervention three times per week, lasting for 3 months. After 3-months intervention, the participants in the treatment group displayed significant

improvement in depressive symptoms when compared to those in the control group. In this study, the population and the intervention were relatively similar to those of the current study, however, its sample size was relatively small, with a total of only 14 participants. Meanwhile, in America, Lavretsky et al. (2011) recruited 73 older participants with depressive symptoms and allocated them randomly into two groups. Both groups were maintained under drug therapy throughout the whole study, with the only difference being that the treatment group were receiving supplementary Tai Chi exercise lasting 2 hours per week, in a consecutive 10-week worth of sessions. Their study reported that the complementary use of Tai Chi could help reduce depressive symptoms in older adults. Not to mention, a systematic review (Wang et al., 2010) which involved 10 studies and 2008 subjects confirmed the positive effect of 6 to 48 weeks of Tai Chi exercise on depressive symptoms among older persons. Although several studies have reported the positive effect of Tai Chi on depressive symptoms, there is still the presence of some controversial research findings. A review (Saeed, Antonacci, & Bloch, 2010) which summarized the available evidence of the effects of Tai Chi, Qi Gong, and meditation on depressive and anxiety symptoms reported that Tai Chi had not shown any effectiveness as an alternative treatment for depression and anxiety. A study (Yeung et al., 2012) that was carried out in America allocated 39 older Chinese-Americans with depressive symptoms into the treatment group and the waiting list group. The treatment was a 1-hour group-based Tai Chi exercise held twice per week lasting for 12 weeks consecutively. At end of this study, no significant relief on the depressive symptoms of the participants was detected. The difference between Yeung's study and current study may derive from the respective sample sizes which will affect the results of the data analysis. In Yeung's study, there was a total of 39 initial subjects, but 2 of them were lost to follow up. Therefore, the final subjects included in the data analysis was only 37. Moreover, folk music was added to the background during the span of the entire

intervention, which further proved that listening to music could help to relieve depressive symptoms (Chan, Chan, Mok, Tse, & Yuk, 2009; Chan, Wong, Onishi, & Thayala, 2012). In this study, we combined the Tai Chi exercise together with the act of listening to music and thus certified the possible synergistic effect of the two treatments in the control of depressive symptoms among community-dwelling older persons in Southwest China.

5.9 Impact of Combined Music and Tai Chi Therapy on Quality of Life

As current study had demonstrated, the combined music and Tai Chi therapy were effective towards enhancing the quality of life amongst depressed community-dwelling rural Chinese older persons. It is recorded that after the intervention, the participants' quality of life as a whole had enhanced from 69.91 (11.893) at the baseline to 81.44 (9.026). To further elaborate, the average score for the overall two items was enhanced from 4.87 (1.656) to 7.00 (1.000). In the physical health domain, the average score was enhanced from 18.25 (3.307) to 21.80 (2.556); in the psychological health domain, the average score was increased from 16.53 (3.248) to 18.87 (2.855); in the social relationship domain, average score increased from 8.53 (1.999) to 9.91 (1.295); and in the environment domain, average score increased from 21.73 (4.240) to 24.13 (3.215). The findings also disclosed that the two general items increased evenly every month, while the physical, psychological, and environment domains increased slightly in the first 2 months, but increased significantly in the third month. This statistic may be explained as a result of time-dose efficacy. Whereas in the social relationship domain, there was a significant enhancement in the first month, which later kept at the same level during the 2 months after. In the account of this study's group setting, the depressed older persons participated into Tai Chi exercise in groups within their communities and thus would provide them more opportunities to communicate with each other and to help them make

friends with those who suffer from the same depressive symptoms. After 1 month worth of group-based Tai Chi exercise, the elderly had managed to build their own connections, hence the social relationship domain did not change in the later 2 months.

The finding of the aforementioned is supported by the findings of previous studies. In Hong Kong, China, a study which involved 139 residents confirmed the effect of a 26-week's Tai Chi programme on the quality of life (Lee, Lee, & Woo, 2009). Tai Chi can be best matched to the older Chinese residents' cultural belief if compared to other types of exercise which operate on the basis of western mechanisms (Lee, Lee, & Woo, 2007). In Asia, a study carried out in South Korea also confirmed the positive effect of an 8-week Tai Chi exercise on the quality of life (Lee et al., 2009). Furthermore, a study which recruited 33 community-dwelling older Americans also demonstrated the effectiveness of a 12-week Tai Chi programme on the quality of life (Hartman et al., 2000). Another study recruited a larger sample size of 145 community-dwelling older Americans also reported the same effect of a 12-week Tai Chi programme on the quality of life (Taylor-Piliae et al., 2014).

In the meantime, studies from Hong Kong (Lee, Chan, & Mok, 2010) and Australia (Cooke, Moyle, Shum, Harrison, & Murfield, 2010) have had consistent results with current study, that is to show that listening to music could help older persons to enhance their quality of life. Apart from those mentioned, there are several other studies that explored the effect of combined music and exercise therapy on the quality of life, their results are all in congruence with the finding. Hui, Chui, and Woo (2009) allocated 111 community-dwelling Chinese older persons into either the treatment group or the control group. The treatment group accepted 12 weeks of low impact aerobic dance with music

playing as background, and thus found that the dance exercise had effectively enhanced the older persons' quality of life. Moreover, a meta-analysis (De Dreu, Van Der Wilk, Poppe, Kwakkel, & Van Wegen, 2012) based on 6 RCTs had confirmed the positive effect of music-based movements on the quality of life.

5.10 Impact of Combined Music and Tai Chi Therapy on Physical Mobility

As the present study had disclosed, the combined music and Tai Chi therapy were effective in enhancing physical mobility amongst depressed community-dwelling rural Chinese older persons. After the three months intervention, the older persons' average time spent on completing the TUG test was decreased from 15.38 (3.200) at the baseline to 11.56 (2.115).

The finding was congruent with most of the research findings from previous studies. Researchers Zhang, Ishikawa-Takata, Yamazaki, Morita, and Ohta (2006) recruited 49 community-dwelling Chinese older persons, in which their study disclosed that the 8-week intensive Tai Chi training could help older adults to improve their physical mobility. There was also similar research finding obtained from studies conducted in Western countries (Ballard et al., 2016; L. Li & Manor, 2010; Taggart, 2002). According to a systematic review (Chen, Zhang, Wang, & Liu, 2016), more than 150 minutes' Tai Chi exercise lasting for more than 15 weeks could effectively help to improve physical mobility. In addition, Tai Chi is reported to be a safer and more effective way to improving physical mobility when compared to other regular exercises (Yıldırım, Ofluoglu, Aydogan, & Akyuz, 2016). Although the findings are consistent with most studies, a study (Gao et al., 2014) carried out in the same region of western China did not find a significant impact of Tai Chi on physical mobility. In Gao's study, the participants

were Parkinson's patients, thus vastly different when compared to the community-dwelling older persons with depressive symptoms of this study. Moreover, the current study did employ the use of Chinese folk music as background when the participants were practising Tai Chi, as listening to music was reported to be helpful in improving the physical mobility of older persons (Chaiwanichsiri, Wangno, Kitisomprayoonkul, & Bhidayasiri, 2011; Garza-Villarreal et al., 2014).

5.11 Summary

The present study determined that the findings of the prevalence rate of depressive symptoms, participants' quality of life, and physical mobility were similar to most of what previous studies have found. In regards to the indictors of depressive symptoms, the findings were proven as slightly different. Based on the factors of region and cases of urban migration, it was found that the male gender was more likely to report of depressive symptoms than the female. Further multi-centre studies are needed to certify this finding.

In congruence with the James-Lange Theory, this study has shown that the depressed older persons were accepting of group-based Tai Chi exercise with Chinese folk music as background. The therapy has helped these elderly to feel socially connected. Both Tai Chi and music have helped to calm the participants, allowing them to experience emotions of happiness and relaxation. Based on these arousal of both physical and psychosocial aspects, the participants reported the improvement in depressive symptoms, quality of life, and also physical mobility.

CHAPTER 6: CONCLUSION

6.1 Introduction

Depressive symptoms are common amongst older persons, which have increasing social and economic burden. In China, the phenomenon of ageing is occurring at rather, a faster rate than any other countries worldwide (Wei, 2017). Therefore, implementing healthy ageing policies to reduce the potential economic and social burden is warranted.

As the current study's result has demonstrated, the prevalence rate of depressive symptoms in Southwest China is 31.3%, a much higher rate than other developed areas in China. Yet, this statistic is fairly consistent with previous studies that have been carried out in other rural parts, worldwide (Tiong, Yap, Huat Koh, Phoon Fong, & Luo, 2013; Nakulan, Sumesh, Kumar, Rejani, & Shaji, 2015). Older persons' quality of life and physical mobility were also at a lower level compared to data obtained from the developed areas worldwide. This study had also confirmed the correlation between depressive symptoms, quality of life, and physical mobility.

Sociodemographic data were proven to have an impact on depressive symptoms and the quality of life. The female gender, married, living with family, no chronic health problems, no negative life events, higher monthly income, and exercising more were the protective factors against depressive symptoms among the participants. On the other hand, the male gender, divorced or widowed, living alone, having chronic health problems, having negative life events, lower monthly income, and exercising less were the risk factors for depressive symptoms. The results also revealed that married, living

with family, no chronic health problems, no negative life events, higher monthly income, employed before age 55 years, and exercising more were the protective factors of quality of life. Meanwhile, single, divorced or widowed, living alone, having chronic health problems, having negative life events, lower monthly income, not employed before age 55 years, and exercising less were the risk factors of quality of life.

A 50-minute session of the 24-movements Yang's Tai Chi with Chinese folk music playing in the background was held 3 times per week, lasting for 3 consecutive months proved effective in reducing depressive symptoms, enhancing the quality of life and physical mobility in community-dwelling older persons living in the Southwest region of China.

6.2 Strengths and Limitations

Strengths: This study adopted the cluster randomized controlled design so errors could be better controlled. Second, this study recruited a large sample size to determine the prevalence rate of depressive symptoms, quality of life, and physical mobility, of which the sample size was also used to determine the effect of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. Third, this study used a single blinded design, where the accessors were blinded while collecting data to avoid subjective bias. Finally, this study used repeated measures, which enabled us to assess the time-dosage effect of the treatment.

Limitations: It was impossible to govern the participants in this study because the researcher could not control their social activities. Instead, this study adopted the single-blinded design to avoid any chances of contamination between the two groups.

This study only recruited participants in Ya'an City of Sichuan Province, Southwest China, thus resulting in a conclusion that is limited from predicting the prevalence rate of depressive symptoms among other community-dwelling older person in other parts of China.

This study did not make the effort to explore the effect of Tai Chi and music respectively, and thus unable to distinguish what value was contributed by Tai Chi, and what value was contributed by music. This concern will be deeply explored in further studies.

6.3 Implications for Nursing

The findings of this study may illustrate some research concerns related to healthy ageing in China and the prospective measures that may be implemented in the administration and practice of nursing.

6.3.1 Nursing Administration

This study addressed the high prevalence rate of depressive symptoms, as well as the lower levels of quality of life and physical mobility among older persons in Southwest China. Thus, nursing administrators should pay more attention to depressive symptoms, quality of life, and physical mobility among community-dwelling older citizens, to assist the family. The social and economic burden caused by depressive symptoms, the complications of depressive symptoms, and the pressure of their family members should not be ignored as well.

Second, the findings of this study identified the impact of the sociodemographic characteristic on depressive symptoms and on the quality of life. In addition, the relationship between depressive symptoms, quality of life, and physical mobility were ascertained. Hence, nursing administrators are advised to pay considerate attention towards the aforementioned major factors as to prevent depressive symptoms and to those who display the relevant risk factors as to reduce the prevalence rate of depressive symptoms, which would, in turn, enhance the quality of life and physical mobility of older persons.

Third, this study ascertained the positive effect of combined music and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. Nursing administrators are suggested to practise this doable, easy-to-achieve, and economical treatment, so as to make efficient use of the professional medical and nursing resources, and then to redirect them into areas of more dire need. This treatment may even fill the huge gap between the demand and supply of health resources in China, especially to those areas with lower levels of economy and medical care services.

Finally, it is recommended that nursing administrators employ community workers and volunteers skilled in Tai Chi to deliver exercise programs to community-dwelling older people. This social activity would help them keep a healthy lifestyle, which in turn prevents or reduces depressive symptoms, and further enhances their quality of life and physical mobility. This is the easiest and most cost-effective way to achieve the goal of healthy ageing.

6.3.2 Nursing Practice

There is a comparably low level of nursing resources in Southwest China that is channelled towards the community, like family visitation, community health record building, paying special attention to those living alone, sedated, of low income, single, divorced or widowed, having chronic health problems, experiencing negative life events within the past three years, and were unemployed before 55 years old. If such resources were allocated nurses should be better placed to identify older people exhibiting depressive symptoms and initiate interventions to limit the impact of those. Second, community nurses could set up a timetable for every community for older residents to participate in the group-based Tai Chi exercise at their convenience, to reduce or prevent depressive symptoms, as well as to enhance the quality of life and physical mobility. By shifting the area of focus from the clinic to the community, the coverage of limited nursing resources is broadened. Finally, it is recommended that Tai Chi should be promoted as routine cost-effective health education intervention program for community-dwelling older Chinese people. Hence, it empowers everyone with the knowledge to aid themselves and their family, friends, and relatives.

6.4 Recommendations for Future Research

As the present study was limited because of the research design, future studies adopting a double-blinded design are recommended. Moreover, further multi-centre studies are needed to certify whether the combined music and Tai Chi therapy would have the same positive effect as it did in the current study in Southwest China. The nursing field would benefit greatly as well from studies that explore the long-term effects of combined music

and Tai Chi therapy on depressive symptoms, quality of life, and physical mobility. Hence, follow up studies conducted over a longer period will be required.

6.5 Summary

To summarise, older persons in Southwest China have higher chances of reporting depressive symptoms, as well as lower levels of quality of life and physical mobility, with the three situations affecting one another. Sociodemographic data were also proven to affect the prevalence rate of depressive symptoms, quality of life, and physical mobility. A 50-minute session of the 24-movements Yang's Tai Chi with Chinese folk music playing in the background, conducted 3 times per week, lasting for 3 consecutive months was found effective in reducing depressive symptoms, as well as in enhancing the quality of life and physical mobility in community-dwelling older persons living the Southwest region of China. Furthermore, this study illustrated the effect of a much easily achieved, economical way of preventing and treating depressive symptoms, and enhancing quality and physical mobility.

The findings of this study enable nurses and nurse administrators to have a better understanding of the current prevalence rate of depressive symptoms and the sociodemographic data's impact on depressive symptoms and the quality of life. It is hoped that this knowledge will guide nurses in practice, especially in the community field, to recognize depressive symptoms in advance, to redirect clinical treatment into prevention, build a cost-effective, easy-to-achieve, wide-coverage method of dealing with depressive symptoms, quality of life, and physical mobility. The current study also hopes for every community dweller to help themselves, which would, in turn, allow for the comparably limited nursing resources to be used more efficiently.

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LIST OF PUBLICATIONS AND PAPERS PRESENTED

Liao, S.J., Chong, M.C., Tan, M.P., Chua, Y.P.(2018).The effect of combined music and Tai Chi on depressive symptoms among community-dwelling older people in China, *Issues In Mental Health Nuring*, Accepted.

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