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Author

Chen, Shu-Ming

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**EFFECTS OF A MOTIVATIONAL INTERVIEW  
INTERVENTION ON PEOPLE WITH TYPE II DIABETES IN  
TAIWAN – A RANDOMIZED CONTROLLED TRIAL**

by

**SHU-MING CHEN**

RN, Dip.N, BN, MN

A thesis submitted in fulfillment of the requirements of the degree of

**Doctor of Philosophy**

To the School of Nursing and Midwifery, Faculty of Nursing and Health, Griffith  
University

April 2008

## STATEMENT OF ORIGINALITY

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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## SYNOPSIS

Type II diabetes is a serious problem in Taiwan. The prevalence of Type II diabetes in the whole population is between 5 to 10% and 11% in people over 45 years of age. Diabetes is the fifth leading cause of death, and care costs are 4.3 times higher than for people without diabetes. Self-management is the cornerstone of diabetes control. Failure to motivate or empower people to self-manage their diabetic condition has been identified as an important issue in research literature. Developing effective and efficient strategies to promote self-management of diabetes is important in order to prevent serious complications. The aim of the present study was to determine whether participation in a Motivational Interview (MI) by Taiwanese people with Type II diabetes would improve their self-management and well being.

This three phase RCT included a small qualitative component. The sample was made up of 286 people from a large tertiary teaching hospital in Southern Taiwan. Participants were randomly allocated into either the MI group or the usual care group. Phase I provided baseline measures, phase II the intervention and phase III involved re-testing to establish the effectiveness of the intervention at three months follow-up. Content of the interview was modified according to an assessment of participant's Stage of Change; an approach underpinned by the Transtheoretical Model (TTM). The Motivational Interview (MI) encompassed a variety of interviewing and counselling techniques and information sharing. The control group was provided with usual care that included diabetes educational sessions and attendance at a Diabetes Club provided by hospital nursing staff.

Effectiveness of the intervention was measured according to Stage of Change, personal, psychological, social and metabolic variables. Variables were measured before and after 3 months after completion of the intervention. All measures had been used in previous studies with Chinese samples and had good reported internal consistency with Cronbach's alpha of between 0.76 and 0.98. Data were analysed using SPSS (version 13.0).

Results showed that the intervention group did improve significantly in Stage of Change ( $\chi^2= 7.77$ ,  $p= 0.005$ ; OR=0.151, 95% CI: 0.079 to 0.287), diabetes knowledge ( $\chi^2= 24.71$ ,  $p< 0.001$ ; OR=0.31, 95% CI: 0.15 to 0.65), diabetes self-management ( $\chi^2= 16.56$ ,  $p< 0.001$ ; OR=0.30, 95% CI: 0.16 to 0.54), diabetes management self-efficacy scores ( $\chi^2= 7.99$ ,  $p= 0.005$ ; OR=0.44, 95% CI: 0.24 to 0.80) and HbA1c levels ( $t= 4.25$ ,  $p< 0.001$ ; OR=0.42, 95% CI: 0.25 to 0.71) from baseline to 3 months follow-up, compared to the control group.

Over half (57%) of the intervention participants progressed in their Stage of Change from baseline to 3 months follow-up compared with only 17 % of participants in the control moving to the next stage. The findings indicated that the Stage of Change altered from contemplation to preparation or action stages. One very important finding related to demographic differences: the MI intervention was more effective for women, middle aged, and employed participants. These findings support the importance of tailoring diabetes interventions and education according to individual differences. Moreover, participants with higher levels of education obtained better glycemic control as a result of the MI intervention compared with the control group at 3 months follow-up. These findings support the importance of providing information in terms easily understood by individuals with low literacy levels. The findings provide important evidence concerning the effectiveness of MI in conjunction with the participants' readiness to change. This research informs future clinical practice in diabetes self-management, and provides recommendations for further research in this area.

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## LIST OF ABBREVIATIONS

ADA	American Diabetes Association
BMI	Body Mass Index
BG	Blood Glucose
BP	Blood Pressure
CCT	Controlled Clinical Trial
C-DMSES	Diabetes Management Self-Efficacy Scale
CHD	Coronary Heart Disease
DASS	Depression Anxiety Stress
DCCT	Diabetes Control and Complications Trial
DCMM	Diabetes Case Management Model
DES	Diabetes Education Session
DSMI	Diabetes self-management Instrument
DMM	Diabetes Management Model
FBG	Fasting Blood Glucose
HbA1c	Glycated hemoglobin A1c
HDL	High-density Lipoprotein
HFI	HbA1c Fluctuation Index
IDDM	Insulin-Dependent Diabetes Mellitus
LDL	Low-Density Lipoprotein
MI	Motivational Interview
MOS-SSS-C	Medical Outcomes Study Social Support Survey
NIDDM	Non-Insulin-Dependent Diabetes Mellitus
RCT	Randomised Controlled Trial
RN	Registered Nurse
SMBG	Self-Monitoring Blood Glucose
SOC	Stage of Change
SRBG	Self-Recording Blood Glucose
TG	Triglyceride
TTM	Transtheoretical Model
UKPDS	United Kingdom Prospective Diabetes Study
WHO	World Health Organization
WHOQL	World Health Organization Quality of Life-brief

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## Publications and Presentations Derived From This Research

Chen, SM., Wollin, J., & Creedy, D. A pilot study of motivational interview in older adults with Type II diabetes. International Conference on Health Aging, October 2006, Taipei, Taiwan.

Chen, SM., Wollin, J., & Creedy, D. An evaluation of the effectiveness of a brief motivational interview on improving diabetes self-management in people with Type II diabetes in Taiwan. 13<sup>th</sup> Annual Qualitative Health Research Conference, June 2007, Seoul, Korea.

Chen, SM., Wollin, J., & Creedy, D. The effects of a motivational interview intervention on people with Type II diabetes in Taiwan- A randomized controlled trial. Gold Coast Health and Medical Research Conference, December 2007, Gold Coast, Australia (Poster).

# CHAPTER ONE

## INTRODUCTION

Diabetes is a condition characterized by excessive levels of glucose in the blood and inability of insulin to metabolized glucose. This disorder is caused by a decreased production of insulin by the beta cells in the pancreas, or by a decreased ability of the body to use insulin properly to metabolize glucose. Insulin is a hormone that is necessary for the body's cells to be able to use glucose. The cause of diabetes is unknown, but heredity and diet are believed to play an important role in its development (WHO, 1999). There are two common forms of this condition: Type I or formerly known as insulin dependent diabetes mellitus (IDDM); and Type II or formerly called non-insulin dependent diabetes mellitus (NIDDM). Type I diabetes is usually diagnosed in people under the age of 30 and usually requires frequent insulin injections. Risk factors for Type I diabetes include viral infections, autoimmune disease and a family history of diabetes. Type II diabetes usually occurs after the age of 40 years and usually has a gradual onset. Risk factors for Type II diabetes include obesity, family history of diabetes and age over 40 (ADA, 2003). Treatment requires self-management of the diet, regular exercise, medication and self-monitoring of blood glucose (WHO, 2004c). Around 90% of people with diabetes are Type II, and around 10% have Type I diabetes (WHO, 1999).

Diabetes poses a major threat to global public health. It is a leading cause of morbidity, mortality, and increasing health care costs worldwide. A growing number of intervention studies have been conducted over the past twenty years with the aim of promoting healthy clinical outcomes (targeting for example, HbA1c, blood glucose levels), and to attain better self-management and quality of life for people with diabetes. But there are many barriers to making and maintaining the necessary behavioural changes for successful management of diabetes.

Increased knowledge in patients leads to better adherence to diabetic treatment regimens. Diabetes knowledge is necessary but not enough to promote a healthy lifestyle. Diabetic regimens require the acquisition of new knowledge and skills as well as the adoption of many behavioural and lifestyle changes (Beebe & O'Donnell, 2001).



Harris (2000) indicated that around 50% to 80% of participants with diabetes had significant deficits in both the knowledge and skills needed to manage their condition. Harris (2000) found that glycated hemoglobin levels were higher than 8.0% and fewer than half the sample achieved ideal glycemic control hemoglobin of A1c < 7.0%. Harris (2000) reported that diabetes self-management was hindered by a range of personal, social and psychological circumstances. Many intervention studies have described how challenging it is for diabetics to maintain active self-management (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002; Norris, Engelgau & Narayan, 2001). Diabetes self-management depends not only on pre-requisite knowledge and technical skills needed to maintain self-management of their condition, but also on an individual's level of motivation to engage in and achieve a healthy lifestyle.

This introductory chapter will provide an overview of country of Taiwan, where this study was conducted. The global prevalence of diabetes and the burden of Type II diabetes in Taiwan will also be discussed. Next, current approaches to diabetes care in Taiwan will be outlined. Major intervention approaches and the impact of behaviour on the management of diabetes will be reviewed. The present study was based on the Transtheoretical Model (TTM) of change and used a Motivational Interviewing (MI) intervention to bring about better self management in participants. These topics and relevant studies will also be reviewed. The aim, significance, research questions, and hypotheses will be stated. An overview of the thesis will be provided.

## **1.1 Background**

### **1.1.1 An overview of Taiwan**

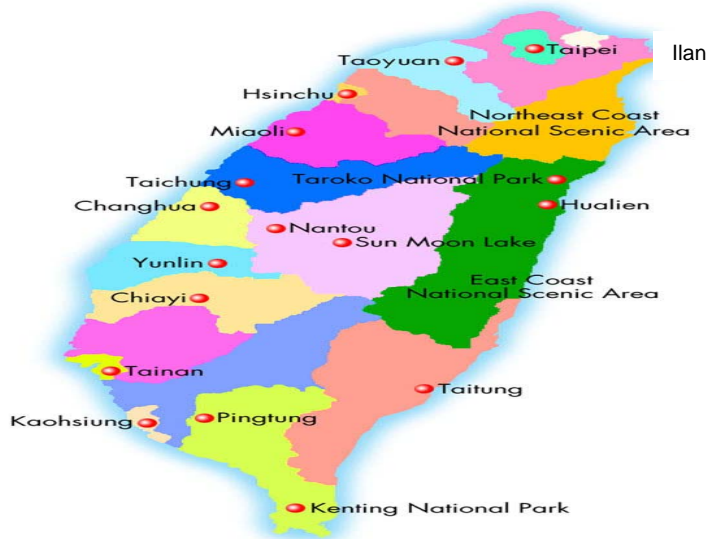
Taiwan is located in the Pacific Ocean about midway between Korea and Japan to the north and Hong Kong and the Philippines to the south. Taiwan has a total area of 35,967 square kilometres (Government Information Office, The Republic of China, 2007a). Taiwan is a developing country and has sixteen counties and seven municipalities. Taipei is the capital city. Taiwan has a population of 22.9 million (Government Information Office The Republic of China, 2007b). More than 18 million, of the 'native' Taiwanese, are descendants of Chinese who migrated from Fujian and Guangdong Provinces on the mainland. A large majority of people in Taiwan speak Mandarin Chinese but 'native' Taiwanese and many others also speak

one of the Southern Fujianese dialects (Min-nan, also known as Taiwanese). Taiwan's culture is a blend of its distinctive Chinese, Japanese, and Western influences. According to Taiwan's Interior Ministry, there are about 11.2 million religious believers in Taiwan, with more than 75% identifying themselves as Buddhists or Taoists (Government Information Office, The Republic of China, 2007b).

The life expectancy in 2002 was 73 years for males and 78 for females, with an average of 75 years. Taiwan has 18,228 medical care institutions, one physician for every 632 people, and 40 hospital beds for every 10,000 people. The majority of people (97%) have health care insurance provided by the government. Every major city has several large hospitals and every small town has a clinic (Government Information Office, The Republic of China, 2007c).



**Figure 1.1 Geographic location of Taiwan** (Source: Government Information Office, The Republic of China, 2007a)



**Figure 1.2 A map of Taiwan** (Source: Government Information Office. The Republic of China, 2007a)

### 1.1.2 Global burden of diabetes

Diabetes poses a major threat to global public health. The World Health Organisation (2004c) estimates that the number of people with diabetes will rise dramatically in the future. This increase has been attributed to the increasing proportion of aged people in the population, urbanisation, and increasing prevalence of obesity and physical inactivity.

There are two basic forms of diabetes: Type I diabetes and Type II diabetes (WHO, 1999). Most people with diabetes have Type II, which is consistently associated with obesity and physical inactivity. Indeed, Type II diabetes accounts for more than 90% of cases globally (WHO, 2004c). An accurate estimate of the prevalence of Type I diabetes is low compared with Type II (WHO, 2004c), so prevention of the latter remains an issue (WHO, 2004a).

In the next thirty years, it is projected that the global population of people with diabetes will gradually rise from 115 million in the year 2000 to 366 million in 2030 (WHO, 2004b). These figures point to the increasing public health burden of diabetes worldwide, a burden that will continue to increase in the future (WHO, 2004c). The increasing prevalence of Type II diabetes has also resulted in rising health care costs, medical complications, and other hardships for individuals. There is an urgent need to

decrease the prevalence of Type II diabetes and to effectively manage the condition to minimise the likelihood of adverse outcomes for individuals as well as costs to the health care system.

Estimates have shown that India, China, and the USA had the highest numbers of people with diabetes, and were identified as the ‘top three’ countries in 1995 (King, Aubert & Herman, 1998) and again in 2000, a situation that is expected to continue until 2030 (Wild, Roglic, Green, Sicree & King, 2004). Between 2000 and 2025, the Pacific Island countries are expected to report increasing prevalence of diabetes, while South-East Asian countries are predicted to exhibit the greatest rates of increase in Type II diabetes (WHO, 2004a).

Diabetes is becoming most pronounced in South-East Asian populations (Amos, McCarty & Zimmet, 1997). Specifically, the highest reported prevalence occurs in people of Chinese extraction in Singapore, Taiwan, and the People’s Republic of China (Zimmet, Alberti & Shaw, 2001). It is estimated that the number of people with diabetes in China will increase from 8 million in 1996 to more than 32 million by 2010 (Zimmet, 1999). Clearly, diabetes is a growing public health concern within Chinese ethnic populations.

### **1.1.3 The burden of diabetes in Taiwan**

The morbidity, mortality and financial costs of diabetes are important issues in Taiwan. According to the Department of Health, Taiwan, the overall prevalence rate for adults with diabetes is between 5 and 10%; and in people over 45 years old the prevalence is higher at 11% (Department of Health Taiwan, 1998). The total number of people with diabetes is estimated to be between 600,000 and 800,000 in a population of approximately 22 million; and this continues to increase (Department of Health Taiwan, 2004). Mortality rates associated with diabetes has increased five-fold over the past twenty years, and this trend is expected to continue to increase in Taiwan over the next twenty years (Department of Health Taiwan, 2003). The death rate from diabetes has been long-reported as fifth in the top ten leading causes of death in Taiwan (Department of Health Taiwan, 2004).

Apart from the morbidity and mortality associated with diabetes, the treatment of diabetes also imposes a particular financial burden on Taiwan. This has implications for continuing high health care costs, as diabetes accounts for more than 11.5% of total medical expenses in 1998 (about \$35 billion Taiwan Dollars ), which is 4.3 times more than the cost of care required for people without diabetes (Lin, Chou, Tsai, Lee & Tai, 2004). The personal burden of diabetes is also significant in terms of complications from renal disease, angiopathy, and cranial nerve disorders. More serious complications include renal dialysis, amputation, and blindness (Chen, Shaw, Tseng, Chen & Lee, 1997; Tsai, 1998; Tseng, 2004). The incidence of complications from diabetes has also risen rapidly and challenges individuals' quality of life (Wei, Sung, Lin, Lin, Chiang & Chuang, 2003).

Adherence to treatment regimens by people with diabetes is problematic. The Bureau of the National Health Insurance Taiwan (2001) showed that only 540,000 people with diabetes had taken medication as prescribed. Of all diabetics, 10% were not prescribed any medications (Lee, Lien & Chiue, 2001). Approximately 30 to 40% of people subsequently diagnosed with diabetes report that they did not recognise any of the symptoms of diabetes (Lee, Lien & Chiue, 2001). People who do not know they have diabetes may not seek advice from health professionals until related complications such as coronary artery disease, cerebrovascular disease, or peripheral vascular disorders have developed (Lee, Lien & Chiue, 2001). Strategies need to be put in place to prevent diabetes, assist in the timely diagnosis of diabetes and ongoing management in order to prevent complications (Lee, Lien & Chiue, 2001).

#### **1.1.4 Current approaches to diabetes care in Taiwan**

In order to prevent or delay complications, the Taiwanese health care system has been working towards effective models of diabetes care. There are three models for managing care in Taiwan: 'Diabetes Shared Care Model'; 'Disease Management'; and 'Case Management'. These are described below. In 1991 the Department of Health in Taiwan began a 'Diabetes Shared Care Model', which involved the establishment of a preferred providers' network, the application of standard treatment guidelines; modification of the service utilisation review criteria; reform of the payment system; and improved patient education (Lee, Lien & Chiue, 2001). The Diabetes Shared Care

Model was implemented in Ilan County in 1997 (Chiu & Lin, 2001), and in Kaohsiung, Changhua, and Chiayi Counties in 1998 (Chiu & Lin, 1999; Lin, 1997). Then, in 1999, 'a pre-evaluation of a diabetic disease management program based on the Shared Care Model' was followed by a similar model being adopted in Taoyuan. The Taoyuan program was based on an attempt to standardise care guidelines; establish a Preferred Providers' Network; reform the insurance payment system; improve patients' education; enhance the efficiency of diabetes care and reduce overuse of the medical system (Lai, 2002; Lee, Lien & Chiue, 2001; Lee, Lien & Lien, 2003; Liu, Chu & Chen, 2002).

The Shared Care Model, is a modified version of the American Diabetes Association (ADA, 2003) program (including regular screening that uses laboratory data such as AC glucose, HbA1c, cholesterol, Triglyceride levels; physical examination; and assessment of diabetes knowledge) and includes an education program to assist people with diabetes as well as reduce occurrence of the disease in Taiwan (Ho, 2001; Lai, 2002; Lin, 2002; Liu, Chu & Chen, 2002; Weng, Hsu & Hsieh, 2002). Although the Shared Care Model produced benefits in the care of diabetes, it was challenging for clinicians to share patients' disease information electronically with other hospitals via computerised records, required the maintenance of consistent 'treatment standards' for people with diabetes, and the formation of treatment teams from different services to provide shared care as well as form care networks in small towns. In order to address the limitations of the Shared Care Model, Lee, Lien and Lien (2003) developed a new model called the Disease Management Model.

The Disease Management Model includes (1) confirmation of the patient's individual profile; (2) standardisation of care; (3) patient consent for clinical treatment; and (4) maintenance of a patient information system. The information system involves a 'diabetes passport' that records patients' demographic data, clinical outcomes, and self-care activities at home. In conjunction with the diabetes Shared Care Network promoted by the National Health Insurance Bureau (NHIB), the Disease Management Model has significantly reduced medical expenses (Lee, Lien and Lien (2003). Related reports also indicated that disease management of diabetes efficiently reduced the cost of hospitalisation and frequency of emergency treatment, as well as improving biochemical indicators such as glycated hemoglobin A1c (HbA1c) and blood glucose index (Chien, Chiu & Huang, 2001; Lim, Emmanuel & Chan, 2002). Although no

long-term reporting mechanism currently exists, it can be seen from the short-term experience that an efficient Disease Management Model may improve knowledge of the disease for sufferers and reduce expenditure (Hsu, Weng, Lin, Chen, Lee & Lee, 2004).

Despite the effectiveness of the Disease Management Model (DMM) in reducing expenditure, no data exists on the effects of this model on behavioural change related to self-management for blood glucose control, medication compliance, and impact on associated clinical outcomes (Huston, 2002). Diabetes knowledge is necessary but not sufficient for sustained health behaviour changes. Psychological aspects are important determinants of diabetes outcomes in terms of learning new skills and changing behaviour (Delahanty, Conroy & Nathan, 2006). In recognition of the limitations of the DMM, a Case Management Model was introduced.

The Case Management Model draws attention to the differences in personal characteristics, family conditions, and social support that may influence an individual's self-management of HbA1c and blood sugar index (Fisher, Chesla, Skaff, Gilliss, Mullan & Bartz, 2000; Fisher, Chesla, Mullan, Skaff & Kanter, 2001; Wagner, Grothaus, Sandhu, Galvin, McGregor & Artz, 2001). It is argued that the Case Management Model is a better option in terms of providing holistic, individual care because of the attention given to a range of needs. Accordingly, most evaluation studies of the Case Management Model for people with diabetes have found improved HbA1c levels, diabetes knowledge, fasting BG, weight, HDL, Triglyceride, LDL, or cholesterol levels on clinical outcomes (Choe, Mitrovich, Dubay, Hayward, Krein & Vijan, 2005; Jen, Chen, & Hsu 2005; Norris, Nichols, Caspersen, Glasgow, Engelgau & Jack, 2002). Despite the merits of case management, it is a labour-intensive model of care, and expensive to implement widely.

## **1.2 Diabetes self-management**

Diabetes self-management is defined as a set of skilled behaviours one engages in to manage one's own illness (Heisler, Smith, Hayward, Krein & Kerr, 2003). Self-management of diabetes generally involves following a regular eating and exercise plan, self-testing blood glucose levels, and taking medication (Toobert, Hampson & Glasgow, 2000). When a person further develops their self-management abilities, they

become more aware of their own needs and, hopefully, become better at discerning and handling conflicting demands that may arise in relation to their diabetes and daily activities (Redman, 2004). What remains unclear is what motivates people to adopt lifestyle changes. Little is known about the reasons why people do not maintain optimum self-management (Clement, Braithwaite, Magee, Ahmann, Smith & Schafer, 2004; Tseng, 2004).

Access to basic resources may facilitate behaviour change. For example, Nyomba, Berard and Murphy (2004) found that when individuals were given access to glycometer reagents, an increase in self monitoring blood glucose (SMBG) frequency occurred. Furthermore, patient evaluation of their diabetes self-management was associated with improvement. Therefore, it is important for health professionals to strengthen patients' self-management activities.

Glasgow, Toobert and Gillette (2001) found that particular factors appear to act as important personal barriers or facilitators to diabetes self-management. These include factors such as personal characteristics (knowledge, beliefs); environmental factors; social; cultural and psychological factors (stress, depression, self-efficacy); as well as quality of life (Glasgow, Hampson, Strycker & Ruggiero, 1997; Goldney, Phillips, Fisher & Wilson, 2004; Hill-Briggs, 2003; Norris et al., 2001).

Several studies have found that self-efficacy has been positively related to improved self-management outcomes (Aljaseem, Peyrot, Wissow & Rubin, 2001; Heisler, Piette, Spencer, Kieffer & Vijan, 2005; Howells, 2002; Krichbaum, Aarestad & Buehe, 2003; Wen, Shepherd & Parchman, 2004). Glasgow et al. (2001) found that psychological factors such as self-efficacy, health beliefs, and emotional well-being were significantly correlated to self-management and quality of life.

Historically most interventions have aimed to promote self-management and included an educational component, but the suitability of the information provided for individual needs has rarely been assessed (Bowman & Epp, 2005). Redman (2004) found 40-60% of people with diabetes received formal diabetes education, but 50-80% of participants still had significant knowledge and skills deficits, and less than half of all people in the study mastered the idea of glycaemic control. Some studies examined the



effects of educational interventions outcomes on glycemic control and showed mixed outcomes. Some studies demonstrated positive changes (Gilliland, Azen, Perez & Carter, 2002; Raji, Gomes, Beard, MacDonald & Conlin, 2002; Wattana, Srisuphan, Pothiban & Upchurch, 2007) but some studies showed no significant changes (Adolfsson, Walker-Engstrom, Smid & Wikblad, 2007; Clark, Hampson, Avery & Simpson, 2004; Gerber et al., 2005). These studies highlight the need to assess individual needs and shape interventions to address specific behaviour and knowledge deficits (Clement et al., 2004).

Many intervention studies have targeted self-management education (Jack, 2003; Norris et al., 2002) but most studies in this area suffer from one or more methodological limitations. These include a failure to use theory or a conceptual model to guide selection of measures (Jack, 2003); the use of measures that have not been validated or have unknown reliability (Norris et al., 2002); a failure to motivate or empower people to self-manage (Jack, Liburd, Spencer & Airhihenbuwa, 2004); small or unrepresentative samples (Hendricks & Hendricks, 2000), and poorly defined outcome measures (Hendricks & Hendricks, 2000). These studies also report low rates of participant engagement in education, non-adherence to treatment recommendations, and high relapse rates.

In order to address these issues, the present study will test the use of a motivational interview strategy that aims to address specific individual needs. Motivational Interviewing (MI) is a brief intervention based on the original work of Miller (1983) and Miller and Rollnick (2002). The motivational interview has been successful in the treatment of alcohol abuse (Figlie, Dunn & Laranjeira, 2005), drug abuse (Amrhein, Miller, Yahne, Palmer & Fulcher, 2003; Baker, Boggs & Lewin, 2001), smoking (Curry, Ludman, Graham, Stout, Grothaus & Lozano, 2003; Winickoff, Hillis, Palfrey, Perrin & Rigotti, 2003), pain self-management (Habib, Morrissey & Helmes, 2003; Habib, Morrissey & Helmes, 2005), weight loss and glycemic control (Clark et al., 2004; West, DiLillo, Bursac, Gore & Greene, 2007) but not widely applied in the Type II diabetes field (Clark & Hampson, 2001; Clark et al., 2004; Jackson, Asimakopoulou & Scammell, 2007; West et al., 2007). The motivational interview strategy is thought to work by increasing levels of 'change talk' (Miller & Rollnick, 2002) with resultant change in behaviour.

### **1.2.1 A behaviour change intervention**

The Transtheoretical Model (TTM) is based on the premise that people are at different stages of readiness for engaging in health behaviours, and that intervention approaches are likely to be most helpful when they are matched to the individual's current stage of change (Ruggerio, 2000). Research based on the TTM of change have reported increased effectiveness when the interview is tailored for the individual's stage of readiness to change as opposed to following a generic approach (Prochaska & Velicer, 1997). Many people need to bring about dramatic lifestyle changes to achieve ideal diabetes control after diagnosis. Allowing for individual differences (especially in regards to readiness to change) may be a key factor in motivating people to adhere more precisely to self-management and lifestyle changes for Type II diabetes. In addition, the people-centred approach to the consultation may also play an important role in behaviour change (Stewart, Stewart & Belle, 1995).

When the motivational interview strategies are used in conjunction with the TTM, there is strong emphasis on choosing tasks to suit individuals. These strategies start out with the development of rapport, and setting an initial focus on a task which is important to the person concerned. The issue of importance is discussed, providing a better understanding about how the person feels about this issue.

Jones, Edwards, Vallis, Ruggiero, Rossi and Rossi (2003) have suggested that the Transtheoretical Model may provide important insights into the processes underlying the adoption of diabetes self-management behaviours. Using motivational interviews integrated with insights derived from the TTM model of behavioural change, may enable participants to develop from thinking about change, to preparing for change, acting accordingly, and finally remaining committed to the changes they have made (Miller & Rollnick, 2002). Despite the potential of MI and TTM in relation to Type II Diabetes, only three studies (reported in four papers) were identified that used the MI method in Type II diabetes. These studies focussed on weight loss (West et al., 2007), lifestyle change (Clark & Hampson., 2001; Clark et al., 2004) and increased exercise (Jackson et al., 2007). Further research is needed in order to better understand the

application of motivational interviewing to enhance self-management and prevent Type II diabetes complications.

### **1.3 Aim**

The aim of this study is to determine whether participation in a Motivational Interview (MI) by Taiwanese people with Type II diabetes would improve their self-management and well-being.

#### **1.3.1 Preliminary work completed by the researcher**

The researcher is part of a health care team in Taiwan that seeks to promote self-management by people with Type II diabetes. Before commencing the current research, the researcher, as part of a clinical team, undertook a series of preliminary studies. The diabetic research team developed and implemented a disease management program and evaluated its effectiveness (Hsu et al., 2004). Using the medical claims database, this program recruited 560 people with Type I and Type II diabetes into the intervention program; the control group consisted of 3,836 people with diabetes not enrolled in the program but on a wait list. This study found that participants in the program had a lower mean total health care cost per person than people not enrolled. However, the research found that 28% of participants still had poor control of their blood glucose levels, HbA1c and self-management (Hsu et al., 2004). The majority of participants (93.7%) reported being very satisfied with the program.

Following evaluation of the disease management program, the diabetic research team employed a stratified case management design to evaluate the effectiveness and efficiency of case management programs for people with Type II diabetes. One hundred and fifty people with Type 2 diabetes were recruited and allocated into a high-risk group: HbA1c  $\geq 9\%$  (n=50), a median-risk group: HbA1c  $< 8.9, \geq 7\%$  (n=50), and a low risk group: HbA1c  $< 6.9\%$  (n=50). This study used specific case management programs for the three different groups. The high-risk group showed significantly decreased HbA1c levels; the middle-risk group showed a significantly increased HbA1c level; and the low-risk group showed no significant changes in HbA1c level. A limitation of this study was that similar interventions were used in the three groups; perhaps the interventions did not meet the participants' individual needs according to risk, and were therefore

ineffective. Based on these findings the researcher recommended that the assessment of an individual's readiness to change be a component of intervention programs in further studies (Chen, Hsu, Weng, Lee, Lee & Liu, 2004; Hsu, Weng, Chen, Lee, Lee & Liu, 2004). Therefore, a Motivational Interview protocol based on the TTM approach was developed to be evaluated in the current study. The significance of the current study is discussed below.

#### **1.4 Rationale and Significance**

Diabetes poses a major threat to global public health and is a leading cause of morbidity and mortality worldwide. Type II diabetes is a serious and growing problem in Taiwan where it is the fifth leading cause of death, and health care costs are 4.3 times higher than for people without diabetes. Self-management is the cornerstone of diabetes control but often requires changes to attitudes, knowledge, skills and behaviour over a sustained period of time. Further work is required to develop effective and efficient strategies to promote self-management of diabetes.

Motivational interviewing has been used to successfully bring about change in people with a range chronic conditions and addictive behaviours. Channon, Huws-Thomas, Rollnick and Hood (2007) reported that motivational interviewing has been successful in changing the behaviour of people with Type I diabetes. Although the needs of people with Type I diabetes varies from people with later onset Type II diabetes, the application of motivational interviewing in addressing the needs of this patient population is promising.

The results of the present study will make a significant contribution to improving the management of diabetes. It will evaluate the novel use of a motivational interview (MI) intervention for people with Type II diabetes and extend the scope of practice for nurses caring for people with this condition.

This study will contribute to the improved care of people with Type II diabetes. The intervention aims to facilitate a person's ability to self-manage their diabetes. Self-management of diabetes has been promoted for some time as best practice (Weiler & Crist, 2007). By establishing the effectiveness of the MI intervention based on

readiness to change, this research will provide empirical evidence that can inform practice and improve the likelihood of self-management by people with Type II diabetes.

The TTM provides a theoretical framework that will be used to guide the motivational interview intervention. Initially the nurse researcher will assess the person's stage of readiness for change and have an in-depth discussion about the sort of changes they would like to bring about in their lives (Astroth, Cross-Poline, Stach, Tilliss & Annan, 2002; Cassidy, 1999; Prochaska & Velicer, 1997). This approach is well within the scope of nursing practice and enables clinical nurses to optimise patient learning and promote the likelihood of self-management amongst people with Type II diabetes. As such, this research makes an important contribution to nursing knowledge and practice through the change agency role of nurses and empowerment of clients.

This research addresses a complex range of variables that impact on the ability of a person with diabetes to self-manage. Although diabetes self-management programs have been found to have a moderate to strong effect in the short term, previous research has not addressed a wide range of outcome variables. The effectiveness of the motivational interview will be assessed according to progression in the assessed stage of change, as well as a range of personal, psychological, social, and metabolic factors.

The current study aims to assess readiness to change and then provide a MI intervention to bring about changes towards diabetes self-management. The dual mechanism of readiness to change and MI could be applied to other populations with chronic conditions who seek to make lifestyle changes.

### **1.5 Research question**

The research question is: what is the effect of a motivational interview on stage of change, personal, psychological, social, and metabolic variables in Taiwanese people with Type II diabetes?

### **1.6 Research hypotheses**

Based on the research question, this study elucidated five research hypotheses:

Hypothesis one: People with Type II diabetes who participate in a motivational interview will have improved Stage of Change outcomes from baseline to three months follow-up compared to the control group.

Hypothesis two: People with Type II diabetes who participate in a motivational interview will have improved personal outcomes from baseline to three months follow-up compared to the control group.

Hypothesis three: People with Type II diabetes who participate in a motivational interview will have improved psychological outcomes from baseline to three months follow-up compared to the control group.

Hypothesis Four: People with Type II diabetes who participate in a motivational interview will have improved social support outcomes from baseline to three months follow-up compared to the control group.

Hypothesis five: People with Type II diabetes who participate in a motivational interview will have improved metabolic outcomes from baseline to three months follow-up compared to the control group.

## **1.7 Structure of the thesis**

This chapter has introduced the study, provided an overview of the context and outlined the research problem and significance. The focus of chapter 2 is a review of existing research on this topic. The literature review presents a critique of randomized controlled trials on self-management intervention programs for Type II diabetes. There is also a review of studies that have used stage of change for diabetes self-care behaviours (such as weight loss) as well as studies that have applied a motivational interviewing intervention with people with Type II diabetes. The conceptual framework is also presented in chapter 2.

Chapter 3 describes the method used in the study. A randomised controlled trial was employed in this study. There is also a qualitative component that aims to describe

participants' thinking during the various stages of change. This study includes three phases, recruitment and baseline assessment, the intervention, and a 3 month follow-up phase. Procedures for recruitment, the intervention protocol, data collection and data analysis are outlined.

Chapter 4 and 5 present a summary of participant characteristics and results from the evaluation of the MI intervention. Chapter 4 focuses on the quantitative results and presents changes in variables from baseline to 3 months post-intervention. The reliability and validity of measures used in the study are presented. Chapter 5 describes the qualitative data obtained during the motivational interview. The thematic analysis of data will aim to enrich the quantitative data obtained during the study.

Chapter 6 provides a discussion of the findings in relation to the existing literature and possible limitations. The outcomes of the study are discussed and effects of MI intervention are explicated. Finally conclusions about this study are presented in Chapter 7. This chapter also describes implications for nursing practice and recommendations for future research practice and education.

## **1.8 Summary**

Type II diabetes poses a major global public health problem. Chinese people are predicted to constitute the greatest increasing proportion of people developing diabetes, specifically, in Singapore, Taiwan, and mainland China. The prevalence of Type II diabetes in Taiwan is between 5 to 10% and in people over 45 years of age the prevalence is 11%. Diabetes is the fifth leading cause of death, and care costs are 4.3 times higher than for people without diabetes. There are currently three models of managing care in the Taiwanese health care system and each has its limitations. Therefore, new approaches to promote self-managed care are required to motivate and empower people to manage their diabetes. Applying the TTM in conjunction with motivational interviews (MI) has been successful in the treatment of different conditions but not widely applied to people with Type II diabetes. This study will test the efficacy of a motivational interview to enhance diabetes self-management.

## **CHAPTER TWO**

### **LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

#### **2.1 Introduction**

This literature review examines studies that aim to improve the self-management and well-being of individuals with Type II diabetes. There are three sections in this chapter. Firstly, a review was conducted on published randomized controlled trials that assessed the effectiveness of self-management interventions for Type II diabetes. This review provides a summary of diabetes self-management programs and identifies limitations of research in this area. The second review investigated the application of behavioural change theories in the published literature. The third review focuses on motivational interviewing (MI) applied to people with diabetes. This review evaluates the effectiveness of MI interventions in diabetes care, provides an overview of the research quality and identifies further research needs in this area. Finally the conceptual framework of this study is presented.

Growing rates of Type II diabetes around the world has prompted a great deal attention on intervention strategies to enhance individuals' self-management of their condition. While there has been considerable attention given to clinical practice in the control of diabetes, the greatest challenge relates to understanding the motivation of people with Type II Diabetes and how they can be assisted to overcome a range of difficulties in the management of their diabetes. This literature review will present the current understanding of self-management strategies for diabetes, as well as identify the gaps in nursing knowledge and practice.

#### **2.2 Diabetes self-management identified in the literature**

Self-management is defined as “the individual’s ability to manage the symptoms, treatment, physical and psychological consequences and lifestyle changes inherent in living with a chronic condition”; and “the ability to monitor one’s condition and to effect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life” (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002, p.



177). There is a consistent evidence demonstrating that effective diabetes self-management significantly improves health outcomes (Heisler, Smith, Hayward, Krein, & Kerr, 2003; Jones et al., 2003; Norris et al., 2002; Ruggiero et al., 1997; Samuel-Hodge et al., 2000; Wysocki et al., 2003).

Self-management is a cornerstone of diabetes care. People with diabetes are expected to perform daily self-management activities to achieve optimal glycemic levels and help avoid diabetes-related morbidity and mortality (Wattana et al., 2007). Diabetes self-management generally involves following a regular eating and exercise plan, the self-monitoring of blood glucose levels, and adhering to a medication or insulin regimen (American Diabetes Association, 2007; Toobert, Hampson, & Glasgow, 2000). Clinical trials in Sweden, China, Finland, Canada, and the United States have shown that self-management interventions involving diet, physical activity, and medication can reduce the risks associated with Type II diabetes by as much as 25-50% (Berlin, Sass, Davies, & Hains, 2002; Ciechanowski et al., 2004; Hernan et al., 2003; Koch, 2002; Tuomilehto et al., 2001). Effective self-management requires individuals to understand the interrelationships between management tasks and implement appropriate changes in their own diabetes care plan (Taylor et al., 2003).

Many diabetes self-management intervention studies conducted to date have been based on educational interventions. In fact, the most common type of intervention for diabetes self-management is education. While education is the cornerstone of diabetes control, education alone does not necessarily motivate people to self-manage their diabetic condition. One widely-cited systematic review of 72 RCT studies on self-management interventions (Norris et al., 2001) concluded that self-management education strategies for Type II diabetes had short-term positive effects (< 6 months) on knowledge, frequency and accuracy of SMBG, self-reported dietary habits and glycemic control. Norris et al. (2001) recommended, however, that further research was needed to inform the theory underpinning behaviour change, and to investigate strategies that produced long-term effects. However, Huang et al. (2001) argued that further analysis of the systematic review by Norris et al. (2001) was required. For example, it is unclear which type of program (for example, individual, group or peer programs) or which components are most effective in improving self-management for Type II diabetes or which patients might benefit most. Although a growing body of evidence suggests that

improving self-management behaviours and physical functioning are critical for optimal glycemic control and to decrease diabetic complications (Norris et al., 2002), more needs to be known about the applicability of behaviour change strategies to address Type II diabetes.

Although many studies have identified that a number of self-management interventions related to glycemic control and diabetes knowledge were important for managing diabetes (Trento et al., 2001; Brown et al., 2002; Keyserling et al., 2002), Glasgow et al. (2002) argued these were not enough, because it is difficult to motivate or empower people to change. Indeed it is well known that individuals often report difficulty sustaining behaviour change. Glasgow et al. (2002) suggested that self-management interventions should therefore involve a tailored education component and be based on theoretical approaches known to be effective in the maintenance of behaviour change.

The following section presents a review of published randomized controlled trials that measure the effectiveness of self-management interventions for Type II diabetes. This review presents a quality appraisal rather than a systematic review of efficacy. The appraisal summarises the study design, components of the intervention approach, effectiveness of the self-management intervention, and possible limitations.

### **2.3 Self-management interventions for Type II diabetes**

#### Search parameters

A search of major databases (ProQuest; CINAHL; Medline; Psych Info; Cochrane; PubMed) was undertaken for the period from 2001 to 2007. Inclusion criteria were: publication in English; available by inter-library loan service in Australia; a refereed journal publication; and a sample that included people with Type II diabetes. Although it has been noted that self-care behaviours differ for people with Type I and Type II diabetes (Norris et al., 2001), studies with both groups were included. If the type of diabetes was unclear, then the study was included if the mean age of participants was >30 years because most of these individuals probably have Type II diabetes. Furthermore, only randomized controlled trials (RCT) or clinical controlled trials (CCT)

were included because this type of study design generally supports maximum validity and causal inference of effect (Richter & Berger, 2000).

The initial search identified a total of 1104 intervention studies, of those 182 addressed the condition of diabetes. Assessment according to the inclusion criteria resulted in 19 studies being included in the review which are outlined in Table 2.1. These studies were reviewed in regards to setting, sample, content and design of the self-management intervention, outcomes assessed, and study quality.

### **2.3.1 Discussion of review findings**

The studies under review were conducted in seven countries. The majority of studies were derived from the USA (12 studies), UK (2 studies) and one study each from Italy, China, Korea, Sweden and Thailand. Fifteen studies were conducted with a sample of people with Type II diabetes and four studies with a mixed sample of Type I and Type II diabetics. All studies were conducted with people in the community who were attending a hospital outpatient department, community clinic and or health service such as a general practice. Eight studies recruited from participants for rural areas whereas 11 studies were conducted in a metropolitan or city area. Only 4 of the 19 studies included different ethnic groups such as Mexican-American (3 studies), and African-American (1 study) cohorts.

**Table 2.1 Summary of RCT studies addressing diabetes self-management**

Authors & Year	Sample/Population group	Sample size	Design/Interventions	Outcome measures	Findings	Limitations
Adolfsson et al. (2007)	Type II diabetics Community-based Primary care centre outpatients Central Sweden 59 % male 41% female Mean age 63 years (range= 54-71)	101	RCT Coping skills intervention Intervention – empowerment group education – 5 sessions x 2.5 hours; Follow-up session within 7 months Control group received routine diabetes care. 12 months follow-up	BMI HbA1c Study-specific questionnaire (included diabetes knowledge, self- efficacy and satisfaction with daily life)	Significant difference on diabetes knowledge  No significant difference on self-efficacy and satisfaction with daily life, BMI and HbA1c.	1. Small sample size 2. High decline rate (n = 69)
Brown et al. (2002)	Type II diabetics Community-based outpatients Rural Starr county USA Mexican-American 19.5% male 80.5% female Mean age 54 years (rang= 35-70)	256	RCT Knowledge intervention Intervention -self-management education. Team provided group education for 52 contact hours Control group received usual care (routine diabetes care from nurses or other health care providers) 12 months follow-up	HbA1c Fasting glucose Lipids BMI Two questionnaires: (diabetes-related knowledge, health beliefs).	Significant difference on: diabetes-related knowledge, HbA1c and fasting glucose  No significant difference on lipids, BMI or health beliefs	1. Blinding of outcome assessors not reported 2. Allocation concealment not reported 3. Sample size/power calculation not reported, and little information on attrition/drop-out data.
Brown et al. (2005)	Type II diabetics Community-based Central Starr county, USA Mexican American Clinic health office outpatients 35% male 65% female Mean age 49.6 years (range= 35-70)	216	RCT Knowledge intervention  Intervention - education (24 hours) and support groups (28 hours) for 12 months Control group received education (16 hours) and support groups (6 hours) for 12 months 3 and 12 months follow-up	HbA1c Fasting blood glucose Diabetes knowledge (Spanish- language knowledge instrument)	Significant difference on HbA1c, FBG, diabetes knowledge after 3 months and 12 months	1. Randomized by site 2. Intervention group had more visits than control 3. No baseline comparisons or attrition information

Cho et al. (2006)	Type II diabetics Hospital-based Hospital outpatients Central Seoul, Korea  61 % male 39% female Mean age 52.9 years (range= 46-63)	80	RCT Knowledge intervention Intervention - Internet-based glucose monitoring system (IBGMS) every 2 weeks and visited physician every 3 months. Control group received conventional office visits only. 15 and 30 months follow-up	HbA1c SMBG HFI	Significant difference on HbA1c, HFI and SMBG	1. Small sample size 2. Unclear if study population representative of target population 3. Unclear if assessor blinded
Clark et al. (2004)	Type II diabetic Clinic-based Rural clinic outpatients Sussex, UK 58% male 42% female Mean age 59.5 years (range= 40-70)	166	RCT Lifestyle intervention Intervention - modified MI involving individualised behaviour change strategies. Sessions conducted every 12 weeks (x3). Met therapist at 52 weeks and thanked for participation.  Control group received same level of contact - every 12 weeks (x3).  12 months follow-up	BMI HbA1c Cholesterol Triglycerides Total HDL-C LDL-C Diabetes self- management (using the summary of diabetes self-care activities questionnaire) Fat-related dietary habits (using the Kristal food habits questionnaire) Physical activity (using the physical activity scale for the elderly questionnaire)	Significant difference on Fat-related dietary habits, the summary of diabetes self-care activities  No significant difference on BMI, HbA1c cholesterol, triglycerides, HDL-C, LDL-C and physical activity	1. No comparison of dropouts to completers. 2. Incomplete baseline statistics 3. No detailed on usual care.

Fu et al. (2003)	Chronic disease (diabetes, stroke and arthritis) Community-based Shanghai, China Rural health centre outpatients 28% male 72% female Mean age 64 years (range= 22-90)	954	RCT Knowledge, skills intervention Intervention - the Shanghai Chronic Disease Self- management program (included exercise, self-efficacy education) 7 weekly, two hour sessions by trained peers  Control group – wait list for the program 6 months follow-up	Self- management behaviour change score, self-efficacy score, health status and health service utilization	Significant difference on self-management behaviour change, self-efficacy, health status.  Not significant - health care utilization.	1. No details on usual care 2. Only 17% of participants had diabetes 3. Extent of co-morbidity not known
Gerber et al. (2005)	Type I and II Clinic-based Outpatient clinic Rural Chicago, USA  28.6% male 71.4% female Mean age 54.8 years (rang= 46-69)	244	RCT Knowledge intervention  Intervention – computer-based multimedia education (19 modules) 10 to 20 min duration, self-test on completion of each module  Control group received simple multiple-choice quizzes on diabetes-related concepts  12 months follow-up	HbA1c BMI, BP Self-efficacy (using the management diabetes self- efficacy scale which developed for Speaking Latino population)  Knowledge (Spanish- speaking Latino knowledge scale)  Medical care (using the American Diabetes Association standards of medical care in diabetes questionnaire) Computer use rate	Significant difference on HbA1c (only on low-health literacy group)  The computer use rate: 74.9% found the program easy to use (65% for lower-literacy vs 87.5% for higher-literacy participants)  No significant difference on HbA1c, BMI, and BP, self-efficacy, knowledge, and medical care	1. No reported on sample size/power calculation 2. The elderly and lower- health literacy people were less computer use this could be dampening the potential effect of intervention. 3. No comparison dropouts to completers. 4. Unclear if study population represents target population

Gilliland et al. (2002)	Type II diabetics Community-based Rural New Mexico Native Mexican -Americans 20% male 80% female Mean age 60 years (range= 47-73)	104	Controlled Clinical Trial (CCT) Lifestyle intervention Intervention 1 – group sessions including friends and family, culturally-appropriate diet and exercise education with 5 support sessions (one every six weeks for two hours). Intervention 2 - individual sessions culturally-appropriate diet and exercise education with five sessions (once every six weeks for forty-five minutes). Control group received usual care (some education, but not specific to the culture). 12 months follow-up	HbA1c, Weight Cholesterol Triglycerides	Significant difference on: HbA1c, weight (combined interventions vs control)  No significant difference on cholesterol and triglycerides.	1. Relatively high drop out rate (49%). 2. No reported method of randomisation 3. No detail if providers of regular care blinded to the intervention 4. Not known if outcome assessors were blinded to the intervention 5. Small sample size
Glasgow et al. (2002)	Type II diabetics Community-based Central Oregon USA Primary care clinics outpatients 44% male 56% female Mean age 59.7 years (range= 40-85)	320	RCT Coping skills intervention Intervention 1- a brief dietary session for 1 to 2 hours Intervention 2 - a brief dietary session and community resources (eating out, grocery shopping), newsletters for 1 to 2 hours and phone calls 15-20 minute for 7 times over 12 months Intervention 3 - a brief dietary session 1 to 2 hours and phone call 15-20 minute Intervention 4 - a brief dietary session and community resources 1 to 2 hours and phone call 15-20 minute 12 months follow-up	Clinical assessment (HbA1c and Lipid ratio) Behaviour outcomes questionnaires (Kristal fat and fibre behaviour scale) Quality of life (illness intrusiveness scale)	Significant difference on: HbA1c, Lipid ratio, self-efficacy.  No significant difference on behavioural outcomes, quality of life.	1. No reported sample size/power calculation 2. No reported blinding of assessor.

Glasgow et al. (2004)	Type II diabetics Clinic-based Central Colorado, USA Postmenopausal women  Mean age 61 years (rang= 39-75)	279	RCT Coping skills intervention Intervention - a multiple lifestyle behaviour change program over 6 months (included non-residential retreat of 2.5 days. Weekly meetings (1 hr) including physical activity, stress management education and support  Control group received usual care 6 months follow-up	Problem solving (Diabetes problem- solving inventory) Dietary outcomes (Fat and Fibre Behaviour questionnaire) Physical activity (CHAMPS activities questionnaire for older adults) Sallis self- efficacy tool	Significant difference on diabetes problem solving scores, physical activity, dietary behaviour and self-efficacy.  Not significant - fat and fibre behaviour	1. No details on usual care 2. No reported on sample size/power calculation 3. Unclear how study population recruited
Keyserling et al. (2002)	Type II diabetics Clinic-based Community health centre outpatients Central North Carolina, USA African-American women 100% female Mean age 59 years (rang= 40-87)	200	RCT Knowledge intervention Intervention A- Clinic and community – 4 x monthly visits to a nutritionist; 3 group sessions and 12 x monthly phone calls from peer counsellors  Intervention B - clinic only - 4 x monthly visits to a nutritionist;  Intervention C – minimal intervention - mailed pamphlets published by the ADA  12 months follow-up	Physical activity - PA HbA1c Weight HDL cholesterol Dietary intake (saturated fats, dietary cholesterol intake and total energy intake)  Two questionnaires: diabetes knowledge, psychological wellbeing (diabetes health status instrument)	Change in physical activity by PA: significant change intervention A with C, intervention B with C.  Significant difference on diabetes knowledge  Not significant - saturated fats, dietary cholesterol intake and total energy intake, HbA1c, HDL cholesterol, and weight.  Not significant - diabetes health status (e.g., mental and social well-being )	1. Sample included African-American women thus limited generalization 2. Unclear - reliability of measures such as the accelerometers as a direct measure in the different PA clinics, and two questionnaire instruments. 3. No detail on providers if regular care blinded



Long et al. (2005)	Type II diabetics Community-based Clients from GP practices Urban Northwest England  58 % male 42% female Mean age 69 years (range not reported)	591	RCT Knowledge intervention 3 Intervention Groups - Proactive call-centre treatment support (providing feedback and encouragement phone call 20min according to status – monthly if HbA1c>9, every 7 weeks if HbA1c =7.1-9%, every 3 months if HbA1c <7.0. Plus usual care. 12 months follow-up	Diabetes satisfaction and treatment questionnaire. In-depth semi-structured interview with 25 participants	Significant difference on diabetes knowledge in younger people  >90% of people strongly agreed that the PACCTS approach was an acceptable intervention.	1. Intensity of intervention unclear 2. Training for intervention not described 3. Unclear if assessor blinded 4. Incomplete baseline statistics
Raji et al. (2002)	Type I and II diabetics Hospital-based Hospital outpatients USA 99% male 1% female Mean age 60 years (range not reported)	106	RCT Knowledge intervention Intervention 1 - core elements of ADA recommended program (3.5 days duration) Intervention 2 - mailed educational materials (including booklets) to homes every 3 months x 1 year. Control group received usual care (routine diabetes care from nurses or other health care providers) 12 months follow-up	HbA1c	Significant difference on HbA1c (combined interventions vs control)	1. No details on drop-out rate 2. Small sample size 3. No reported assignment method to the treatment groups 4. Unclear if study population represents target population

Rothman et al. (2004)	Type II diabetics Hospital-based Hospital outpatients Central Massachusetts USA  42% male 58% female Mean age 53.5 years (range not reported)	217	RCT Knowledge, skills intervention Intervention - one-on-one assessment, feedback, treatment plan, educational counselling, medication treatment and strategies. Control group received usual care	HbA1c Systolic blood pressure	Significant difference on HbA1c (only for low literacy participants), and the systolic blood pressure readings (for both high and low literacy participants).	1. No details on usual care. 2. Unclear on frequency and duration of intervention.
12 months follow-up						
The California Medi-Cal Type 2 Diabetes Study Group (2004)	Type II diabetics Clinic-based Rural Southern California USA Medi-Cal centre outpatients 29% male 71% female Mean age 57 years (range = 56-58)	362	RCT Knowledge, skills intervention Intervention – intensive diabetes case management program (individual education, glucose and medication strategies) for 12 months. Practical assistance – glucometer, transport.  Control group received traditional primary care treatment	HbA1c Weight BMI Blood pressure Fasting lipid	Significant difference on HbA1c levels and target HbA1c goals ( $<6.5$ , $<7.0$ , or $<7.5\%$ )  Not significant - weight, BMI, systolic blood pressure and fasting lipid	1. Training for intervention not described 2. Intervention group possibly confounded by the same case management providers for control group. 3. Intervention received more visits than control
25 months follow-up						

Trento et al. (2001)	Type II diabetics Clinic-based Clinic outpatients, Central Torino, Italy 54% male 46% female Mean age 60 years (range = 35-80)	112	RCT Knowledge intervention  Intervention - diabetes education with 4 sessions and repeated every 3 months  Control group received usual care (routine diabetes care from nurses or other health care providers)	HbA1c Weight BMI SMBG Three questionnaires ( diabetes related quality of life, diabetes knowledge, health behaviours)	Significant difference on: HbA1c, quality of life, diabetes knowledge.  No significant difference on weight, BMI, SMBG	1. No reported power calculation. 2. Unclear if assessor blinded 3. Training for intervention not described
2 years follow-up						
Vallis et al. (2003)	Type I and Type II Hospital-based Hospital outpatients Central Canada 48.9% male 51.1% female Mean age 56 years (range not reported)	768	RCT Lifestyle intervention Intervention -.program based on the TTM theory, individualised stage-based feedback report and strategies, phone counselling every 3 months; free glucose strips Control group received usual care and no free strips 16 months follow-up	Low-fat eating – (National Cancer Institute – block food frequency) BMI Quality of life (Diabetes QoL scale and mental health inventory -short form), Social support diabetes Family Behaviours Checklist; Interpersonal Support Evaluation List), Stressful life events (questionnaire on finances, relationships, and social problems)	Significant difference on low-fat eating, BMI, quality of life, social support and stressful life events.	1. No information on attrition 2. Unclear if assessor Blinded 3. Unclear if sample representative

Wattana et al. (2007)	Type II diabetics Hospital-based Community hospital outpatients Eastern Chiang Mai Thailand 24 % male 76% female Mean age 58.4 years (range = 45-69)	147	RCT Knowledge, skills intervention Intervention - small group diabetes education class (120min), four small group discussions (90 min/group), two individual home visits from the researcher (45 min), and a patient education manual Control group received usual care, including a physical examination and individual health education from a registered nurse and/or other health- care provider. 6 months follow-up	HbA1c CHD risk profile (Framingham Heart Study Coronary Heart Disease Risk Profile) BP; smoking status; Quality of life (SF-36 Thai version)	Significant difference on HbA1c, CHD risk and quality of life	1. No reported attrition, no comparison of dropouts to completers 2. Unclear how study population recruited 3. No details on how intervention program was delivered in different hospitals.
Williams et al. (2005)	Type II diabetics Hospital-based Hospital outpatients Central Rochester USA  49% male 51% female Mean age 55.7 years (range = 24-80)	232	RCT Knowledge, skills intervention Intervention - ADA video on diabetes care (20 min) and 3 activation sessions – 20 mins (based on Expanding Patient Involvement in Care program – EPIC). Control group received ADA video on diabetes care + 3 educational videos (i.e., same level of contact) 6 and 12 months follow-up	HbA1c Diabetes care active involvement (audio tape analyses)	Significant difference on HbA1c and diabetes activation involvement for diabetes care	1. No reported sample size/power calculation, 2. Unclear if assessor blinded

In regards to sample, ten studies had a higher proportion of women than men (Gilliland et al., 2002; Brown et al., 2002; Keyserling et al., 2002; Fu et al., 2003; Glasgow et al., 2004; The California Medi-Cal Type II diabetes study group, 2004; Brown et al., 2005; Gerber et al., 2005; Wattana et al., 2007). Only two studies (Raji et al., 2002; Cho et al., 2006) had a higher proportion of men than women. Interestingly, there are no details on gender differences reported in the reviewed studies. Although some intervention studies included only female or male participants, it is unclear exactly how the interventions outcomes differ according to gender.

All studies recruited adults, with eighteen studies reporting a mean age greater than 52.9 years. Interestingly, there was a wide range of ages in most samples that spanned 24 to 85 years. Few studies reported on age-related differences. It could be for example, that younger people adopt an exercise routine more quickly than their older counterparts, but it is unclear whether age was considered or controlled for in the analyses, or was not reported.

Some studies recruited particular ethnic groups and attempted to provide culturally-appropriate education and social intervention strategies. Some studies also took account of geographic needs such as inner city or rural settings. For example, Brown et al. (2002) described the development of a community-based education and support group for bilingual Mexican-American in a rural area. Although this trial significantly improved glycemic control, there was a high level of attrition when the intervention changed from education to support only. It is unknown whether the social environment makes a difference in studies that recruit community-based as opposed to clinic-based populations. The setting in which an intervention is conducted may indeed make a difference in self-management outcomes.

#### Intervention content and delivery

Content predominantly focussed on the provision of information about the condition, symptom management, improving physical health (through weight loss and exercise), dealing with psychological consequences, life style change, and social support. The majority of studies were focused on knowledge interventions (8 studies),

knowledge with skills training (5 studies), coping skills (3 studies) and lifestyle interventions (3 studies). A large number of studies reported improved diabetes self-management using education program interventions. Fifteen of the 19 studies provided diabetes education as the main focus of their intervention (Adolfsson et al., 2007; Brown et al., 2002; Brown et al., 2005; Cho et al., 2006; Clark et al., 2004; Fu et al., 2003; Gerber et al., 2005; Gilliland et al., 2002; Glasgow et al., 2002; Glasgow et al., 2004; Raji et al., 2002; Rothman et al., 2004; The California Medi-Cal Type 2 Diabetes Study Group, 2004; Trento et al., 2001; Wattana et al., 2007).

Educational strategies in these programs involved didactic lectures, experiential activities around skill building and problem solving, behaviour strategies (e.g. exercise, SMBG), family member participation, peer participation, culturally-appropriate diet assessment, motivation or empowerment strategies (e.g. individual counselling, individualized assessment), phone call follow up or supplying equipment. Two studies applied face-to-face individual psychological counselling (Keyserling et al., 2002; Vallis et al., 2003), one study used phone call support (Long et al., 2005), and one study provided activation skill training for diabetes care (Williams et al., 2005). On the basis of information outlined in this review, the spectrum of intervention strategies is clearly greater than that of only 'diabetes knowledge'. One of the limitations from this review is that few published studies provided detailed information on the intervention strategy, and it was difficult to accurately follow the intervention procedure, making comparisons across studies and replication difficult.

The reviewed studies used a wide range of methods to deliver the interventions. Modes of delivery were group-based, individualised approaches, peer-support, or a combination of strategies. Delivery format included lectures, provision of written materials or manuals or various combinations of resources. Predominantly, interventions were delivered in person with various forms of follow-up support. The literature is mixed on the relative merits or otherwise of individual versus group-based interventions. There is greater recognition of the social challenges of living with a chronic condition and some studies included family members and peers as part of the intervention. Accessing information via a computer program or on-line were also

reported. Effects of using technology to deliver an intervention on glycemic control were mixed, with positive results in one study (Cho et al., 2006) and non-significant results in another (Gerber et al., 2005). One study used a telephone support intervention but failed to show long term significant results (Long et al., 2005). Five studies used an intervention that was theoretically based and three had positive results (Fu et al., 2003; Glasgow et al., 2004; Vallis et al., 2003) whereas two had non-significant results (Adolfsson et al., 2007; Gerber et al., 2005).

### Outcome measures

The studies under review used a range of outcome measures that can be classified according to physical, psychological and social well-being, knowledge of the condition and its treatment, use of medication, self-efficacy, self-care behaviours, and use of health care resources. Most authors considered it important to provide education to people with diabetes in order to improve SMBG and glycemic control outcomes. However, many of the papers under review involved didactic interventions that focused on the acquisition of knowledge and had positive effects on post-intervention knowledge levels but mixed results on glycemic control (Adolfsson et al., 2007; Brown et al., 2002; Brown et al., 2005; Gerber et al., 2005; Keyserling et al., 2002; Long et al., 2005; Trento et al., 2001) and no effect on weight or SMBG (Keyserling et al., 2002; Trento et al., 2001). It is apparent that factors other than knowledge are needed to achieve long term change. It has been suggested that improving personal attitudes and motivation may be more effective than knowledge in improving glycemic control (Norris et al. 2001).

Some studies focused on lifestyle changes, but generally failed to show improvement in glycemic control compared with the control group (Clark et al., 2004; Keyserling et al., 2002). There were some consistent findings that enhancing self-efficacy (Cho et al., 2006; Fu et al., 2003; Gerber et al., 2005; Glasgow et al., 2004), social support (Brown et al., 2005; Gilliland et al., 2002; Vallis et al., 2003) or stress management (Glasgow et al., 2004) improved self-management.

Many studies examined the effects of diabetes self-management interventions on risk factors for cardiovascular disease, including weight, lipid levels, BMI, cholesterol, triglycerides, HDL cholesterol, LDL cholesterol, BP (Brown et al., 2002; Clark et al., 2004; Gerber et al., 2005; Gilliland et al., 2002; Keyserling et al., 2002; The California Medi-Cal Type 2 Diabetes Study Group, 2004; Trento et al., 2001; Wattana et al., 2007). Overall, most studies achieved positive physical outcomes such as HbA1c or glycemic control in the short-term (but there were mixed results at 12 months follow-up) and mixed results in regards to psychological outcomes such as self-efficacy, self-care behaviours and quality of life.

It would appear that more work is required in regards to the content and mode of delivery of self-management interventions for people with Type II diabetes. Studies that developed an intervention for a particular context (culture, location, family-based) seemed to report better outcomes. Relatively few studies seem to target long-term behaviour change or changes in attitude or motivation to maintain self-management behaviours.

### **2.3.2 Limitations of the published literature**

This review only included RCT studies published in English. Despite the rigour of a RCT design, there were some limitations in regards to reporting that made it difficult to draw firm conclusions about the effectiveness of self-management interventions. Making comparisons between these studies was challenging because of differences in regards to sample, length, and intensity of interventions and methodological issues.

#### Sample characteristics

Some studies included people with Type I or Type II diabetes. As identified previously the needs of these two groups differ. Norris et al. (2001) argued that if the type of diabetes was unclear it was difficult to examine the true effects of an intervention. It was argued that the educational techniques and social influences relevant to Type I diabetes were sufficiently different from Type II to warrant separate



interventions and/or analysis. The trials by Raji et al. (2002), Vallis et al. (2003) and Gerber et al. (2005) included participants with either type of diabetes. All these studies failed to clearly explain the effects of intervention according to type of diabetes. For example, Raji et al. (2002) implemented an education intervention and used HbA1c as an outcome measure but did not distinguish between Type I and Type II diabetics. Furthermore, the majority of participants were male (99%) with an average age of 60 years, however, consideration did not appear to be given to possible gender bias, the age range of participants was not reported, nor was the length of time an individual had their particular condition. It is therefore difficult to assess the exact effects of the intervention because there may already be a significant difference amongst the group in regards to personal characteristics, knowledge or diabetes skills because of diabetes type.

The second issue regarding the sample is age of participants. Chang et al. (2005) found that different age groups have different levels of self-care behaviour outcomes. Age is also an important factor in determining the content and scope of activities included in a particular intervention. The use of age-appropriate activities is more likely to produce positive effects. Furthermore, the studies included in this review reported a wide range of different age groups making a comparison of results within and across studies difficult. For example, Fu et al. (2003) reported an age range of 22 to 90 years, and a study conducted by Wattana et al. (2007) reported an age range of 45-69 years. Some researchers, such as Long et al. (2005), Raji et al. (2002), Rothman et al. (2004), Vallis et al. (2003) did not report an age range.

#### Length and intensity of an intervention

Another possible limitation relates to the length and intensity of an intervention. It was often the case that there was limited reporting about specific program details. This omission could reflect adherence to strict word limits by the publishing journal. However, the lack of program detail made difficult to compare relative results. For example, Rothman et al. (2004) and Long et al. (2005) did not report on the time or intensity of their interventions.

## Methodological issues

All the trials included in this review had some limitations, making it difficult to draw firm conclusions about the effectiveness of a self-management intervention. There was frequently an inadequate description of components of an intervention. In this review there are sixteen studies that involve a multi-component intervention. One limitation of the published literature is that the content is not always described in sufficient detail to allow a thorough understanding of the intervention. For example The California Medi-Cal Type II diabetes study group (2004) failed to clearly explain the multiple components of their case management program for the intervention group and no details were provided on the training for intervention. In addition, some studies such as Fu et al. (2003), Clark et al. (2004) and Rothman et al. (2004) did not provide details about routine care. It is important to know these details as the quality of routine care in some health services may exceed standard care offered in other settings.

Another methodological problem relates to sample size with many studies recruiting a sample of one hundred or less, and are then allocated to a number of groups. For example Gilliland et al. (2002) recruited 104 people who were then allocated to 3 groups. This is similar to the study by Raji et al. (2002) (n = 106, 3 group intervention) while Cho et al. (2006) had 80 participants allocated into 2 groups. These cohorts make little allowance for attrition and may not provide sufficient power to detect a true difference between groups.

Moreover, internal validity was frequently threatened by lack of blinding of the assessor. Although it is sometimes not feasible to blind staff to participants' allocation, more studies should at least use a different researcher to conduct the follow-up assessment to reduce bias. Attrition can also introduce potential bias when more than 20% of initially enrolled subjects drop out before data collection. Gilliland et al. (2002), for example, reported a relatively high attrition rate of 49% and did not provide detail on whether providers of usual care were blinded to the allocation.

### **2.3.3 Conclusions from the review**

This review has identified a number of important implications for future research. There is an increasing emphasis on the use of randomised controlled trials in clinical intervention studies. This is a positive development because of the associated rigour associated with this design. Although this review did not include a meta-analysis of results, trends in regards to effective interventions for Type II diabetes self-management could be identified and are consistent with those identified in an earlier review by Norris et al. (2001). Earlier research focused on knowledge and glycaemic control as the main outcome measures to the exclusion of outcomes reflecting other aspects of functioning such as SMBG, psychological outcomes such as depression or anxiety, quality of life, behavioural end points, and social support outcomes. Increased knowledge of diabetes alone was not sufficient to increase participants' confidence and motivation to engage in effective diabetes self-management. The review highlighted the need for greater attention to be given to the content and delivery methods of any intervention. Those studies that aimed to address specific issues of a cohort (e.g., cultural needs) appeared to generate positive outcomes. It was unclear as to the extent to which behavioural theory underpinned the various interventions. Norris et al. (2001) recommended that behavioural theory needed to have an explicit role in future research to improve our understanding of behaviour change in self-management interventions. In this regard, greater attention needs to be given to the assessment of individual needs. The current literature review also identified that greater attention needs to be given to behavioural interventions that are feasible and attractive to a large percentage of the relevant population. Effectiveness also needs to be measured in regards to physiological outcomes, behavioural end points and quality of life.

### **2.4 Behaviour change for self-management**

The review on interventions for diabetes self-management identified mixed results in regards to effectiveness. Studies often reported early change following an intervention but a lack of sustained behaviour change at 12 months. Sustained behaviour change in people with Type II diabetes is difficult to achieve. It is important to understand the factors that may affect or are associated with behaviour change in people with Type II diabetes. Many studies have identified a wide range of factors associated with self-management of a diabetic condition. These factors include personal factors

such as age (Chang et al., 2005; Davis et al., 2006), gender (Ponzo et al., 2006; Whittemore et al., 2005), and education levels (Heisler et al., 2005), as well as modifiable variables such as knowledge (Persell et al., 2004; Lee & Shiu, 2004), self-efficacy (Aljaseem et al., 2001; Sarkar et al., 2006), emotional states such as depression, distress or fear of diabetes complications (Bell et al., 2005; Goldney et al., 2004; Lee et al., 2006), social support (Ciechanowski et al., 2004; Shiu, Kwan & Wong, 2003) and desire for glycemic control (Funnell et al., 2007).

As outlined in Chapter 1, this thesis gives consideration to personal and modifiable factors and aims to apply the Transtheoretical Model (TTM) of behaviour change in an intervention to enhance self-management of Type II diabetes. The following section describes the Transtheoretical Model and reviews studies that have used this approach to bring about behaviour change by people with a diabetic condition.

#### **2.4.1 The Transtheoretical Model (TTM)**

The Transtheoretical model (TTM) is a set of behaviour change techniques (processes of change) drawn from different theories and used in accordance with patients' level of readiness to change (Prochaska & DiClemente, 1998). The TTM has three organizing constructs: stages of change, processes of change, and levels of change. The TTM conceptualizes change as a process, not an event, in which individuals go through distinct stages of behaviour change. The five stages of change include pre-contemplation, contemplation, preparation, action and maintenance (Prochaska, DiClemente, & Norcross, 1992). The TTM can be used as a guideline for health care professionals to provide stage-matched interventions to challenge undesirable behaviours (Demmel, Beck, Richter, & Reker, 2004). A brief description of the five Stages of Change is presented in Table 2.2.

**Table 2.2 Brief description of the stages of change**

Pre-contemplation (Stage 1)	Individuals are ignorant of the nature and extent of the problem needing to be changed or are unwilling to change their problematic behaviour.
Contemplation (Stage 2)	Individuals who are thinking seriously about change. This includes an evaluation of the pros and cons of both the problem behaviour and change.
Preparation (Stage 3)	Individuals who are committed to change and to involvement in a plan involving change to be implemented in the near term.
Action (Stage 4)	Individuals implement a plan for change, begin to actively manage changes and actual behaviour change occurs.
Maintenance (Stage 5)	Individuals move into the maintenance stage, in which behaviour change must become integrated into their lifestyle. Once this change becomes completely integrated into their daily lives, these individuals are ready to leave the intervention program.

(Prochaska, DiClemente, & Norcross, 1992)

### Pre-contemplation (Stage 1)

People in this stage do not think they have a problem, nor see the need to change their behaviour in the next six months. The hallmark of this stage is resistance to recognizing or modifying a problem. Statements that have been devised to identify an individual at this stage of change include “*As far as I’m concerned, I don’t have any problems that need changing*” and “*I guess I have faults, but there’s nothing that I really need to change*” (Prochaska & DiClemente, 1998).

### Contemplation (Stage 2)

People in this stage realize the benefits (pros) and barriers (cons) of both the problem behaviour and the need for change. Those who are seriously considering changing the problem behaviour within the next six months are classified as contemplators. The hallmark of this stage is ambivalence about changing. Statements that have been devised to identify an individual’s stage of change and include “*I have a problem and I really think I should work on it*” and “*I’ve been thinking that I might want to change something about myself*” (Prochaska & DiClemente, 1998).

### Preparation (Stage 3)

People in this stage are already taking some significant action or intend to take action within 30 days. The hallmark of this stage is an intention to take action in the near future. Statements devised to identify an individual's readiness for change relate to contemplation and action and include "*I can do it but I need the time*" and "*I have tried to change but I haven't had a lot of success.*" (Prochaska & DiClemente, 1998).

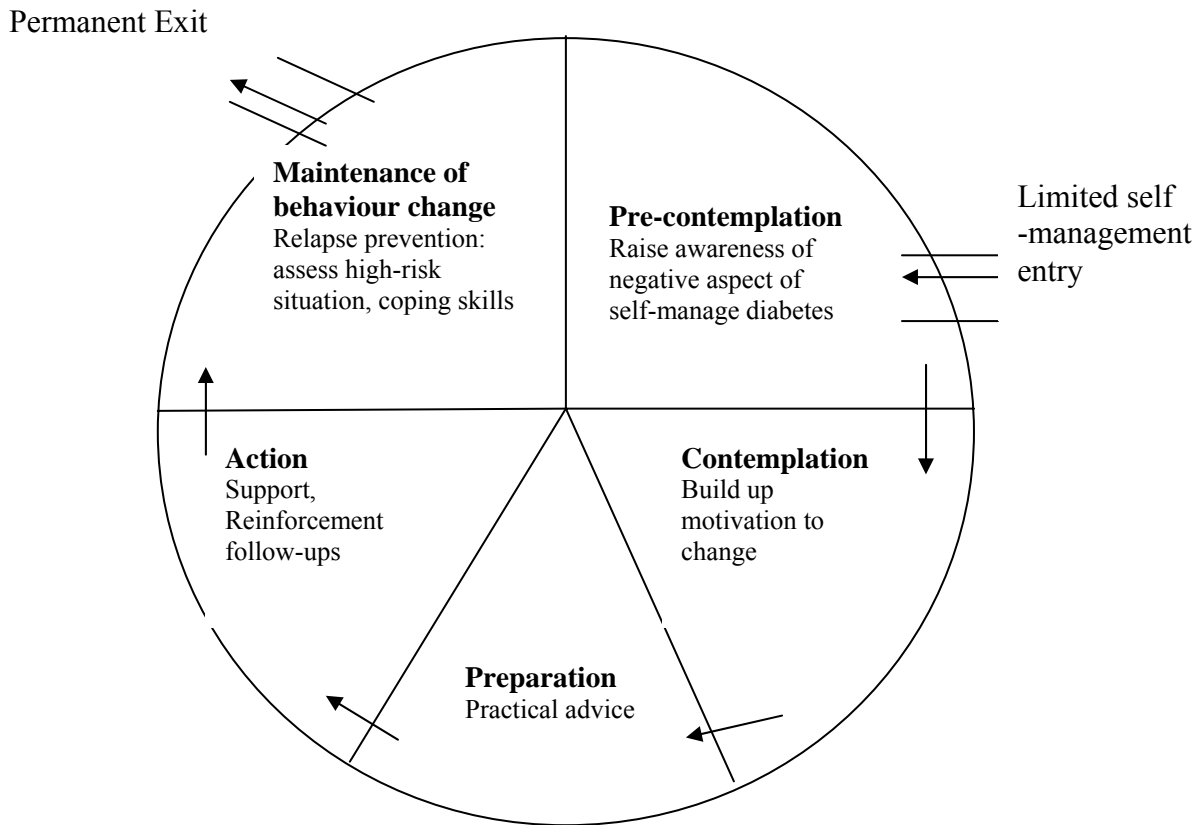
### Action (Stage 4)

The Action stage involves individuals modifying their behaviour, experiences, or environment to overcome their problems. They show signs of change but it has been for periods of less than six months. The hallmark of this stage is the modification of the target behaviour to an acceptable standard and significant overt effort to change. Statements that identify individuals at this stage of change include "*I'm really working hard to change*" and "*Anyone can talk about changing, I am actually doing something about it*" (Prochaska & DiClemente, 1998).

### Maintenance (Stage 5)

People in this stage have engaged in positive behavioural change for more than six months. The hallmark of this stage is stabilizing behaviour change and avoiding relapse. Statements that identify individuals at this stage of change include "*I may need a boost right now to help me maintain the changes I've already made*" and "*I'm here to prevent myself from having a relapse of my problem*" (Prochaska & DiClemente, 1998).

A brief description of the dynamic stages of change and self-management is presented in Figure 2.1.



**Figure 2.1: The dynamic stages of change and self-management**

#### **2.4.2 A review of studies using The Transtheoretical Model**

As part of the literature review to inform the proposed study, an examination of studies using the Transtheoretical model (TTM) to promote diabetes self management behaviours was undertaken.

##### Search parameters

The following databases were searched for the period 2000 to December 2007: the Cumulative Index to Nursing and Allied Health literature (CINAHL), MedLine, ProQuest, Psych Info, PubMed, Cochrane, and ProQuest nursing journals. The keywords used were; diabetes, self-care behaviours, self-management, lifestyle change and stage of change, stage-matched, and Transtheoretical Model. Inclusion criteria were: reported self-management or self-care behaviours, stage of change, and Type II diabetes. If the type of diabetes was unclear, then the study was included if the mean age of participants was >30 years as this cohort is more likely to have Type II diabetes.

Exclusion criteria were: publication in a language other than English; not available by inter-library loan service in Australia; dissertation abstracts (as these contain insufficient information for evaluation and the full text is rarely available); and Type I diabetes, because often their behaviour change pattern is different from people with Type II diabetes (Norris et al., 2001). Due to the small number of studies in this area, all study designs were scrutinized for inclusion in the review as well as scrutinizing those studies with samples that included both types of diabetes.

The search produced 466 abstracts. This number was further reduced by selecting research-based articles, specifically those studies related to Transtheoretical Model (TTM) in relation to diabetes self-management or self-care behaviours, and those related to the Stage of change. This resulted in 13 papers from 12 studies being selected for inclusion in the review. Five papers reported the outcomes of RCTs, three used a prospective cohort design, two used a quasi-experimental design, one reported on the findings of a cross-sectional study, and one was a qualitative study. All the included studies were reviewed and compared, then summarized and presented in Table 2.3.

The papers included in the review report on the application of the Transtheoretical Model (TTM) with Type II diabetes and were conducted in different countries and regions. A comparison of research outcomes between these studies was difficult, however, because the studies differed in regards to sample characteristics, research design, methods of data collection and selected outcome measures.

#### Setting and Sample Characteristics

The majority of papers were derived from the USA (8 studies), UK (2 studies), South Korea (one study) and the Netherlands (one study). The recruited samples varied widely, depending on the design used by researcher. For example, eight studies involved people with Type II diabetes only, 3 studies included people with Type I or Type II and one study did not specify the type of diabetes but the mean age of participants was greater than 30 years. As argued previously, if the data was not analysed according to type of diabetes, it was difficult to accurately determine the effectiveness of the intervention for that particular cohort. For example, the study by



Jones et al. (2003) failed to clearly explain the effects of the intervention according to the different type of diabetes whereas, Peterson and Hughes (2002) analysed results separately for participants with Type I or Type II diabetes.

The studies under review were conducted in different settings and locations. Four studies were conducted in rural areas, 5 studies were conducted from a city clinic, but three 3 studies did not reported the setting. Most studies reported a sample mean age of greater than 52.5 years; only one study reported a sample mean of less than 50 years of age (Mau et al., 2001). Interestingly the majority of studies had a wide age range varying from 35 to 85 years; two studies did not report an age range in their study (Jones et al., 2003; Vallis et al., 2003). Previous researchers in this area have identified the need to conduct research with representative samples in order to facilitate implementation of proven and broadly applicable interventions (Norris et al., 2002; Glazier et al., 2006).

**Table 2.3 Studies using Stage of change (SOC) for diabetes self-care behaviours**

Authors & Year	Sample/Population group	Sample size	Design/Interventions	Outcome measures	Findings	Limitations
Clark et al. (2004)	Type II diabetics Rural clinic outpatients Sussex, UK  58% male 42% female  Mean age 59.5 years (range = 40-70)	166	RCT Lifestyle intervention  Modified MI involving individualised behaviour change strategies Sessions conducted every 12 weeks (x3). Met therapist at 52 weeks and thanked for participation.  Control group received same level of contact - every 12 weeks (x3). 12 month follow-up	BMI HbA1c Cholesterol Triglycerides Total HDL-C LDL-C Diabetes self- management (Summary of Diabetes Self-care Activities) Fat-related dietary habits (using Kristal Food Habits questionnaire) Physical activity (using Physical Activity Scale for the Elderly questionnaire) SOC initial assessment	Significant difference on fat-related dietary habits, Summary of Diabetes Self-care Activities  No significant difference on BMI, HbA1c cholesterol, triglycerides, HDL-C, LDL-C and physical activity	1. No comparison of dropouts to completers. 2. Incomplete baseline statistics 3. No detailed on usual care. 4. No reported on SOC movement during the study
Delahanty et al. (2006)	Type II diabetics Community clinic outpatients Boston, USA 35% male 65% female  Mean age 52.5 years (range= 39-62)	274	Prospective cohort study Lifestyle intervention  To predict psychological variables on physical activity in the Diabetes Prevention Program  Self reported questionnaires and behaviours record  6, 12, 24, 36 months follow-up	Weight loss history Stage of change Leisure physical activity (in met hours and self-reported per week) Self-efficacy (weight efficacy lifestyle questionnaire) Dietary restraint (restraint subscale of the Dutch Eating Behaviour questionnaire) Emotional Eating Behaviour questionnaire Being Eating scale Perceived stress, depression and anxiety questionnaire	Men had significantly higher levels of leisure physical activity, self-efficacy, lower levels of depression and BMI than women at baseline, 12, 24 months Older participants reported more minutes on Leisure physical activity at 12, 24 months SOC (maintenance vs contemplation stage) significant predicted physical activity on maintenance stage Higher levels of baseline physical activity correlated with greater readiness to change, exercise self-efficacy, lower levels of perceived stress, depression and anxiety at 12, 24 months	1. Self reported behaviours 2. No pre-contemplation stage participants 3. Women and men had significant differences in baseline physical activity

Included					SOC assessed only at baseline Age, sex, race-ethnicity and weight control history significant associated with BMI Higher BMI correlated with weight cycling, efforts at weight loss, younger age, lower exercise efficacy, lower weight loss efficacy, a less advanced stage of change for weight loss, more perceived stress emotional eating, poor dietary restraint, being eating frequency and severity, feeling deprived, angry or upset while dieting, and food cravings while dieting	Only reported baseline data
Delahanty et al. (2002)						
Jones et al. (2003)	Type I & Type II Clinic outpatients Southern Ontario, Nova Scotia, USA  47.6 % female 52.4 % male Mean age 54.8 years (rang not reported)	1029	Randomized stratified design  Self-care behaviour change intervention Intervention - pathways to change involving stage-matched personalized assessment reports, self-help manuals, newsletters, individual phone counselling every month Control group received regular physician or endocrinology visits or education sessions as usual 12 month follow-up	Stage of change HbA1c SMBG Healthy eating Smoking	Significant difference on SMBG, HbA1c (only for Action or Maintenance stage), more people shift from pre-action to action stage, more choices healthy low-fat food and stop smoking  No significant difference on visiting physician rates.	1.No information on each stage of change for comparison 2. No details how PTC program delivered 3. No detail on counsellor training. 4. Self-reported behaviours 5. 77.7% completed 6. Unclear if assessor blinded

Kim et al. (2004)	Type II diabetics Hospital outpatients South Korea  62.2% male 37.9% female Mean age 53.29 years (range= 40-65)	45	Pre-and post- test design with an intervention and control group matched for SOC Physical activity focus Intervention- stage-matched counselling strategies 60-90 min x 12 weeks, exercise behaviour training 30 min, 3-5 day a week, and telephone counselling 10-30 min twice a week Control group received usual educational advice 3 month follow-up	HbA1c FBS SOC Readiness for exercise behaviour scale Physical activity levels (7-day physical activity questionnaire)	Significant on physical activity, contemplation, preparation and action stages, FBS and HbA1c  77.4% of the intervention group progressed stage of change from baseline.  Both stage of change and physical activity levels increased	1. Small sample size 2. convenience sampling 3. Limited details on usual care
Kirk et al. (2003)	Type II diabetics Outpatients Glasgow & Argyll area UK  50 % male 50 % female Mean age 57.6 years (range= 50-66)	70	RCT Physical activity intervention Intervention –exercise consultation one- on-one discussion 30 min, standard exercise leaflet and phone call at 1 & 3 months after consultation Control group received standard exercise leaflet and phone call at 1 & 3 months 6 months follow-up	BMI BP HbA1c Physical activity levels (the CSA uniaxial accelerometer 7 days) Behaviour change (stage of change) Cardiopulmonary exercise test (peak exercise test)	Significant on BMI, BP, HbA1c, physical activity counts per week, increase SOC, change in minutes of moderate activity	1. Small sample size 2. Randomization using consecutively numbered sealed envelopes 3. Unclear if assessor blinded

Mau et al. (2001)	Type II diabetic Indigenous Hawaiians, USA  31.5 % male 68.5 % female  Mean age 49.6 years (range= 37-63)	147	Quasi-experimental design Lifestyle/ skills training intervention Culturally appropriate program involving family support. 5 group teaching sessions (with the support person) & exercise classes for 6 months Control group received standard care 12 month follow-up	SOC Dietary behaviour (semi-quantitative food-frequency questionnaire) Physical activity behaviours (the modified activity questionnaire) Mediating factors (stage of change)	SOC associated with dietary and exercise behaviours, pre-action to action/maintenance for fat intake and physical activity	1. Convenience sample 2. Selected population by geographic location 3. Small sample size
O'Connor et al. (2004)	Type of diabetes unclear, refers to adults with diabetes  Outpatients Minnesota, USA 47.6% female 52.4% male Mean age 61.8 years (range= 49-75)	617	Prospective cohort study  SOC to predict glycemic change  Self-report questionnaires  12 month follow-up	HbA1c Questionnaire of SF-12 physical scale	Readiness to change predicts future HbA1c (>7%) change. Significant association between readiness to change and SF-12 physical score HbA1c<7% are more likely to be in the contemplation or preparation stage. In pre-contemplation stage are more likely to be women, younger, employed full-time, to have a shorter duration of diabetes, and higher BMI, and with HbA1c> 7%.	1. Population cohort 2. No details on assessor training.

Parchman et al. (2002)	Type II diabetics Community centre outpatients Rural Texas-Mexico border, USA  71.6% female 28.4% male Mean age 58.7 years (range= 49-68)	256	Prospective cohort study  To examine the relationships between self-management behaviours and stage of change  Interview and self-reported behaviours  Twice a 1 year interview and collected data	SOC for diet and exercise HbA1c Frequency of visits to physician	SOC associated with change in HbA1c SOC for diet associated with continuity of care and change in HbA1c levels, but not SOC for exercise	1. High attrition rate (31%) 2. Self-reported behaviours 3. Convenience sample
Peterson & Hughes (2002)	Type I and Type II diabetics Outpatient clinic, Minnesota USA  60 % male 40 % female Mean age 54 years (range= 28-75)	50	Prospective cohort study  Examine relationships between SOC and clinical outcomes  Assessed by researcher  Data collection at 3, 12, 24 months	Stage of change HbA1c	Individuals at preparation and action stages had larger reduction in HbA1c than pre- contemplation and contemplation stage at 3 and 12 months	1. Small sample size 2. Convenience sample referred from physicians

Singer (2007)	Type II diabetics Primary care outpatient African-American Male Age 63 years	1	Qualitative Case study Lifestyle intervention Application of SOC to influence change in behaviour Duration of intervention unclear	Stage of change Healthier lifestyle	Positive outcomes on the customize a plan to optimize health and movement to next stage	1. Limited generalizability. 2. Timeframe unclear
Vallis et al. (2003)	Type I and Type II diabetes Hospital outpatients Central Canada 48.9% male 51.1% female Mean age 56 years (range not reported)	768	RCT Lifestyle intervention Intervention - program based on the TTM theory, individualised stage-based feedback report and strategies, phone counselling every 3 months; free glucose strips Control group received usual care and no free strips 16 months follow-up	Low-fat eating – (National Cancer Institute - block food frequency); BMI, Quality of life (Diabetes QoL scale and mental health inventory- short form) Social support (Diabetes Family Behaviours Checklist; Interpersonal Support Evaluation List) Stressful life events (questionnaire on finances, relationships, and social problems)	Significant difference on low-fat eating, BMI, quality of life, social support and stressful life events.	1. No information on attrition 2. Unclear if assessor blinded 3. Unclear if sample representative
Van Sluijs et al. (2005)	Type II diabetes Rural and city 29 General Practices outpatients Netherlands 50.8 % male 49.2 % female Mean age 55.5 years (range= 18-70)	358	RCT Physical activity intervention Intervention – “Physician-based assessment and counselling for exercise (PACE)” program. Consultation 10 min, phone calls after 2 weeks and 8 weeks. SOC after 4 weeks Control group received usual care 8 weeks, 6, 12 month follow-up	Self-efficacy (making time and resisting relapse questionnaire) Benefits of physical activity scale Barriers to physical activity questionnaire Social support scale Processes of change questionnaire	Significant change on self-efficacy, cognitive and behavioural process of change at 8 weeks and 12 months Significant association with barriers at 8 weeks but not at 6 and 12 months No significant difference on benefits of physical activity at 8 weeks, 6, 12 months	1. Sample referred from physicians 2. Unclear if assessor blinded 3. No details on usual care 4. High non-response on the social support questionnaire

### Design and intervention

A variety of research designs have been used in an attempt to measure behaviour change among people with diabetes. Predominantly a RCT or quasi-experimental design was used to investigate lifestyle change (Clark et al., 2004; Mau et al., 2001; Vallis et al., 2003), increase physical activity (Kirk et al., 2003; Van Sluijs et al., 2005; Kim et al., 2004) or self-care behaviour change (Jones et al., 2003) interventions. All of these studies incorporated a process of stage-matched counselling and education, but also used other strategies to enhance behaviour change such as a modified motivational interview (Clark et al., 2004), phone call follow-up after a consultation (Kirk et al., 2003; Van Sluijs et al., 2005; Kim et al., 2004; Jones et al., 2003), family support (Mau et al., 2001) and provision of resources to facilitate behaviour change (such as free glucose strips) (Vallis et al., 2003). However, many studies reporting on strategies employed after the stage-matched assessment did not provide adequate information on the nature of the empowerment or motivation process used to encourage participants at a particular stage to change their inadequate behaviours, or how a process may have been modified for the particular target problem or participant population. For example, Jones et al. (2003) used various strategies such as self-help manuals, newsletters, and phone counselling. The authors failed to clearly explain how these strategies had been delivered or how they addressed a particular target problem. There were also no details provided on the effectiveness of each individual strategy (or in combination) for participants with either Type I or Type II diabetes.

Another issue of considerable importance when comparing and contrasting previous studies relates to differences in timeframe and intervention intensity. For example, Kim et al. (2004) provided 60-90 minute counselling sessions whereas Van Sluijs et al. (2005) provided only 10 minute counselling sessions. Jones et al. (2003) did not report on the counselling intensity. Another design issue relates to the period of follow-up which varied from 3 to 12 months. Only one RCT study (Vallis et al., 2003) followed participants for over 12 months. Most of the prospective cohort or cross-sectional studies included a 12 month follow-up, with one study following participants for over 24 months (Peterson & Hughes, 2002).

Studies using a prospective cohort or cross-sectional design examined the relationship between stage of change and clinical outcomes (Peterson & Hughes, 2002;



O'Connor et al., 2004; Delahanty et al., 2006) or self-care behaviours (Jones et al., 2003; Parchman et al., 2002). The qualitative study included in this review discussed the progress of a participant through the different stages of change using a case study approach (Singer, 2007). The majority of studies relied on self-report (e.g., Jones et al., 2003; Delahanty et al., 2006; Parchman et al., 2002), and only one study assessed outcomes by the researcher (Peterson & Hughes, 2002). Self-report was often used to collect data on eating or exercise behaviours. It is possible that an over-reliance on self-report may positively bias results. In this review, for example, only two studies failed to show improvement in physical activity; one study delivered the intervention every 12 weeks (Clark et al., 2004), and the other (Van Sluijs et al., 2005) noted improved physical activity during the intervention period but no significant difference at 6 and 12 months follow-up. Self-report relies on individual recall for accuracy, respondents' knowledge of self-management behaviours and their willingness to report those behaviours in a candid way. Quality of data may be enhanced by the use of various sources of objective and self-report information.

### Measures and outcomes

Glycosylated hemoglobin (HbA1c) is a measure of blood glucose control and an indication of the risk of developing complications for people with diabetes (UKPDS, 1998). HbA1c level is the most frequently-used outcome variable because it represents a three month average of an individual's blood glucose levels (ADA, 2003). In this review of the literature, seven of the 12 studies evaluated an intervention. One study failed to show improvements in glycemic control compared with the control group (Clark et al., 2004), and two studies did not measure glycemic outcomes. Increased physical activity levels were associated with improved glycemic control in two studies (Kirk et al., 2003; Kim et al., 2004). Most studies reported positive outcomes related to compliance with a low fat diet, physical activity and improvement in the stage of change. Interestingly only one study measured quality of life and noted a positive outcome (Vallis et al., 2003). Some studies did not provide enough information about Stage of change, for example, Clark et al. (2004) did not report on improvements in stage of change, and Delahanty et al. (2006) did not recruit participants in the pre-contemplation stage.

Five of the 12 studies were cross-sectional and prospective cohort studies, and several aimed to enhance diet control in order to improve HbA1c by using strategies that addressed a particular stage of change. However, Parchman et al. (2002) did not report a relationship between stage of change and exercise. This non-significant finding could be due to methodological issues such as high attrition rate (31%) and use of a convenience sample. Only one qualitative study interpreted the effect of different stages on health and progression into the next stage (Singer, 2007).

Results of many studies were marred by a range of methodological issues. There was potential selection bias as a result of high attrition rates (> 30%) (Kim et al., 2004; Mau et al., 2001; Parchman et al., 2002; Peterson & Hughes, 2002). Another limitation relates to sample size. For example, Kirk et al. (2003) recruited 70 people, Kim et al. (2004) recruited 45 participants, and there were 50 people in the Peterson and Hughes (2002) study. It was unclear if the assessor was blinded to the participant's group allocation (Kirk et al., 2003; Vallis et al., 2003; Van Sluijs et al., 2005; Jones et al., 2003), some studies did not report on the reliability of their measures (e.g., Delahanty et al., 2002), or there were no details on the attrition rate (Vallis et al., 2003). These limitations make it difficult to extrapolate and predict the true significant outcomes from these studies.

### **2.4.3 Conclusions about studies using TTM**

The majority of studies that incorporated TTM in their intervention reported positive results for changes in physical activity, dietary habits, and SMBG. There were generally positive correlations between stage-matched assessment and BMI, HbA1c, exercise and healthy eating. However, the main problems with research in this area relate to small sample sizes, use of disparate multiple outcomes, not using well-known validated questionnaires, poorly-defined training or strategies, and inadequate information on how the theory-based intervention was modified for the particular target problem. These limitations made it difficult to draw accurate conclusions or make comparisons between studies.

Future research needs to address the gaps identified in the emerging literature. Firstly, many of the design features need attention. Future studies need to include larger sample sizes, conduct power calculations to ensure that change can be accurately identified, use validated, standardized measures, and provide detailed descriptions of program content and intervention strategies. Secondly, future research needs to focus on the process of behaviour change and its key components, for example, what is the best way to motivate participants and which are the optimal methods for responding to resistance. Thirdly, intervention studies need to devise and test the efficacy of motivational strategies that enhance the likelihood of people self-managing their diabetes.

## **2.5 Motivational interviewing (MI)**

Motivational interviewing (MI) consists of a set of strategies intended to facilitate individuals through the Stages of Change. As motivation increases, the focus of the motivational interview shifts toward development and commitment to a change plan. This progression from ambivalence, to commitment, to behaviour change is mirrored in the Transtheoretical Model (TTM) (Prochaska & DiClemente, 1983). In this model, the person enters the change process by moving from the pre-contemplation stage to the contemplation stage, weighing the costs and benefits of changing or maintaining their behaviour (Miller & Rollnick, 1991). As ambivalence resolves into commitment, the person moves into the preparation stage. If strengthened and maintained, this commitment carries through to the action and maintenance stages, in which behaviour change is initiated and stabilized. The intent behind motivational interviewing is to guide people from pre-contemplation or contemplation into action by increasing their motivation to change (Miller & Rollnick, 2002). For example, Bledsoe (2006) used TTM and motivational interviewing in a 'quit smoking' program. It was found that stage of change was effective in identifying participants' needs to address their smoking behaviour and progress through the stages of change to achieve their desired behaviour.

Motivational Interviewing (MI) is a method of augmenting an individual's motivation to change problematic behaviours (Miller & Rollnick, 2002). The MI is not focused on teaching new coping skills, reshaping cognitions, or excavating the past. It is

focused on the person's present interests and concerns. MI involves selective responding and a facilitative approach to communication in a way that resolves ambivalence and moves the person toward change. MI strategies can be integrated well with the TTM model which can be helpful in deciding which strategies to use and when to use them in the counselling session. MI approaches are appropriate for people at all stages of change. According to Miller and Rollnick (2002) the motivational interview is best understood in the context of the TTM approach, as it recognizes that not all individuals who engage in dysfunctional behaviour are in a state of readiness to change. Within a MI strategy, the role of the interviewer is to assess the stage of change and then trigger the process of change using techniques that are specific to that stage. Motivational interviewing has been applied to change behaviours considered addictive (e.g., abuse or dependence on alcohol and nicotine), obesity, heart disease, and eating disorders.

Positive behaviour change can be partly attributed to interventions combining the TTM with MI. This intervention method could therefore enhance our understanding diabetes management behaviour at each stage of change. Given the positive effects of motivational interviewing in changing behaviour a review of studies using this approach in regards to Type II diabetes was conducted.

## **2.6 Review of motivational interviewing in Type II diabetes**

Motivational interviewing has been widely used in the field of addictions and a recent systematic review found substantial evidence that MI is an effective substance abuse intervention method (Knight et al., 2006). However, several studies have provided support for the relevance of the MI to improve processes of engagement, adherence, and change during chronic pain self-management treatments for a range of conditions (Habib, Morrissey, & Helmes, 2005; Habib, Morrissey, & Helmes, 2003). Many randomized controlled trials have also reported the effectiveness of MI with problem drinkers (Baker et al., 2002; Figlie, Dunn, & Laranjeira, 2004; Miller, Benefield, & Tonigan, 1993; Spirito et al., 2004; Beckham et al., 2007). Motivational interviewing has also been used in smoking cessation (Curry et al., 2003; Hollis et al., 2005), and dietary fat reduction and exercise promotion programs (Bledsoe, 2006; Calhoun, 2005; Hart, Tinker, Bowen, Longton, & Beresford, 2006; Singer, 2007).

### Search parameters

A search of major databases (CINAHL; Embase; Medline; Psych Info; Cochrane; ProQuest; PubMed; Sociofile from 2000 to 2007) was undertaken to retrieve English language publications using the key words ‘motivational interviewing’, ‘stages of change’, ‘transtheoretical model’, and ‘behaviour change’ to ensure papers not explicitly advertising the use of MI would be included. Reference lists of all relevant articles obtained were checked and additional potentially relevant articles retrieved. The search produced 469 abstracts of which 189 were duplicates. The remaining 280 abstracts were further reduced by selecting research-based papers, specifically those studies related to diabetes, and use of motivational interviewing as an intervention to promote behaviour change. All study designs were scrutinized for inclusion in the review.

#### **2.6.1 Findings**

Using these methods five papers were retrieved. Of these, two articles that reported on the people with Type I diabetes were excluded (Channon et al., 2003; 2007). Although they provided some evidence that adolescents with Type I diabetes valued the intervention, it was believed that the educational techniques and social influences were sufficiently different between Type I and Type II, thus a separate review was recommended (Norris et al., 2001).

Four randomised controlled trials were included in the review. Details of these studies are shown in Table 2.4. These four studies used motivational interviewing as an intervention method. Three studies were derived from UK (Clark & Hampson, 2001; Clark et al., 2004; Jackson et al., 2007) and one was conducted in the USA (West et al., 2007). The four trials had different research purposes: lifestyle change (Clark & Hampson, 2001; Clark et al., 2004), increased physical exercise (Jackson et al., 2007), and weight loss (West et al., 2007). Three studies targeted overweight people with Type II diabetes. The age range was from 34 to 75 years. The samples of three studies included an equal gender balance whereas one study focused on women. The length of the MI intervention differed from 10 minutes to 30 minutes, and number of sessions varied from one to 5 sessions. Three studies combined methods (weight loss education

and phone call follow-up) with MI and only one study used a single MI session. The length of follow-up varied from 6 weeks to 52 weeks. The outcome measures were focused on lifestyle change, self-reported physical activities, stage of change, weight, HbA1c, session attendance rate, self-reported monitoring diet. The results were mixed. For example, Jackson et al. (2007) reported significant results; West et al. (2007) reported significant effects in the short-term but not on long-term results; Clark and Hampson (2001) only provided baseline data whereas Clark et al. (2004) reported significant differences on fat-related dietary and activity but no significant results on metabolic and physical activity variables.

**Table 2.4 Studies of using a MI intervention for Type II diabetes**

Authors & Year	Sample/Population group	Sample size	Design/Interventions	Outcome measures	Findings	Limitations
Clark et al. (2004)	Type II diabetics Clinic-based Rural Sussex, UK Rural clinic outpatients 58% male 42% female Mean age 59.5 years (range= 40-70)	166	RCT Intervention - the modified MI education (behaviour change strategies session) for 30 min. Telephone calls at 12, 24 and 52 weeks  Control group received usual care  12 months follow-up	BMI HbA1c Cholesterol Triglycerides Total HDL-C LDL-C Diabetes self-management (using the summary of diabetes self-care questionnaire) Fat-related dietary habits (using the Kristal food habits questionnaire) Physical activity (using the physical activity scale for the elderly questionnaire)	Significant difference on Fat-related dietary habits, the summary of diabetes self-care activities  No significant difference on BMI, HbA1c cholesterol, triglycerides, HDL-C, LDL-C and physical activity	1. No comparison dropouts to completers. 2. Incomplete baseline statistics 3. No detailed on usual care.
Including  Clark & Hampson (2001)		100	Presents descriptive data of just 100 participants		Baseline data presented	1. Small sample size 2. No details on usual care 3. Unclear if assessor Blinded 4. No comparison dropouts to completers 5. Baseline data available only no comparison data 6. Some instruments unclear on reliability 7. No detail on intensity of MI session

Jackson et al. (2007)	Type II diabetics Hospital-based South-west London UK Diabetes clinic outpatients 52% male 48% female Mean age (range= 34-75)	40	RCT Intervention- exercise consultation interview session for 20-30 min  Control group received usual care  6 weeks follow-up	Physical activity levels Stage of change	Significant difference on physical activity, stage of change from the contemplation stage progressed onto a higher stage of change	1. Small sample size 2. Physician-referred patients 3. No details on usual care 4. Unclear on randomized allocation process 5. Unclear if assessor Blinded
West et al. (2007)	Type II diabetics Community-based Central Birmingham and Alabama USA Over weight volunteer women 0% male 100% female Mean age 53 years (range= 43-63)	217	RCT Intervention - a behaviour weight control program (42-session) with motivational interviewing sessions (5-session) over 12 months.  Control group received weight control program for 42 sessions over 12 months.  12 and 18 months follow-up	Weight HbA1c Number of group sessions attended Number of self- monitoring diaries submitted Self-monitoring diary rating	Significant difference on weight loss, HbA1c (only for 6 months not for 12 and 18 months), number of group attended rate (not for 18 months), number of self-monitoring diaries submitted rate and self-monitoring diary rate  African American women vs white women weight loss (1.4±4.7 vs 3.3±7.1kg, p=0.04) during 18 months.	1. Only focus on women population thus the generalization for men was concerned. 2. No information on non- participants 3. Volunteer study population 4. Unclear if assessor blinded



All of the trials had some limitations making it difficult to draw firm conclusions about the effectiveness of intervention. In the study by Clark and Hampson (2001), the sample size was small (n = 100) for a randomized control trial and there were only 40 people recruited by Jackson et al. (2007). This particular study may have had insufficient power to detect a true difference between groups. Furthermore, the four trials failed to clearly explain if the assessor was blinded to the participant allocation and no details were provided about the usual care offered to participants in the control group. Clark et al. (2004) did not report on baseline statistics and no data that compared characteristics of people who were lost during the study to those who completed. Additionally, most studies had potential selection bias as a result of high non-response rates and recruitment protocols. For example, Jackson et al. (2007) used physician-referred patients, and West et al. (2007) used only female volunteers. Although it is likely that gender plays a role in adherence to diabetes self-management regimes, these results could not be easily generalized to men.

The trial by Clark and Hampson (2001) did not clearly explain components of their intervention and only presented baseline data. The main RCTs (Clark et al., 2004; Jackson et al., 2007; West et al., 2007) reported positive effects of MI on increased physical exercise and weight loss. Two studies reported some positive medium term changes in regards to glycemic control (Clark et al., 2004; West et al., 2007) but not at 12 months follow-up.

### **2.6.2 Discussion of the review findings**

The results of these RCT studies should be regarded with caution for several reasons. Firstly, an exact description of components of the intervention was not reported making it difficult to know precisely which component was effective. Secondly, some of the selected outcome measures (e.g., glycemic control or quality of life) did not match the intent of the intervention. In the four studies reviewed the intervention aimed to primarily address weight loss (West et al., 2007), increased physical exercise (Jackson et al., 2007) or lifestyle change (Clark & Hampson, 2001).

Despite these limitations, motivational interviewing can facilitate a number of positive effects on behaviour and can be used as a part of nursing practice in regards to

patient education, compliance with treatment regimes and lifestyle changes. There are also a number of implications for future research. There is an urgent need for good quality trials that address the limitations described in this review. This includes the recruitment of large sample sizes informed by power calculations, the use of validated outcome measures, the provision of intervention details, and details on the method by which sessions are delivered (frequency, duration, therapeutic focus). These factors are important to develop an evidence-based intervention program for diabetes self-management.

## 2.7 Conceptual framework

In this study, the conceptual framework identifies various factors influencing diabetes self-management and incorporates motivational interviewing within a behaviour change framework (TTM) to bring about better outcomes. The literature review identified several variables (personal, psychological, social, metabolic factors) for inclusion in the baseline assessment. The stage of readiness to change is identified as a mediator for self-management outcomes. The framework used for this study is outlined in Figure 2.2.

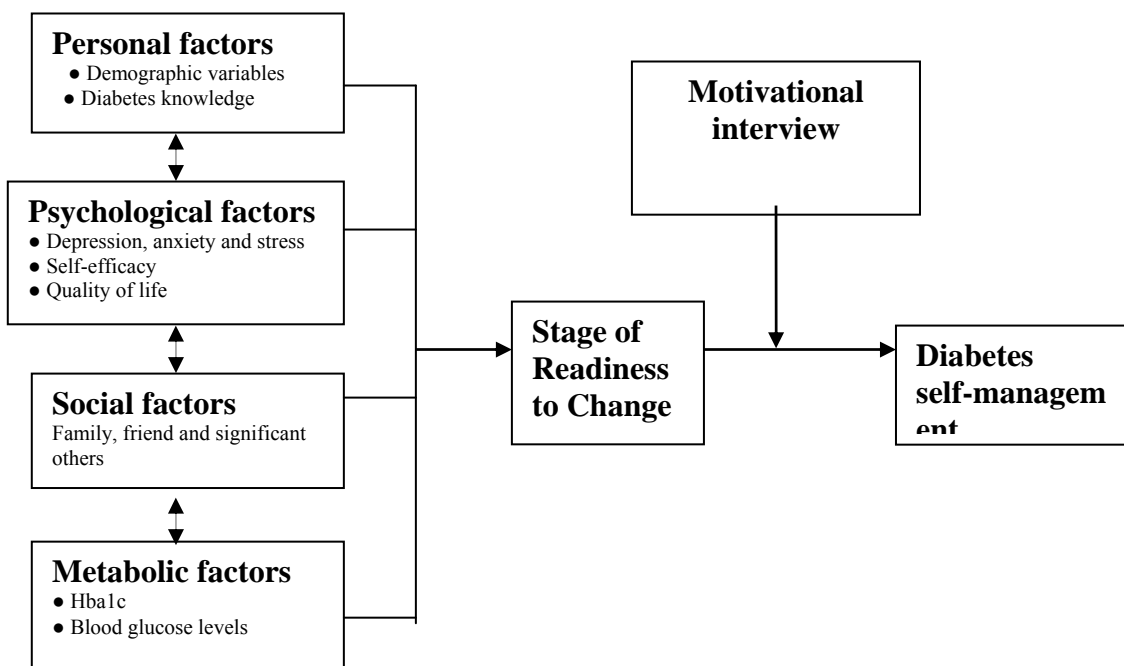


Figure 2.2: Conceptual framework for the study

## 2.8 Summary

This review of the literature has identified several important issues. Clearly this review supports concerns about the quality of research on self-management interventions to promote diabetes self-management. Most of the studies focused on self-management interventions relating to medication (including regimen changes and adherence), blood glucose self-monitoring, and exercise. However, it is clear from studies of self-management interventions that behavioural interventions must be addressed and be practical and feasible. A number of examples in the literature suggested that further research on possible interventions is needed to investigate and clarify issues relating to participation and maintenance of self-management. Further research is needed to identify the barriers and influences affecting behaviour change.

The majority of clinical care practices for people with Type II diabetes have followed recommendations by the American Diabetes Association. Unfortunately, it is commonly reported that many people with Type II diabetes suffer knowledge and skill deficits, and less than half of this population achieve ideal HbA1c levels. Individuals with Type II diabetes are in contact with a wide variety of health care providers, which increases the likelihood of conflicting advice and confusion in regards to treatment guidelines for some people. For instance, while some individuals are followed-up by their physicians and may have their medical treatment varied as deemed necessary, they may not receive adequate and effective education to self-regulate their own medication or health behaviours. Given the increasing prevalence of Type II diabetes world-wide, there is relatively little attention given to assessing individuals' readiness to make change and sustain such behaviour in order to prevent long-term complications of diabetes.

This review identified the benefit of motivational interviewing strategies in promoting self-management by people with a chronic or problem condition, such as chronic pain, alcohol abuse, or cigarette smoking. From the limited available evidence it is clear that stage of change is predictive of stable HbA1c and blood glucose levels. While many studies have aimed to improve diabetes knowledge, psychological

well-being and social variables, relatively few studies have focused on increasing motivation for self-management. Thus, the integration of motivational interviewing strategies within a transtheoretical model could be an important strategy to improving self-management of Type II diabetes. The methods of this intervention study will be presented in Chapter 3.

## **CHAPTER THREE**

### **METHOD**

#### **3.1 Introduction**

The review of the literature identified several significant gaps in the area of diabetes self-management. Firstly a number of RCT intervention studies continued to focus on knowledge and glycemic control to the exclusion of psychological outcomes such as quality of life and behavioural end points (Brown et al., 2002; Keyserling et al., 2002; Norris et al., 2002). The exact content, design, and intensity of a particular intervention was often not clear. Secondly, knowledge alone was not sufficient to translate into increased confidence and motivation necessary to improve diabetes self-management (Brown et al., 2005; Long et al., 2005). Thirdly, previous studies using motivational interviewing had methodological weaknesses associated with small sample sizes, lack of a power calculation, and ambiguity in regards to stage of change and processes during the motivational interview (Clark & Hampson, 2001; Jackson et al., 2007). This chapter describes the research design, sample, setting, measurements, details of the motivational interviewing intervention for the present study, data collection procedures, approach to analyses of quantitative and qualitative data, steps to ensure accuracy and trustworthiness of qualitative data, and ethical considerations.

#### **3.2 Design**

The aim of this study was to determine whether participation in a motivational interview by Taiwanese people with Type II diabetes would improve their self-management and well-being (stage of change, personal, psychological, social and metabolic outcomes). A randomized controlled trial was considered appropriate to minimize the effect of extraneous factors and allow conclusions about the effectiveness of the intervention (Polit & Hungler, 2004). This three phase RCT design included a small qualitative component. Participants were randomly assigned to either the motivational interview (intervention group) or usual care (control group). Phase I provided baseline data, phase II was the intervention and phase III involved re-testing at 3 months follow-up. The overall research design and schedule for data collection are

depicted in Figure 3.1.

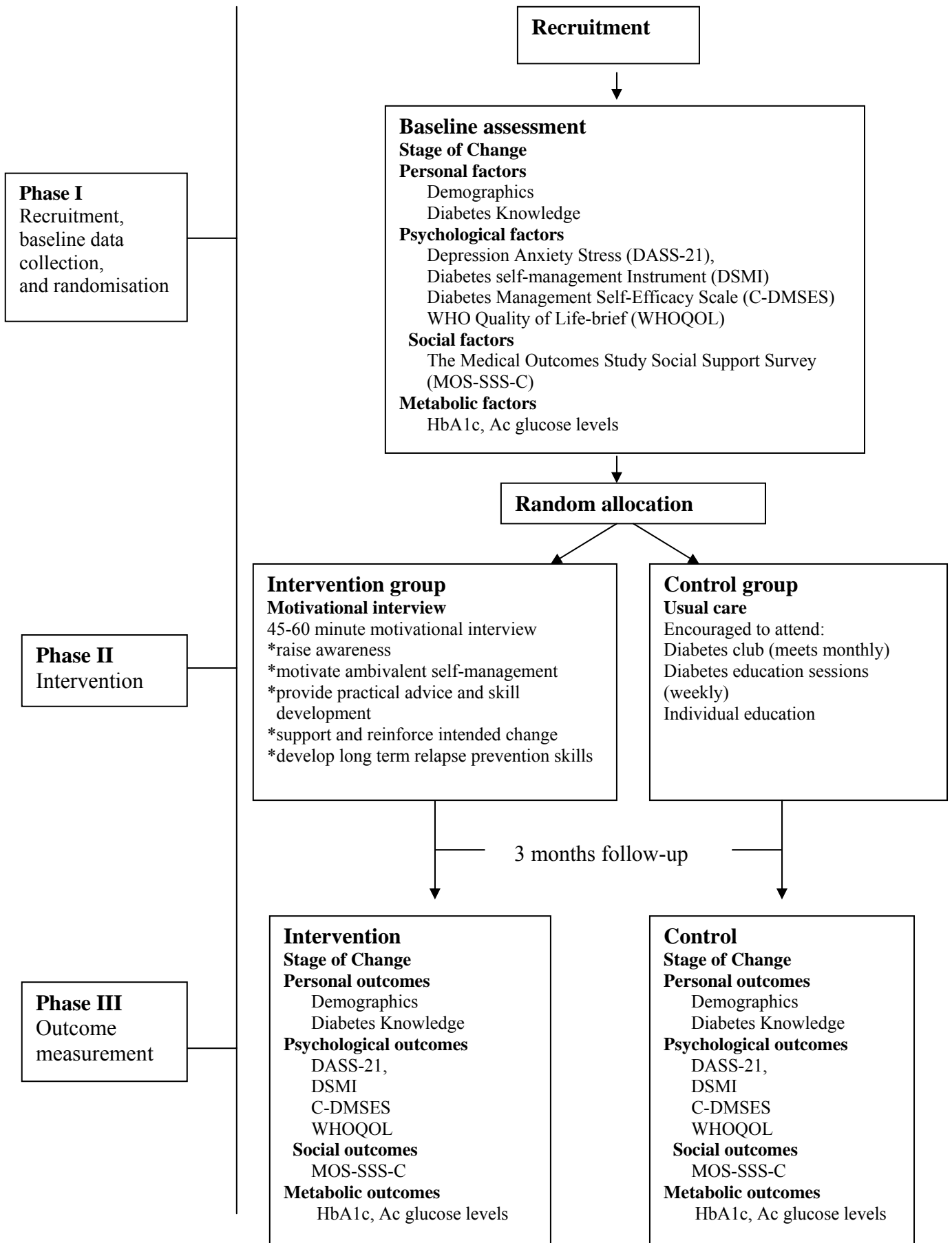
### **3.3 Sample**

Participants were drawn from a large tertiary teaching hospital diabetes outpatient clinic. Inclusion criteria required participants to be: enrolled in the diabetes clinic and have a diagnosis of Type II diabetes for more than 3 months with; more than 18 years of age; able to consent to participate on their own behalf; have no obvious confusion or psychiatric illness; and able to speak, read and write in Chinese. Individuals were excluded from participating if they demonstrated: difficulty communicating in Chinese or were too ill to participate such as patients diagnosed with a terminal illness or receiving haemodialysis.

The sample size was based on a power calculation. The estimation of a medium effect was deemed clinically significant and attainable. A medium effect size of .3 with an 80% confidence interval using 0.05 probability was adopted. Ninety-five percent (0.95) power was selected to decrease the risk of a Type II error. A further 20% was added to the calculations to allow for withdrawals from the study. Thus, a sample of 155 in each group (or a total of 310 people) was required to demonstrate a significant difference.

### **3.4 Setting**

The study took place at a large tertiary teaching hospital located in the Southern Taiwan. The hospital provides a full range of services for children, adolescents, and adults. Services include inpatient and outpatient treatment for many medical diagnoses, including the evaluation and treatment of diabetes. This community teaching hospital serves a local population of more than 215,000 people. This hospital provides services to more than 4300 outpatients with diabetes. An average of 100 people visit the diabetes clinic each day. Dieticians, case managers, nurses, and physicians staff the clinic.



**Figure 3.1: Study design and schedule of data collection**

### **3.5 Description of instruments**

Seven instruments were used in this study to measure key variables at the pre- and post-intervention phases (see Appendix 1). They are described in the following section.

#### Stage of change

The five-item Stage of Change Scale was designed to assess participants' readiness for change. There are five sequential stages of change, a one question stem with five responses, one for each stage, where the participant selects the most applicable response (pre-contemplation= 1, contemplation = 2, preparation = 3, action = 4, maintenance = 5). The pre-contemplation stage includes participants who do not manage their diabetes regularly and had no intention to begin managing their diabetes regularly in the next six months. The contemplation stage includes participants who did not manage their diabetes regularly, but intended to begin managing their diabetes regularly in the next 6 months. Those in the preparation stage did not manage their diabetes regularly, but intended to begin managing diabetes regularly in the next 30 days. Participants who did manage their diabetes regularly but had been managing their diabetes for less than 6 months were in action stage. The Maintenance stage was reflected by participants who had been managing their diabetes for more than six months.

An evaluation of the Stage of Change questionnaire for concurrent validity was conducted by Marcus et al. (1992) who reported a two-week test-retest reliability of 0.78 (n = 20), which was almost identical to that reported by other studies. Donovan, Jones, Holman and Corti (1998) reported a Kappa index of reliability of 0.72 for a similar measure for quitting smoking, 0.73 for reducing alcohol consumption, and 0.52 for doing more exercise. Reliability of the Chinese version of this scale was reported in a preliminary study by Lee et al. (2004) who reported a Cronbach's alpha 0.79 with a sample of 150 participants.



### Demographics

The demographic form contained 12 items which included age, gender, marital status, education level, length of years since diagnosis of diabetes, employment status, religion, living arrangements, other diseases, frequency of self-monitoring blood glucose, frequency of self-recorded blood glucose, and smoking status. This form was in Chinese.

### Diabetes self-management instrument (DSMI)

The Diabetes Self-Management Instrument (hereafter DSMI) is a 35-item self-report scale developed by Lin (2005) that aims to measure diabetes self-management behaviour. This form is available in Chinese. The instrument has five subscales: self-integration, self-regulation, interacting with health care provider and significant others, self-monitoring blood glucose, and adherence to recommended regimen. The DSMI items are rated by participants on a 4 point Likert scale, with scores ranging from '1 = never, it would not happen', 2 = 'occasionally, it happens one to three days each week or happens less than half of a week', 3 = 'usually, it happens four to six days each week or it happens more than half of a week', and 4 = 'always, it happens every day'. According to Lin (2005) the internal consistency as measured by Cronbach's alpha coefficient for the overall scale is 0.94 and for each of the five subscales ranging from 0.77 to 0.90. The two-week test- retest correlations for the instrument are acceptable (overall  $r = 0.73$ ,  $p < 0.01$ ).

### Diabetes Knowledge Instrument

The 21-item Diabetes Knowledge Instrument was designed to assess personal knowledge of diabetes (Lee et al., 2004). This instrument includes six aspects of diabetes knowledge; diet, exercise, medication, self-monitoring glucose level, complications, and foot care. Items are rated by participants on a 3 point scale and produces scores of one (1) for each correct answer, zero (0) for each wrong answer and zero (0) for each "unsure" response. The Chinese version of the instrument has been used in a preliminary study with 143 Taiwanese people with Type II diabetes within the clinical setting. The internal consistency for the Diabetes Knowledge Instrument has a reported Cronbach's alpha of 0.76 (Lee et al., 2004).

### Depression anxiety stress scale (DASS-21)

The 21-item self-report Depression Anxiety Stress Scale (hereafter DASS-21) was developed by Lovibond and Lovibond (1995) with the aim of assessing depression, anxiety, and stress. The DASS-21 consists of 21 items rated by participants on a 4-point Likert scale, with scores ranging from ‘did not apply to me at all = 0’, ‘applied to me to some degree, or some of the time = 1’, ‘applied to me to a considerable degree, or a good part of time = 2’, or ‘applied to me very much, or most of time = 3’. The internal consistency for the DASS-21 subscales has been reported to be 0.91 (depression), 0.84 (anxiety), and 0.90 (stress) with a large normative population, and reported to be 0.96 (depression), 0.90 (anxiety), 0.94 (stress) with a clinical sample (Taouk, Lovibond & Laube, 2003). Crawford and Henry (2003) administered the DASS-21 to a non-clinical sample, broadly representative of the general adult UK population (n = 1,771). The Cronbach’s alpha for the total score was 0.96 (95% CI= 0.96-0.97), 0.94 (95% CI = 0.94-0.85) for the depression scale, 0.89 (95% CI = 0.89-0.90) for the anxiety scale, 0.93 (95% CI = 0.92-0.93) for the stress scale. The Chinese version of the instrument has been used by Taouk, Lovibond and Laube (2003) in a study with 729 Hong Kong Chinese-speaking people. The internal consistency reported in this Chinese population for the DASS-21 was 0.92 (depression), 0.94 (anxiety), and 0.91 (stress). The present study used the Chinese version of the 21-item DASS-21.

### Diabetes management self-efficacy scale (C-DMSES)

The Diabetes Management Self-Efficacy Scale (hereafter C-DMSES) was used to assess individual’s level of confidence in managing their blood sugar, diet, and exercise regime. Bijl, Poelgeest-Eeltink and Shortridge-Baggett (1999) reported the results of the 20-item DMSES with 94 Type II diabetes people. The Cronbach’s alpha for the total scale was 0.81, and the test-retest reliability with a 5 week time interval was  $r = 0.79$ . The 20-item C-DMSES was translated into Chinese by Wu (2006). The translated instrument had a reported internal consistency of 0.88 on the total scale, and test-retest reliability with a 4-week time interval of  $r = 0.91$ . All items were rated on a 10 point likert scale, of 0 = ‘cannot do at all’, to 5 = ‘maybe yes, maybe no’, to 10 = ‘certainly can do’, with a higher score indicating a higher management self-efficacy. The C-DMSES was employed to assess cultural equivalency, content validity and reliability of the Chinese version in a Taiwanese population.

### WHO quality of life- brief (WHOQOL)

The WHO Quality of Life-brief aims to assess quality of life, and emanated from a World Health Organization (WHO, 1991) collaborative study. Drawing on this cross-culturally valid instrument overcomes the usual controversy over the ‘emics’ and ‘etics’ of applying a questionnaire developed in one culture to a different culture. According to Ohaeri, Olusina and Al-Abassi’s (2004) the internal consistency of WHOQOL-brief (26 items) for 118 subjects was high with a Cronbach’s alpha of 0.85. The present study used the 28-item Taiwanese version of the WHOQOL-Brief. The instrument was translated by Wang, Yu, Chung and Yao (2000) from the original WHO Quality of Life questionnaire.

The 28-item questionnaire covers four domains: Physical capacity (7 items); Psychological well-being (6 items); Social relationships (4 items); and Environment (9 items). All items were rated on a 5 point likert scale, of 1 = very dissatisfied, 2 = dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = satisfied, 5 = very satisfied, with a higher score indicating a higher quality of life. The Taiwanese version included two additional items of local importance, namely “being respected” and “food availability”. The developers categorised these two items into the ‘social’ relationships (being respected) and ‘environment’ (food availability) domains. The internal consistency of the Taiwanese version WHOQOL-Brief (28 items) was assessed with 1200 older people living in the community, and produced a Cronbach’s alpha of 0.90 (Wang, Yu, Chung & Yao, 2000).

### Medical outcomes study social support survey (MOS-SSS-C)

Perceived levels of social support were measured using the Medical Outcomes Study Social Support Survey Chinese version (hereafter MOS-SSS-C). This instrument was translated from the MOS-SSS in a study of 3,000 participants with a chronic condition. The instrument was found to be a reliable measure, with a reported Cronbach’s alpha of 0.97 for the overall scale, and 0.91- 0.96 for the four subscales. The twelve month test-re-test reliability was good at 0.78. In view of the significant impact of social support on the health outcomes of people with a chronic condition, Yu, Lee and Woo (2004) translated the survey for use with a Chinese population. The MOS-SSS-C provides a multi-dimensional measure addressing the functional aspects of

perceived social support for people with chronic illnesses. The MOS-SSS-C consists of 20-items rated by participants on a 5 point Likert scale, with scores ranging from 1 = 'none of the time', 2 = 'a little of the time', 3 = 'some of the time', 4 = 'most of the time', and 5 = 'all of the time'. The internal consistency of the MOS-SSS-C was high with a Cronbach's alpha of 0.98 for the overall scale, and 0.93 to 0.96 for the subscales.

### Metabolic outcome measures

'Good diabetes control' has been defined by the American Diabetes Association (2003) as maintaining a HbA1c level of 6.1-8.0%. The HbA1c is a measure of stable blood glucose levels and constitutes a reliable integrated measure of the average blood glucose concentration over the life span of circulating red blood cells for an estimated time frame of 2-3 months. This procedure has been widely available since the early 1980's allowing for objective measurement of stable and long term glycemic status (Krishnamurti & Steffes, 2001). The American Diabetes Association recommends HbA1c testing at least twice a year in patients who show stable glycemic control and more frequently for those patients whose treatment/ therapy has undergone changes, and for those who experience difficulty achieving stable glycemic control. HbA1c serves as a reliable indicator of increased risk of complications due to diabetes.

The Diabetes Complication Care Trial Research Group DCCT (1995) provides values of HbA1c and corresponding blood glucose values in mg/dl and glycemic control evaluation guidelines that revealed HbA1c of 4.0-6.0 which is considered excellent control, HbA1c of 6.1-8.0% is considered good control, HbA1c of 8.1-9.0 % is considered fair control, HbA1c of 9.1-10.0 % is considered poor control, and a HbA1c of 10.1% or greater is considered to be unacceptable glycemic control. DCCT (1995) also provides values of corresponding blood glucose values in mg/dl and glycemic control evaluation guidelines that reveals an average blood glucose level ranging from 60-120mg/dl is considered excellent control, 121-180 mg/dl is considered good control, 181-210 mg/dl is considered fair control, 211-240 mg/dl is considered poor control, and an average blood glucose of 241 mg/dl or greater is considered to be unacceptable glycemic control.

The relationship between glycemic levels and complications implies that near normalisation of glycemic levels and HbA1c levels may prevent complications

(UKPDS, 1998). However, the desire to control diabetic criterion should be set by individual treatment goals, taking into account the individual's capacity to understand and carry out the treatment regimen.

### **3.6 Intervention**

The Motivational Interview (MI) intervention was consistent with the central principles described by Miller and Rollnick (2002). It was designed to produce rapid, internally motivated change by employing strategies that facilitate the adoption of optimal behaviours (Miller & Rollnick, 2002). The MI is a set of strategies intended to encourage individuals to move through the stages of readiness to change, from pre-contemplation to the maintenance stage. The present study followed Miller and Rollnick's guidelines for the motivational interviews. For example, when participants were in the pre-contemplation stage the researcher used awareness-raising, and affirmation strategies to help them move from pre-contemplation to contemplation. At the contemplation stage participants were assisted to make the transition to the preparation stage by posing and negotiating change strategies.

The motivational interviewer used an empathic therapeutic style, avoided argument and resistance, developed a sense of discrepancy between a participant's goals and behaviour, and supported participant self-efficacy. Additional tactics described as effective by Miller and Rollnick (2002) were applied, including asking open-ended questions, affirmation, reflective listening, awareness, eliciting self-motivational statements, integrating objective assessment, summarizing, alternatives and decisional balance. The motivational interviewer emphasized the participant's choice and personal responsibility. In this way, each intervention was personalized. Outside of these methods of tailoring the motivational interview to the individual, delivery of the protocol was standardized.

In the study, those participants randomized to the intervention group received a 45-60 minute motivational interview in a face-to-face session. This session adhered to the key elements of motivational interviewing. These elements are:

1. Motivation to change is elicited from participants and not imposed by the interviewer.

2. Participants will articulate and resolve their ambivalence towards behaviour change.
3. Direct persuasion will not be used to resolve their ambivalence towards behaviour change.
4. Interviewing will be delivered in a quiet and eliciting manner.
5. Interviewing will be directive in helping participants to examine and resolve their ambivalence towards change.
6. The relationship between interviewer and participant will be treated as a partnership created to help participants resolve ambivalence towards behaviour change.
7. Information and educational opportunities will be provided to participants to facilitate change (Miller & Rollnick, 2002). The motivational interview session was scripted so that consistency was assured (Appendix 2).

The interviewer was initially trained in MI techniques using the video “Training the Trainers” which was conducted by Dr Miller who pioneered the MI technique. The researcher who conducted the motivational interviews has also had extensive experience conducting motivational interviews with a range of clients. The researcher introduced the motivational interview to participants as an opportunity to talk about their thoughts and feelings about diabetes, emphasizing that it was up to participants themselves to make decisions about diabetes self-management.

### **3.7 Usual care**

Participants randomly allocated to the control group completed the baseline assessment, and received usual care by the hospital. Control group participants were invited to attend hospital based educational sessions (which included individual education during clinic visits) and attendance at the ‘Diabetics Club’. During the educational sessions, control participants received the same information handout as the experimental group and received medical and lifestyle advice if necessary. The only aspect of the control group’s care that differed from the intervention group was the motivational interview.

### Diabetes education sessions and Diabetics Club

The diabetes education sessions and Diabetics Club are conducted by a diabetes team of experienced allied health care professionals in the hospital where the research was conducted. The educational material and sessions provided to participants are endorsed by the Taiwan Diabetes Association. The material addresses diet, exercise, medication, self-monitoring blood glucose, and gives a clear rationale for adopting a self-management approach to diabetes. The education sessions are conducted for 1 hour per week and provided by a nurse, diabetes educator, physician, dietician, pharmacist, social worker from the hospital.

The Diabetics Club is conducted as a fellowship. The club members have a meeting once per month, share their experiences of living with diabetes, receive specific diabetes education and do some activities such as sporting competitions, diabetes food cooking competitions or excursions.

## **3.8 Data collection procedures**

### **3.8.1 Phase I: Recruitment, baseline data collection, and randomization**

During Phase I, all possible participants attending the hospital diabetes clinic were approached by the researcher. All potential participants who met the inclusion criteria received the information sheet (Appendix 3) describing the study and their potential involvement. Once potential participants had any questions answered they were asked to sign a consent form (Appendix 4). Additionally, participants were asked to consent to the researcher obtaining HbA1c and blood glucose level results from their medical records. Eligible participants who consented to be involved in the study completed a baseline assessment (phase I) prior to being randomly allocated into either the intervention group or control group (phase II). Randomisation involved computer-generated numbers in sealed opaque envelopes.

The instruments completed in this phase included identification of each participant's stage of change; personal details; Diabetes Knowledge Scale; psychological factors including Depression Anxiety Stress Scale (DASS-21), Diabetes Management Self-Efficacy Scale (C-DMSES), WHO Quality of Life-brief (WHOQOL), Diabetes Self-Management Instrument (DSMI); social factors including Medical

Outcomes Study Social Support Survey (MOS-SSS-C); and metabolic variables (including HbA1c and blood glucose levels). The questionnaire took approximately 30 to 40 minutes to complete. This phase provided a baseline profile of each participant. Participants were assigned to one of the five stages of change based on their responses to the stage of change measure.

### **3.8.2 Phase II: Intervention protocol**

Participants who were randomly assigned to the intervention group were interviewed by the researcher, who was a registered practising diabetes nurse specialist trained in motivational interview techniques. An appointment was made for the person to return to the clinic at a negotiated time and complete their 45-60 minute motivational interview with the researcher. The MI was based on the researcher developing rapport and collaboration with each participant. Based on each participant's stage of change the researcher identified topics for discussion. With this approach, the researcher was able to follow the participant's lead, gently guiding the interviews to focus on what the individual considered the most important aspect of diabetes self-management (Appendix 2).

Participants were interviewed in a private room in the clinic area. Each participant gave permission for notes from the interviews to be made. Interview data were transcribed as quickly as possible following each interview so that the memory of the interview was fresh in the researcher's mind. Consistent with the approach adopted, the interview questions were indicative only and their intent was integrated into each interview in a conversational style that was responsive to the individual stage of readiness to change. The researcher proceeded to undertake the five steps for an MI as outlined below.

The control group received usual care. Participants in both groups had the opportunity to register for the diabetes education sessions and join the Diabetes Club as part of the usual care services provided by the hospital.

#### Intervention for pre-contemplation stage participants

In this stage, participants were managing their condition poorly but indicated they were not even thinking about change. They resist attempts to discuss



self-management. One of the strategies used in motivational interviewing to facilitate movement from pre-contemplation to that of contemplation was to raise awareness about their self-management (consciousness-raising). The researcher increased the participant's awareness of the relationship between self-management and diabetes complications. People in the pre-contemplation stage need to be provided with information about self-management in a non-threatening manner. The researcher sought permission to provide information on self-care and diabetes in order to minimize resistance to the information. At this stage, the researcher talked about what happens to people generally rather than about the interviewee specifically. For example, "*experts have found that people that have managed their diabetes can decrease the risk of complications by 25-50%*". The researcher encouraged participants to think about the information and made it clear that she was available if the participant decided to talk about their condition at a later stage.

#### Intervention for contemplation stage participants

When participants enter the contemplation stage the negative aspects of their condition start to outweigh the positive aspects of not changing. On the one hand is recognition of a problem, on the other is avoidance of change due to what the participant perceives as being the disadvantages associated with optimal behaviours for managing diabetes.

In this stage, participants who were thinking about change (contemplators) need to be helped to work through this ambivalence about change. A decisional balance exercise is used in the motivational interview to do this. The researcher simply asked participants about the positive aspects of their self-management practice. For example, "*What is it that you like about managing your diabetes every day?*" The researcher started by asking about the positive aspects of their behaviour in order to minimize resistance and motivate participants to subsequently talk about the negative aspects of their behaviour. Talking about the positive aspect of the behaviour first also helped the researcher to demonstrate empathy, recognizing the positive aspects of each participant's efforts of self-care even in the second stage of change.

Once the participant finished talking about the positive aspects of managing their diabetes, the interviewer briefly summarised what had been discussed. The

participant was then encouraged to talk about the negative aspects of their diabetes self-management by asking *“Is there anything you are not happy about with your diabetes self-management?”* The researcher then prompted participants to elaborate on the less positive aspects of managing their diabetes inappropriately by asking questions such as *“How does it affect you?”* *“What else?”* *“What don’t you manage concerning your diabetes?”* According to motivational interview principles, if a participant verbalizes the need to change often enough, he/she is more inclined to act upon it. Simply by allowing the patient to talk about their willingness and their need to change, the researcher was facilitating behaviour change.

The researcher succinctly summarized the positive and the negative aspects of the participant’s self-management behaviour. For example, *“So, diabetes self-management helps you to control your diabetes and diabetes complications. On the other hand, you feel you were spending too much time on diet, exercise, medication and self-monitoring blood glucose.”* The psychological discomfort created by contrasting the individual’s behaviour with his/her attitude is one of the motivators that help participants to act on their less-than-optimal management strategies.

#### Intervention for preparation stage participants

If the participant indicated he/she was ready for change, the researcher provided practical advice on how to go about making the change rather than continuing to boost his/her motivation to change. Within a motivational interview framework the researcher’s task is to help the participant determine the best course of action to be taken in order to change their inadequate self-management practices. A good way of starting was to set a date for the behaviour change to occur. In this stage, the motivational interview intervention advocates the replacement of any inadequate behaviour with more constructive activities. The interviewer encouraged each participant to think about alternative behaviours to improve self-management.

#### Intervention for action stage participants

In the action stage participants put into practice the skills acquired in the preparation stage. Within a motivational intervention framework, support from the researcher was crucial in this stage. It was important for the participant to have someone with whom to discuss their progress and any difficulties encountered in

making the change thus the researcher-participant relationship facilitated the process of change. Reviewing successful attempts to change helped to increase the participant's self-esteem and sense of mastery about change.

#### Intervention for maintenance stage participants

Maintaining diabetes self-management for people with Type II diabetes is just as important as changing the behaviour of those who were not yet at this stage. It is important to make a distinction between inadequate and adequate diabetes self-management, as this provides the basis for selecting preventative strategies to avoid possible relapse. Relapse prevention strategies in this case were highlighted for those who did not have a history of adequate glucose control. It is well known that in the area of substance abuse, relapse is the rule rather than the exception. The researcher needs to assess situations in which inadequate self-management of the condition was likely to occur and think about possible responses. To minimize the chances of relapse taking place, participants need strategies to avoid relapse. Problem-solving skills may be needed for such contexts.

The researcher followed a similar process for all interviews. Active listening skills were used during the motivational interviews to ensure that the interviewer clearly understood participants' meaning: clarifying, paraphrasing, and reflecting the content and feeling of what was relayed. Attention was also paid to participants' non-verbal behaviour by questioning why a participant was smiling or frowning at a particular question, or by following up with more information when a participant seemed confused. The researcher paraphrased responses and confirmed this understanding with phrases such as: *"Is that what you are saying?"*, then gently probed for further information when it seemed appropriate using phrases such as *"Could you explain that"* or *"Give me an example of that?"* The researcher used fillers such as nodding the head, smiling, frowning, or simply saying "yes", "no" or "mm" to keep the conversation flowing in a natural way and to express feelings or attitudes in relation to the participant's response. At the close of the interview the researcher asked: *"I know that you have a lot of information to deal with, do you have any questions at this time? Please feel free to contact me any time for clarification. This is my phone number....."* On a few occasions this led to important points being added, but generally participants felt that they had conveyed all that they wanted to. The researcher found that generally

participants reported feeling comfortable with the interview process and, participants often thanked the researcher for providing them with the opportunity to discuss how to manage their diabetes.

### **3.8.3 Phase III: Follow-up**

Phase III involved participants repeating the respective measures to establish the effectiveness or otherwise of the intervention. Participants from both groups received questionnaires when they attended their 3 monthly clinical meeting with a physician. All participants filled in and returned the questionnaires enclosed in an envelope to the research assistant. The questionnaires for this phase consisted of a Stage of Change; DSMI; personal factors and Diabetes Knowledge scale; psychological factors including DASS-21, C-DMSES, and WHOQOL; social factors including MOS-SSS-C; and metabolic variables (HbA1c and blood glucose levels). The researcher who conducted the intervention was not involved in the administration of surveys to participants or in assisting with the completion or facilitating the timely return of the questionnaires (blind data collection).

When participants completed the three phases of the study they received a hand written letter of thanks on university letterhead.

## **3.9 Data analysis**

Data were entered and analysed using the Statistical Package for the Social Sciences (hereafter SPSS) computer package software (version 13.0) program. All decisions concerning the statistical significance of the findings were made using an alpha level of 0.5. Prior to analysis all data were analysed for both accuracy of data entry and missing values. The accuracy of data coding and computer entry was checked by comparing the entered data with the original data. These data were analysed using frequency distributions to examine for outliers by inspecting histograms and box plots. If outliers were identified, the data were inspected for errors in recording, entry, or extreme values from unusual cases or situations. Outliers were handled by analysing the data with and without removing the outliers. If there was a difference between the results obtained with and without the outlier, a trimmed mean was used for statistical analysis. Violations of normality of the dependent variables (HbA1c, sugar) were

analysed using histograms, and standard skewness and kurtosis coefficients. Appropriate transformation of variables was done in order to ensure normality. Missing values were studied for patterns using the SPSS MVA software. It was found that missing data conformed to a random pattern and less than five percent of data were missing which is acceptable (Tabachnick & Fidell, 2000).

Statistical analyses were guided by the research questions. Participant characteristics were analysed using descriptive statistics (including frequencies, percentages, means, range and standard deviations) for both the intervention and the control group for age, gender, marital status, education level, length of years since diagnosis of diabetes, employment status, religion, whether living with family, other diseases, frequency of self-monitoring blood glucose, frequency of self-recorded blood glucose, and smoking. Independent t tests were used for interval or ratio data, Kruskal Wallis test for ordinal data, and chi-square test for nominal data (Polit & Hungler, 2004). These tests were performed to determine whether the groups were similar with respect to age, gender, marital status, education level, length of years since diagnosis of diabetes, employment status, religion, whether living with family, other diseases, frequency of self-monitoring blood glucose, frequency of self-recorded blood glucose, and smoking. If significant differences were found for those confounding variables they were introduced into the analysis as covariates. Properties of all instruments were assessed using Cronbach's alpha for reliability (internal consistency) in this population, total and subscale scores were also presented.

### Hypothesis one

People with Type II diabetes who participate in a motivational interview will have improved stage of change outcomes from baseline to the three months compared to the control group. This hypothesis was addressed using the Kruskal-Wallis test which is based on assigning ranks to the scores of various groups. This test is used when the number of groups is greater than two and a one-way test for independent samples is desired. It is also used when the measurement level in the independent variable is nominal data, and dependent variable is ordinal data (Polit and Hungler, 2004). Relative Risk estimate (such as Odds ratio) was also used to estimate of risk of 'caseness' in one group compared to another (Polit and Hungler, 2004).

### Hypothesis two

People with Type II diabetes who participate in a motivational interview will have improved personal outcomes from baseline to three months compared to the control group. This hypothesis was addressed using the Kruskal-Wallis test, Relative Risk estimate and the Group x Time interaction in a 2 x 2 Repeated Measures Analysis of Variance. The Kruskal-Wallis test was used to test the difference between three or more independent groups, based on ranked scores. The Relative Risk was used to estimate risk in one group compared to another, computed by dividing the rate for one group by the rate for another such as Odds Ratio. Repeated-measures analysis of variance is used when there are three or more measures of the same dependent variable for each participant (Polit & Hungler, 2004).

### Hypothesis three

People with Type II diabetes who participate in a motivational interview will have improved psychological outcomes from baseline to three months compared to the control group. This hypothesis was tested by using the Kruskal Wallis test, Relative Risk estimate (such as Odds Rratio) and the Group x Time interaction in a 2 x 2 Repeated Measures Analysis of Variance interpreted to evaluate whether the intervention groups differed in amount of change over time.

### Hypothesis four

People with Type II diabetes who participate in a motivational interview will have improved social outcomes from baseline to three months compared to the control group. This hypothesis was tested by using the Kruskal Wallis, Relative Risk estimate (such as Odds Ratio) and the Group x Time interaction in a 2 x 2 Repeated Measures Analysis of Variance interpreted to evaluate whether the intervention groups differed in amount of change over time.

### Hypothesis five

People with Type II diabetes who participate in a motivational interview will have improved metabolic outcomes from baseline to three months compared to the control group. This hypothesis was tested by using the Independent t test, Relative Risk estimate (such as Odds ratio) and the Group x Time interaction in a 2 x 2 Repeated

Measures Analysis of Variance interpreted to evaluate whether the intervention groups differed in amount of change over time.

### **3.9.1 Qualitative data analysis**

The qualitative data generated during the motivational interviews were analysed using recurrent theme identification. Thematic analysis has been used in nursing research as an explicit data analysis method. This method has promise for clinical researchers who analyse behaviours (Leininger, 1985). The themes are not decided prior to coding the data. These categories are ‘induced’ from the data although the general issues that are of interest are determined prior to the analysis (Ezzy, 2002). Thematic analysis is a straightforward procedure. Crisp (2000, p. 358) reported that ‘the data is inspected to elicit the conditions that underlie life events, interactions with others, strategies and tactics that are adopted by respondents, and consequences. In the present study, the data was initially coded openly by scrutinising interview transcripts line by line or word by word, terms used by respondents, and by making comparisons for similarities and differences between events and incidents.

The first stage of coding during thematic analysis was often described as an ‘open coding’ which is a way to generate an emergent set of categories and their properties. It also is the part of analysis that pertains specifically to the naming and categorizing of phenomena through close examination of data (Strauss & Corbin, 1990). There were two coding steps, the initial coding and the second coding across the cases. The initial coding is the process of examining, conceptualising and labelling individual notes. The second stage consists of a cross-case analysis selecting categories through focused coding across the cases. In this process the researcher culled the less productive categories and focused on a selected number. This was achieved by focusing on core concept categories, around which the other categories were integrated. These core categories were systematically related to other categories. Those relationships were validated and categories that needed further development were filled in or merged.

Data from Phase II of the study comprised notes and records based on participants’ comments during the interview. The interview notes were transcribed in Chinese by the researcher and the transcripts treated as raw data. These transcripts were

reviewed several times. The first time was for accuracy and general understanding, then to identify categories, and finally to code the text. Themes emerged from the data throughout the analysis process and were grouped into categories based on the theme identified. Most cross-lingual qualitative research involves data analysis with interpreted interviews or transcribed texts in the language of participants (Polit & Hungler, 2004). To demonstrate credibility in data analysis, especially with the potential for error in translation, two reviewers (bilingual English and Chinese) identified categories and themes in Chinese, and then translated them into English.

The researcher and a colleague independently coded each transcript into identified theme domains then reviewed the coding. The researcher discussed the coding of the original transcripts in Chinese with the reviewer, and collaborated several times to review data and to discuss the themes. Coding schemes were generated through a formative and iterative process. Initially, the researcher and the reviewer read through transcripts and independently generated possible content domains, these content domains were applied to another transcript, edited and refined.

The thematic analyses focused on different cognitive and identifiable themes of behaviour. Raw data were analysed by identifying and bringing together components or fragments of ideas or experiences, which often were meaningless when viewed alone. Therefore, the researcher applied Leininger's (1985) six steps for thematic analysis.

Step 1 identified and listed descriptors

Step 2 combined raw data and descriptors into meaningful sequential units or into larger units, known as patterns.

Step 3 identified mini or micro-patterns and determine how they relate to patterns and themes.

Step 4 synthesized several patterns to obtain a broad, comprehensive, and holistic view of the data as themes and sub-themes.

Step 5 formulated theme statements to rest or reaffirm.

Step 6 used the confirmed themes for hypothesis, decisions and interventions.

In this way, themes emerged from the data throughout the analysis rather than being specified a priori. These data were then grouped into categories based on the scrip format.



### The accuracy and trustworthiness of qualitative data

To enhance the trustworthiness or credibility of data, Lincoln and Guba (2000) recommended a number of techniques to enhance the credibility of the findings. For the present study, the richness of the data and the researcher's observational and analytical abilities were considered to be important considerations. These factors were seen to contribute to the validity, insights, and outcomes of the research process. As Patton (2002: 185) stated "The validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size".

### **3.10 Protection of human subjects**

Ethical approval for this research was granted by the University Human Research Ethics Committee where the candidate was enrolled and the teaching hospital Institutional Review Boards (IRB) in Taiwan (Appendix 5), where the researcher conducted the study. Prospective participants were informed about the purpose and method of the study. They were also informed that participation in the study was voluntary, and that they could withdraw from the study without penalty or loss of benefits.

This research study was not invasive and presented minimal risks to potential participants. Where participants were found to present with serious physical complications or were unwell, they were referred to their physician for review. Participants were informed that their responses remained confidential and anonymous. Participants signed a written consent form prior to participating in the research. Survey data from each participant were stored in the hospital clinic in a locked filing cabinet accessible only to the researcher. Code numbers were assigned to each participant to ensure anonymity. Each participant's identification number and corresponding list of names were stored separately in a locked cabinet. All data were stored in accordance with NHMRC guidelines. All participants' data such as consent forms, demographic data sheets, pre- and post survey will be kept for a period of five years, and then destroyed by the researcher.

### **3.11 Pilot study**

A pilot study was undertaken in order to test the recruitment strategies, intervention protocols, and data collection instruments in preparation for the major study. The pilot study was successfully completed without any changes being made to research protocols. Therefore, the findings of the pilot study have been incorporated into the main study. The pilot study data provided tentative information regarding the impact of the intervention, and a general sense of an appropriate sample size on which to base the main study.

### **3.12 Summary**

The Method Chapter described the RCT design used to test the research questions. This study developed five research hypotheses which can be summarised thus: people with Type II diabetes who participate in a Motivational Interview (MI) will have improved Stage of Change, personal, psychological, social, and metabolic outcomes from baseline to the three months compared to the control group. The Transtheoretical Model (TTM) was used within a MI framework. A RCT design including a qualitative component was used to establish the effectiveness of the intervention. A pilot study was conducted to establish the feasibility of a major study. Results and findings of the quantitative analysis are presented in Chapter 4, and findings from the qualitative analysis are presented in Chapter 5.

## **CHAPTER FOUR**

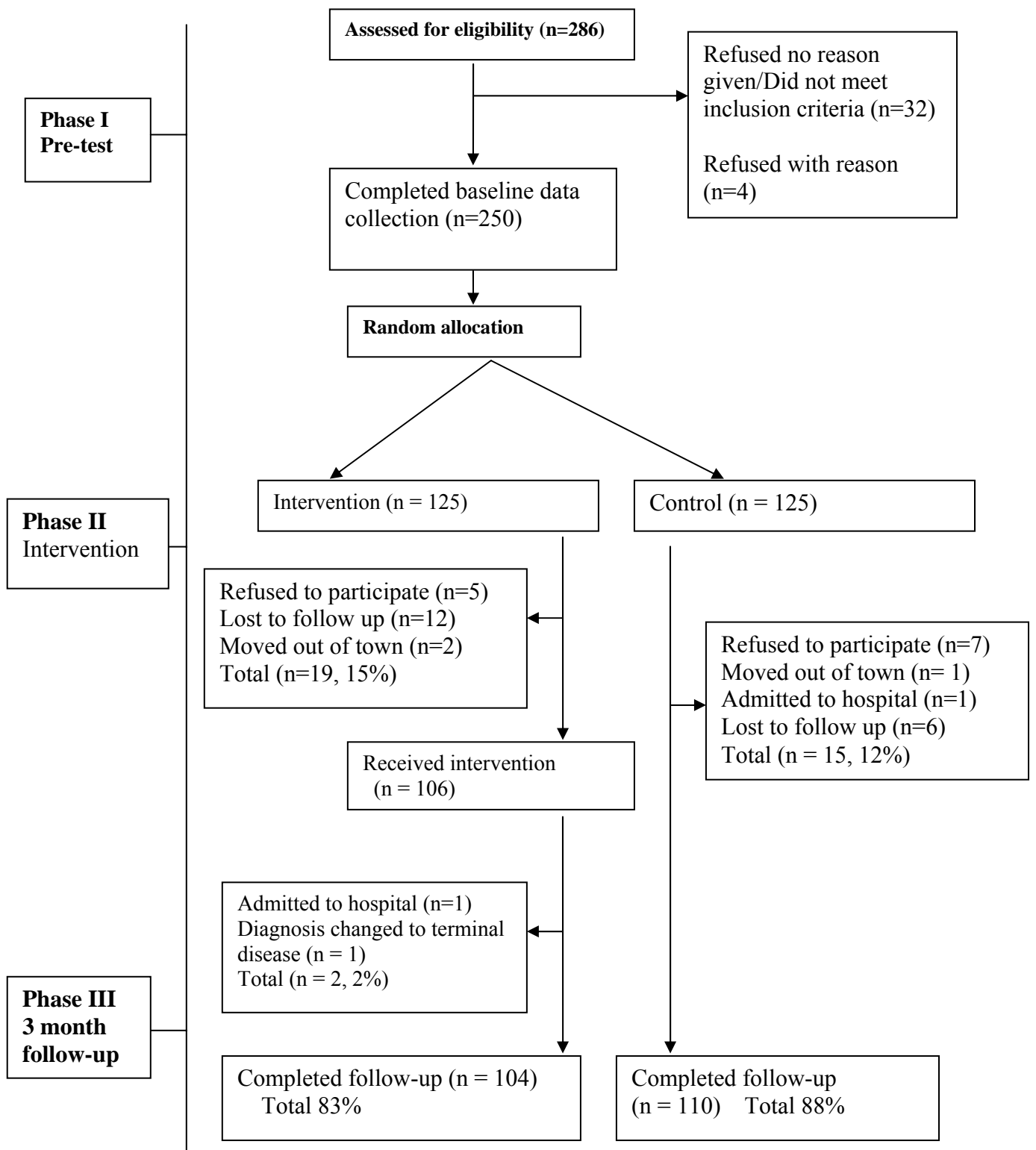
### **QUANTITATIVE RESULTS**

#### **4.1 Introduction**

The aim of this study was to determine whether participation in a Motivational Interview (MI) by Taiwanese people with Type II diabetes would improve their self-management and well-being. This research investigated the effect of a Motivational Interview (MI) on participant's stage of change, personal, psychological, social, and metabolic variables. The analysis of data related to response rate, sample characteristics, the validity and reliability of instruments, results of testing the hypothesis, and all outcome measures are presented.

#### **4.2 Response rate**

The initial recruitment of the sample for this study identified 286 people with Type II diabetes who attended a diabetes out-patients clinic at a teaching hospital in South Taiwan. Potential participants were invited to take part in the study. Thirty-two people refused without citing a reason or did not meet the inclusion criteria, and 4 people declined because they did not have enough time to participate. Two hundred and fifty people participated in the first phase of the study and were subsequently randomly allocated into the intervention or control groups. Nineteen people allocated to the intervention cohort completed Phase 1 but did not complete Phase 2 of the intervention, thus 106 people participated in the Phase 2 intervention. The total number of participants allocated to the control group and who completed the study were 125. In Phase 3, 214 people completed the outcome data collection at three months. A consort flow diagram (see Figure 4.1) depicts information for the phases of the trial (recruitment, allocation, intervention, three months follow-up).



**Figure 4.1: Consort diagram of the trial**

### **4.2.1 Attrition**

More participants withdrew from the motivational interviewing intervention from baseline to 3 months follow-up ( $n = 21$ ) than from the control group ( $n = 15$ ), but this was not statistically significant ( $p = 0.37$ ). There were no significant differences between participants lost to follow-up and those who continued with respect to baseline characteristics, stage of change, personal, psychological, social and metabolic outcomes.

### **4.3 Baseline characteristics of participants**

Of the 286 potential patients who met the inclusion criteria, 250 completed baseline data collection. The selected baseline characteristics are shown in Table 4.1. The participants' ages ranged from 26 to 87 years with a mean age of 58.71 ( $SD = 10.86$ ) years. The 250 participants had been diagnosed with diabetes an average of 7.75 years ( $SD = 7.05$ ) with a duration ranging from 3 months to 33 years. Of these 250 participants, 130 (52.0%) were male and 120 (48.0%) female. In the baseline sample, around two-thirds were employed ( $n = 172$ ; 68.8%), 234 (93.6%) reported religious beliefs, and 233 (93.2%) lived with their family. The vast majority of the sample ( $n = 233$ , 93.2%) were educated at primary school or higher level, while the remaining 17 (6.8%) participants had received less than primary school education. Two hundred and six (82.4%) participants were married, five (2%) were single, seven (2.8%) divorced or separated, and 32 (12.8%) widowed. Around half the participants ( $n = 127$ , 50.8%) reported not having any other diseases. Less than half (48%) of participants were monitoring blood glucose at home, and 40.4% of the sample recorded their blood glucose. Most participants ( $n = 212$ , 84.8%) were non-smokers (as outlined in Table 4.1).

**Table 4.1 Overall baseline characteristics of all participants (n=250)**

Demographic	Overall N (%), mean $\pm$ sd (range)	Intervention N (%), mean $\pm$ sd (range)	Control N (%), mean $\pm$ sd (range)	Comparison
Age (year)	58.71 $\pm$ 10.86 (26-87y)	59.17 $\pm$ 10.67 (28-87y)	58.26 $\pm$ 11.08 (26-86y)	t= 0.66
Length of time diagnosed (year)	7.75 $\pm$ 7.05 (3m-33y)	7.75 $\pm$ 7.16 (3m-30y)	7.76 $\pm$ 6.96 (3m-33y)	t= -0.01
Gender (%)				
Male	130 (52.0)	61 (48.8)	69 (55.2)	$\chi^2= 1.02$
Female	120 (48.0)	64 (51.2)	56 (44.8)	
Employment (%)				
Yes	172(68.8)	85(68.0)	87(69.6)	$\chi^2= 0.074$
No	78(31.2)	40(32.0)	38( 30.4)	
Religion (%)				
Yes	234(93.6)	119(95.2)	115(92)	$\chi^2= 1.06$
No	16(6.4)	6(4.8)	10(8.0)	
Live with family (%)				
Yes	233(93.2)	116(92.8)	117(93.6)	$\chi^2= 0.06$
No	17(6.8)	9(7.2)	8(6.4)	
Education (%)				
No education	17(6.8)	12(9.6)	5(4.0)	$\chi^2= 2.90$
Primary school	94(37.6)	49(39.2)	45(36.0)	
High school	39(15.6)	20(16.0)	19(15.2)	
Vocational education	59(23.6)	25(20)	34(27.2)	
(certIFICATE level)	38(15.2)			
Bachelor degree	3(1.2)	18(14.4)	20(16.0)	
Master degree		1(0.8)	2(1.6)	
Marital status (%)				
Single	5(2.0)	3(2.4)	2(1.6)	$\chi^2=< 0.01$
Married	206(82.4)	102(81.6)	104(83.2)	
Divorced or separated	7(2.8)	4(3.2)	3(2.4)	
Widowed	32(12.8)	16(12.8)	16(12.8)	
Combine with other diseases (%)				
Yes	123(49.2)	60( 48.0)	63(50.4)	$\chi^2= 0.14$
No	127(50.8)	65(52.0)	62(49.6)	
Self-monitoring blood sugar (%)				
Yes	121(48.4)	57(45.6)	64(51.2)	$\chi^2= 0.78$
No	129(51.6)	68(54.4)	61(48.8)	
Self-recorded blood sugar (%)				
Yes	101(40.4)	47(37.6)	54(43.2)	$\chi^2= 0.81$
No	149(59.6)	78(62.4)	71(56.8)	
Smoking status (%)				
Yes	38(15.2)	16(12.8)	22(17.6)	$\chi^2= 1.11$
No	212(84.8)	109(87.2)	103(82.4)	

\*All variables' p-value presented NS

t= Independent t test

$\chi^2=$  Kruskal Wallis Test, grouping variable: participant group for ordinal data

Participants in both groups (intervention and control) were compared on baseline personal variables. An independent t-test investigated differences between two independent group means for age and duration of diagnosis. The Kruskal-Wallis test determined the difference in mean rank of scores at baseline for gender, employment, religion, living arrangements, education, marital status, presence of other diseases, self-monitoring blood glucose, self-recording blood glucose, and smoking status. The results showed no significant differences on baseline characteristics between the intervention group and the control group (Table 4.1).

The dependent variables of Diabetes Knowledge, stage of change, Diabetes Self-Management (DSMI), Depression Anxiety Stress (DASS-21), Diabetes Management Self-Efficacy (C-DMSES), WHO Quality of Life-brief (WHOQOL), the Medical Outcomes Study Social Support Survey (MOS-SSS-C), HbA1c and Ac glucose were tested for normality by using frequency distributions to examine for outliers, by inspecting histograms, box plots, and analysing skewness and kurtosis values. No outliers were found in the data.

**Table 4.2 Baseline Stage of change, personal, psychological and social variables**

Variables	Overall (n=250) mean	Control (n=125) mean rank	Intervention (n=125) mean rank	Comparison	p-value
Stage of change	2.48±0.95	131.14	119.86	$\chi^2=1.75$	0.18
Diabetes Knowledge	12.94±3.95	130.77	120.23	$\chi^2=1.33$	0.24
DSMI	108.19±18.67	119.15	131.85	$\chi^2=1.92$	0.16
DASS21	8.65±9.83	124.50	126.50	$\chi^2=0.04$	0.82
C-DMSES	147.92±31.23	125.60	125.40	$\chi^2<0.001$	0.98
WHOQOL	101.49±10.62	126.94	124.06	$\chi^2=0.09$	0.75
MOS-SSS-C	79.56±13.52	120.96	130.04	$\chi^2=0.98$	0.32

Kruskal Wallis Test; Grouping Variable: participant group

As outlined in Table 4.2 there were no statistically significant group differences in relation to stage of change, Diabetes Knowledge, and psychological variables of C-DMSES, DASS-21, WHOQOL, DSMI, and the social variable of MOS-SSS-C at baseline.

Baseline assessment of stage of change levels are shown in Table 4.3. At baseline in both groups, there were 28 (11.2%) participants in the pre-contemplation stage, 123 (49.2%) in the contemplation stage, and 54 (21.6%) in the preparation stage, 40 (16.0%) in the action stage, and 5 (2.0%) in the maintenance stage. The intervention group had 19 participants (15.2%) in the pre-contemplation stage (control group: 7.2%). Both in the control and intervention groups, the highest number of participants were in the contemplation stage (control group: 51.2%; intervention group: 47.2%), and the lowest number in the maintenance stage (control: 1.6%; intervention: 2.4%). The Kruskal Wallis test showed no statistically significant group differences between the levels of stage of change for the control group (mean rank: 131.14) and intervention group (119.86) ( $\chi^2= 1.75$ ,  $p = 0.18$ ).

**Table 4.3 Baseline assessment of Stage of Change (n=250)**

Group	Pre-contemplation n (%)	Contemplation n (%)	Preparation n (%)	Action n (%)	Maintenance n (%)	Mean rank	p-value
Control	9(7.2)	64(51.2)	27(21.6)	23(18.4)	2(1.6)	131.14	0.18
Intervention	19(15.2)	59(47.2)	27(21.6)	17(13.6)	3(2.4)	119.86	
Overall	28( 11.2 )	123(49.2 )	54(21.6)	40(16.0 )	5(2.0 )		

Kruskal Wallis Test; Grouping Variable: participant group;  $\chi^2= 1.75$   
Pre-contemplation (stage 1); Contemplation (stage 2); Preparation (stage 3); Action (stage 4); Maintenance (stage 5)

There were no significant differences between the control and intervention group in relation to the metabolic variables. The overall baseline mean HbA1c ranged from 5.0 to 16.5 with an overall mean HbA1c of 8.75 (SD= 2.03). The control group had a mean score of 8.62 (SD= 1.82), while the intervention group had 8.88 (SD= 2.23). The overall baseline mean Ac glucose ranged from 55.0 mg/dl to 592.0 mg/dl with a mean Ac glucose of 163.69 mg/dl (SD= 75.76 mg/dl). The control group had mean scores of 157.95 (SD= 63.85) while the intervention group had 169.44(SD= 85.92).

The average HbA1c for both groups was approximately 8.75 mg/dl, placing them at higher risk for the development of diabetes complications. Similarly, at baseline, the Ac glucose of participants in both groups placed them in the high complication category. No statistically significant group differences were found in relation to HbA1c levels (control group: 8.62±1.82 vs intervention group: 8.88±2.23,  $p= 0.32$ ) and Ac



glucose (control group: 157.95±63.85 vs intervention group 169.44±85.92, p= 0.23) at baseline (Table 4.4).

**Table 4.4 Baseline metabolic variables for all participants (n = 250)**

Variables	Overall	Control (n=125)	Intervention (n=125)	Comparison	p-value
	Mean ± SD	Mean± SD	Mean ± SD		
HbA1c	8.75±2.03	8.62±1.82	8.88±2.23	t =0.98	0.32
Ac glucose	163.69±75.76	157.95±63.85	169.44±85.92	t =1.20	0.23

t= Independent t test

#### 4.4 Reliability of instruments

The reliability attributes of the Diabetes Knowledge Instrument, Diabetes Self-Management Instrument (DSMI), Depression Anxiety Stress Scale (DASS-21), Diabetes Management Self-Efficacy Scale (C-DMSES), WHO Quality of Life-brief (WHOQL), and The Medical Outcomes Study Social Support Survey (MOS-SSS-C) were established for the current research study using Cronbach’s alpha (as outlined Table 4.5). The validity of the standardized instruments used in this study was reported in Chapter Two.

**Table 4.5 Reliability of research instruments**

Instruments	Coefficient Alpha (n=250)
Stage of change	0.83
Diabetes Knowledge instrument	0.79
Diabetes Self-Management instrument (DSMI)	0.94
Depression Anxiety Stress (DASS-21)	0.94
Diabetes Management Self-Efficacy scale (C-DMSES)	0.93
WHO Quality of Life-brief (WHOQOL)	0.90
The Medical Outcomes Study Social Support (MOS-SSS-C)	0.96

#### 4.5 Hypotheses

The Kruskal Wallis test was used to test each hypothesis. This test is used when the number of groups is greater than two and a one-way test for independent samples is desired, because the measurement level of independent variables is nominal data, and ordinal for dependent variables (Polit & Hungler, 2004). Repeated-measures analysis of

variance (ANOVA) is used when there are three or more measures of the same dependent variable for each participant (Polit & Hungler, 2004), and were used in this research to test the difference among means of the intervention and the control group from baseline to 3 months follow-up. Some assumptions were simplified to be able to use Repeated-measures ANOVA in this data analysis. Some of these scale scores were based on categorical (eg. no/yes) or ordinal (Likert scale) data but for purposes of comparison, scale scores were treated as interval data (Polit & Hungler, 2004). An independent t-test was used to analyse differences in personal outcomes at baseline and 3 months follow-up.

A post-hoc Honestly Significant Difference (HSD) Tukey test was then used to extend the implications of the ANOVA findings to determine where the changes in personal outcomes occurred. Each hypothesis was tested by using the Time x Group interaction effect interpreted to evaluate whether the intervention groups differed in amount of change over time. If the interaction was not significant, the separate Time and Group effects were then interpreted. For the tests of within-subjects effects, the Huynh-Feldt estimate of the degree of violation of the sphericity assumption exceeded 0.70 in all analyses. The p-values reported in the results section are for the Huynh-Feldt adjusted values. The strength of each of the effects was quantified using partial eta square ( $\eta^2$ ), with rough guidelines of 0.01 = small, 0.06 = medium, and 0.14 = large effects, used to aid interpretation. These are equivalent to Cohen's f values of 0.10, 0.25, and 0.40 respectively. These are included in the results tables. Post hoc testing was conducted on all significant Group x Time interactions to interpret significant differences were. In case of non-significant interactions, significant group and time effects were interpreted and no post-hoc analysis was necessary (since there were only two additional time points and two groups).

Relative risk was used to test the effect of the Motivational Interview (MI) on change in Diabetes Knowledge, stage of change, Diabetes Self-Management (DSMI), Depression Anxiety Stress (DASS-21), Diabetes Management Self-Efficacy (C-DMSSES), WHO Quality of Life-brief (WHOQOL), the Medical Outcomes Study Social Support Survey (MOS-SSS-C), HbA1c and Ac glucose from baseline to 3 months. Relative risk is an estimate of risk of 'caseness' in one group compared with another. Relative risk is computed by dividing the rate for one group by the rate for

another (Polit & Hungler, 2004). In the current study the Likelihood Ratio and Odds Ratio were calculated to determine whether the intervention had an effect on the dependent variables.

#### 4.5.1 Hypothesis One

People with Type II diabetes who participate in a MI will have improved stage of change outcomes from baseline to three months compared to the control group. This hypothesis was tested using the analysis of the Kruskal-Wallis test.

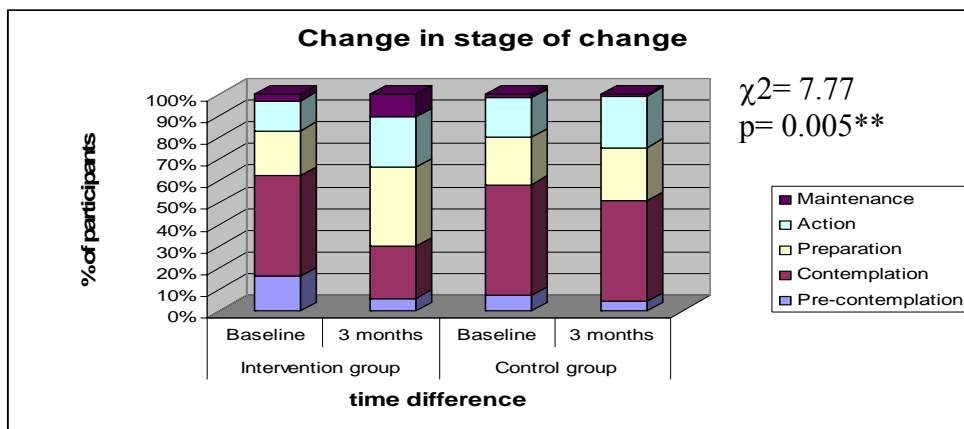
Comparing the intervention and control groups on the baseline stage of change (Table 4.6) revealed that the majority of participants were in the contemplation stage (control: 51.2%; intervention: 47.2%) and only a few participants were in the maintenance stage (control: 1.6%; intervention: 2.4%). At 3 months follow-up, the intervention group had the largest number of participants in the preparation stage (36.5%) and fewest participants in the pre-contemplation stage (5.8%), compared with the control group which had the largest number of participants (46.4%) in the contemplation stage and the lowest number in the maintenance stage (0.9%). There was a small increase from the baseline (2.56, SD = 0.92) to 3 months follow-up (2.70, SD = 0.91) in the control group but a larger increase in the intervention group (baseline: 2.41, SD = 0.98; 3 months follow-up: 3.09, SD = 1.06).

**Table 4.6 Comparison of stage of change from baseline to 3 months**

Stage of change	Control group		Intervention group (%)	
	<u>Baseline</u>	<u>3 months</u>	<u>Baseline</u>	<u>3 months</u>
	<u>n (%)</u>	<u>n(%)</u>	<u>n(%)</u>	<u>n(%)</u>
Pre-contemplation	9 (7.2)	5 (4.5)	19 (15.2)	6 (5.8)
Contemplation	64 (51.2)	51 (46.4)	59 (47.2)	25 (24.0)
Preparation	27 (21.6)	27 (24.5)	27 (21.6)	38 (36.5)
Action	23 (18.4)	26 (23.7)	17 (13.6)	24 (23.1)
Maintenance	2 (1.6)	1 (0.9)	3 (2.4)	11 (10.6)
Total mean scores (mean ± sd)	2.56 (0.92)	2.70 (0.91)	2.41 (0.98)	3.09 (1.06)

Baseline n=125; after 3 months intervention group n=104, control group n=110

The Kruskal Wallis test was used to analyse the two groups for stage of change. There was a significant difference between the intervention and the control group after 3 months follow-up ( $\chi^2 = 7.77$ ,  $p = 0.005$ ). The intervention group had 5.8% participants in the pre-contemplation stage, 24.0% in the contemplation stage, the largest number (36.5%) were in the preparation stage, 23.1% were in the action stage, and 10.6% were in the maintenance stage. In contrast, the control group had 4.5% in the pre-contemplation stage; the largest proportion (46.4%) were in the contemplation stage, 24.5% were in the preparation stage, 23.7% in the action stage, and 0.9% were in the maintenance stage (Figure 4.2).



Kruskal Wallis Test; Grouping Variable: participant group  
 After 3 months two groups mean rank: intervention group = 119.11; control group = 96.53

**Figure 4.2 Comparison two groups Stage of change from baseline to 3 months**

The Relative Risk analysis identified a statistically significant difference on the Likelihood ratio (38.05,  $p < 0.001$ ), this revealed that the MI intervention was effective. The Odds Ratio of 0.15 (95% CI: 0.07 to 0.28) indicated that the MI intervention had an effect on stage of change levels. In addition, a Chi-Square test revealed that 57% of participants in the intervention group changed stage during the period from baseline to 3 months follow-up, compared with only 17% of the control group moving to the next stage.

The Kruskal Wallis test was also used to analyse demographic variables for Stage of change. The results showed that some demographic variables such as gender, age, and employment status related to significantly different outcomes at 3 months follow-up in the stage of change levels. A Kruskal Wallis test was used to analyse

which gender group appeared to have the best stage of change outcomes after the MI intervention. The results indicated no significant difference between the control and the intervention group at baseline (male,  $p= 0.19$ ; female,  $p= 0.58$ ). At three months follow-up, there was no significant difference in the male participants ( $p= 0.08$ ) but there was a significant difference in the female participants ( $p= 0.02$ ), with a higher mean rank score (60.00) in the intervention group (Tables 4.7).

**Table 4.7 After 3 months: Stage of change variable analysed by gender**

Gender	Group	3 months n (Mean rank)	$\chi^2$	p-value
Male	Intervention	46 (59.76)	3.04	0.08
	Control	61 (49.66)		
Female	Intervention	58 (60.00)	5.18	0.02*
	Control	49 (46.90)		

Kruskal Wallis Test; grouping variable: participant group

A Kruskal Wallis test was also used to analyse which age group appeared to have the best Stage of change outcomes. The results showed no significant difference between the control and the intervention groups at baseline (young age,  $p = 0.16$ ; middle age,  $p = 0.14$ ; retirement age,  $p = 0.53$ ). At 3 months follow-up there was also no significant difference in the young age group ( $p = 0.62$ ) and the retired age group ( $p = 0.28$ ), but significant difference in the middle age group ( $p = 0.01$ ) with higher mean rank scores of 84.10 in the intervention group (Table 4.8).

**Table 4.8 After 3 months: Stage of change variable analysed by age**

Age levels	Groups	3 months n (Mean rank)	$\chi^2$	p-value
Young age	Intervention	2 (4.00)	0.24	0.62
	Control	4 (3.25)		
Middle age	Intervention	75 (84.10)	6.42	0.01*
	Control	75 (66.90)		
Retired age	Intervention	27 (31.94)	1.16	0.28
	Control	31 (27.37)		

Kruskal Wallis Test; grouping variable: participant group

Age levels: 1<40 years; 2=41-64 years; 3>65 years (retired age)

A Kruskal Wallis test was also used to analyse which employment status group appeared to have the best stage of change outcomes. The results indicated no significant difference between the control and intervention groups at baseline (unemployment,  $p = 0.22$ ; employment,  $p = 0.45$ ), or at 3 months follow-up, in the unemployed group ( $p = 0.13$ ), but a significant difference in the employed group ( $p = 0.01$ ) and higher mean rank score of 82.03 in the intervention group (Table 4.9).

**Table 4.9 Stage of change variable analysed by employment status**

Employment	Group	3 months n(Mean rank)	$\chi^2$	p-value
Unemployment	Intervention	32 (37.50)		
	Control	35 (30.80)	2.21	0.13
Employment	Intervention	72 (82.03)		
	Control	75 (66.29)	5.46	0.01*

Kruskal Wallis Test; grouping variable: participant group

In conclusion, the results support hypothesis one indicating that people with Type II diabetes who participated in a motivational interview had improved stage of change outcomes from baseline to three months compared to the control group. The current study found that intervention group participants altered their stage of change from pre-contemplation (stage one) to contemplation (stage two), and from contemplation (stage two) to either preparation (stage three) or action (stage four). There was a significant difference between the intervention group and the control group indicating that being female, middle aged, and employed correlated with improved self-management at 3 months follow-up. This finding will be discussed in Chapter 6.

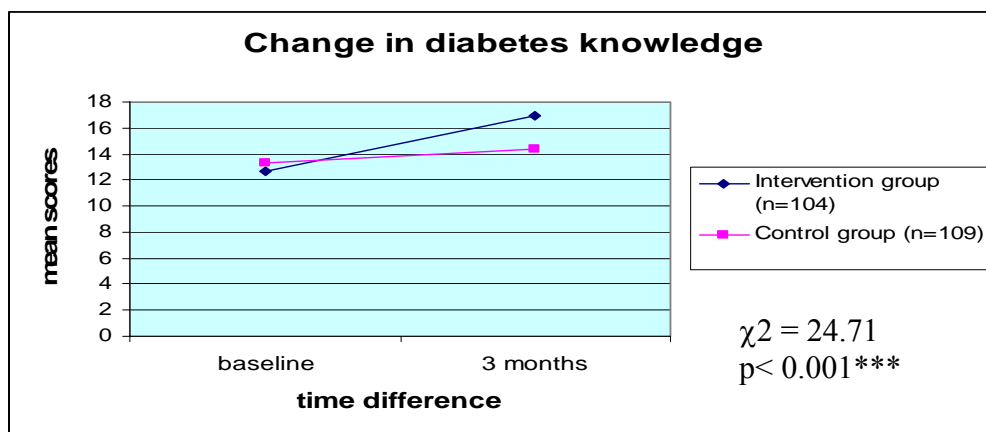
#### 4.5.2 Hypothesis Two

People with Type II diabetes who participate in a MI will have improved personal outcomes (knowledge, self-monitoring blood glucose SMBG, and self-recording blood glucose SRBG) from baseline to three months compared to the control group.

The data used to test this hypothesis were analysed using the Kruskal-Wallis test, Relative Risk estimate and the Group x Time interaction in a 2 x 2 Repeated Measures Analysis of Variance (RM-ANOVA). Participants in both groups increased their

diabetes knowledge scores from baseline to three months (Figure 4.3). Differences after 3 months for these values were then computed and the control and intervention groups compared using a Kruskal Wallis test. Analysis revealed a significant within subject effect for diabetes knowledge in the intervention and control groups. The Kruskal Wallis test showed no significant difference at baseline ( $\chi^2 = 1.33$ ,  $p = 0.24$ ), but significant difference at 3 months follow-up ( $\chi^2 = 24.71$ ,  $p < 0.001$ ).

The Relative Risk was statistically significant on the Likelihood ratio (which exceeds 10) (10.64,  $p < .001$ ) and indicated that the MI intervention was effective. The Odds Ratio of 0.31 (95% CI: 0.15 to 0.65) indicated that the MI intervention was effective in changing diabetes knowledge levels.



Kruskal Wallis Test; Grouping Variable: participant group  
 After 3 months two groups mean rank: intervention group = 128.40; control group = 86.58

**Figure 4.3: Change in diabetes knowledge from baseline to 3 months**

The RM-ANOVA, using a Time x Group interaction identified a significant difference between the control and intervention groups from baseline to 3 months follow-up ( $p = 0.04$ ). The results indicate that a significant change in diabetes knowledge occurred over time (see Table 4.10). In the intervention group, diabetes knowledge levels increased from baseline with a mean score of 12.61 (SD = 4.04) to a 3 month follow-up mean score of 16.98 (SD = 3.43). The control group reported a baseline mean score of 13.27 which changed to 14.39 at 3 months follow-up. A

significant time effect ( $p = 0.001$ ) was observed, indicating that change occurred in diabetes knowledge from baseline to three months for both groups (Table 4.10).

**Table 4.10 Change in diabetes knowledge**

Mean scores at baseline and 3 months		
Group	Baseline	After 3 months
	mean(SD)	mean(SD)
Intervention	12.61 (4.04)	16.98 (3.43)
Control	13.27 (3.84)	14.39 (4.08)

Baseline n=125; after 3 months intervention group n=104, control group n=110

**Tests of Within-Subjects**

Measure: MEASURE\_1

Source	dk	Type III Sum of Squares	df	Mean Square	F	Sig.
dk	Linear	762.29	1	762.29	163.59	<0.001
dk * group	Linear	273.41	1	273.41	58.67	<0.001
Error(dk)	Linear	983.16	211	4.66		

**Tests of Between-Subjects**

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	87669.41	1	87669.41	3408.96	<0.001	0.94
group	102.96	1	102.96	4.00	0.04*	0.01
Error	5426.35	211	25.71			

$\eta^2$  – Partial Eta Squared

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

A Kruskal Wallis test was also used to analyse which gender group appeared to have the best diabetes knowledge outcomes after the MI intervention. The results indicated no significant difference between the control and the intervention group at baseline (male,  $p = 0.80$ ; female,  $p = 0.27$ ). At 3 months follow-up, both the male and female groups had significantly different scores in diabetes knowledge (male,  $p = 0.006$ ; female,  $p < 0.001$ ), with higher mean rank scores (male = 62.83; female = 65.91) in the intervention group (Tables 4.11).



**Table 4.11 After 3 months diabetes knowledge variable analysed by gender**

Gender	Group	3 months n(Mean rank)	$\chi^2$	p-value
Male	Intervention	46 (62.83)	7.56	0.006**
	Control	60 (46.35)		
Female	Intervention	58 (65.91)	18.82	<0.001***
	Control	49 (39.90)		

Kruskal Wallis Test; grouping variable: participant group

A Kruskal Wallis test was also used to analyse which age group appeared to have the best diabetes knowledge outcomes after the MI intervention. The results indicated no significant difference between the control and intervention group at baseline (young age,  $p = 0.25$ ; middle age,  $p = 0.54$ ; retired age,  $p = 0.16$ ). At 3 months follow-up, there was also no significant difference in the young age group ( $p = 0.06$ ), but a significant difference in the middle age group ( $p < 0.001$ ) and the retired age group ( $p = 0.002$ ), with higher mean rank scores (middle age = 90.39; retired age = 36.70) in the intervention group (Tables 4.12).

**Table 4.12 After 3 months: Diabetes knowledge analysed by age levels**

Age levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Young age	Intervention	2 (1.50)	3.42	0.06
	Control	4 (4.50)		
Middle age	Intervention	75 (90.39)	19.42	<0.001***
	Control	74 (59.40)		
Retired age	Intervention	27 (36.70)	9.27	0.002**
	Control	31 (23.23)		

Kruskal Wallis Test; grouping variable: participant group

Age levels: 1<40 years; 2=41-64 years; 3>65 years (retired age)

The education results indicated no significant difference between the high school and vocational education group ( $p = 0.41$ ) and the bachelor degree or higher group ( $p = 0.89$ ) but a significant difference did emerge in the primary school or less group ( $p = 0.04$ ) (Table 4.13). At 3 months follow-up, there was a significant difference among the three groups (primary school or less,  $p < 0.001$ ; high school and vocational education,  $p = 0.002$ ; and bachelor degree or higher,  $p = 0.001$ ).

**Table 4.13 Diabetes knowledge analysed by educational levels**

Educational levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Education 1	Intervention	52 (57.94)	13.11	<0.001***
	Control	44 (37.34)		
Education 2	Intervention	37 (50.49)	9.76	0.002**
	Control	45 (34.11)		
Education 3	Intervention	15 (24.80)	11.83	0.001**
	Control	20 (12.90)		

Kruskal Wallis Test; grouping variable: participant group

Educational levels: 1=<primary school; 2=high school and vocational education; 3=>bachelor degree

There were no significant difference on knowledge levels and employment status between the control and intervention groups at baseline (unemployment,  $p=0.70$ ; employment,  $p=0.25$ ) (Table 4.14). At 3 months follow-up, employment status was associated with significantly different knowledge scores in the control and intervention groups (unemployment,  $p=0.002$ ; employment,  $p<0.001$ ).

**Table 4.14 Diabetes knowledge analysed by employment status**

Employment	Group	3 months n(Mean rank)	$\chi^2$	p-value
unemployment	Intervention	32 (41.70)	9.64	0.002**
	Control	35 (26.96)		
employment	Intervention	72 (87.31)	15.30	<0.001***
	Control	74 (60.06)		

Kruskal Wallis Test; grouping variable: participant group

Table 4.15 presents the frequency of self-monitoring blood glucose (SMBG) and blood glucose (SRBG) for both groups at 3 months. Differences between baseline and 3 months follow-up for these values were compared between the control and intervention groups using a Kruskal Wallis test. A significant difference between the control and intervention group was identified relating to SMBG and SRBG. In SMBG, the mean rank score of the intervention group was higher than in the control group and statistically different at 3 months follow-up (intervention, 120.31; control, 95.39;  $p<0.001$ ). In SRBG, the mean rank score of the intervention group was also higher than the control group at 3 months (intervention, 119.09; control, 96.55;  $p=0.002$ ).

**Table 4.15 Comparison SMBG and SRBG changes at 3 months follow-up**

Items	Baseline n (Mean rank)	3 months n (Mean rank)	$\chi^2$	p-value
Self-monitoring blood glucose				
Intervention	125 (122.00)	104 (120.31)	12.67	<0.001***
Control	125 (129.00)	110 (95.39)		
Self-recording blood glucose				
Intervention	125 (122.00)	104 (119.09)	9.42	0.002**
Control	125 (129.00)	110 (96.55)		

Kruskal Wallis Test; grouping variable: participant group

SMBG: self-monitoring blood glucose; SRBG: self-recording blood glucose

In conclusion, the key findings for hypothesis two demonstrated that the Motivational Interview (MI) intervention provided positive outcomes in participants' diabetes knowledge levels. There was a significant difference between the intervention and control groups at 3 months follow-up. The results showed significant differences in diabetes knowledge between the intervention and control groups according to gender, age, education levels, and employment status at 3 months follow-up. Frequency of self-monitoring blood glucose and self-recording blood glucose also showed significant differences between the intervention and control groups at 3 months follow-up. The results confirm hypothesis two. These findings will be discussed in Chapter 6.

### 4.5.3 Hypothesis Three

People with Type II diabetes who participate in a MI will have improved psychological outcomes from baseline to three months compared to the control group.

This hypothesis was tested by using the Kruskal Wallis test, Relative Risk estimate and the Group x Time interaction in a 2 x 2 Repeated Measures Analysis of Variance (RM-ANOVA) to determine group differences over time. The psychological outcomes included the Diabetes Self-Management Instrument (DSMI), Depression, Anxiety, Stress Scales (DASS-21), Diabetes Management Self-Efficacy Scale (C-DMSSES), and WHO Quality of Life-brief (WHOQOL) variables.

The analysis indicated that participants in both groups differed in regards to Diabetes Self-Management (DSMI) mean rank score from baseline to 3 months (see Table 4.16). Differences between baseline and 3 month follow-up values were then computed and the group compared using the Kruskal Wallis test. Analyses revealed a significant within subject effect for DSMI in both groups. The Kruskal Wallis test showed no significant difference at baseline ( $\chi^2 = 1.92$ ,  $p = 0.16$ ), but a significant difference at 3 months follow-up ( $\chi^2 = 16.56$ ,  $p < 0.001$ ).

The Relative Risk revealed a statistically significant Likelihood ratio (16.98,  $p < 0.001$ ) which revealed that the MI intervention was effective. The Odds Ratio of 0.30 (95% CI: 0.16 to 0.54) identified the MI intervention was effective in changing DSMI levels.

**Table 4.16 Psychological changes at 3months follow-up**

Items	Baseline n (Mean rank)	3 months n (Mean rank)	$\chi^2$	p-value
<b>DSMI</b>				
Intervention	125 (131.85)	104 (125.21)	16.56	<0.001***
Control	125 (119.15)	110 (90.75)		
<b>DASS21</b>				
Intervention	125 (126.50)	104 (108.10)	0.01	0.88
Control	125 (124.50)	110 (106.93)		
<b>C-DMSES</b>				
Intervention	125 (125.40)	104 (119.80)	7.99	0.005**
Control	125 (125.60)	110 (95.87)		
<b>WHOQOL</b>				
Intervention	125 (124.06)	104 (112.99)	1.59	0.207
Control	125 (126.94)	110 (102.31)		

Kruskal Wallis Test; Grouping Variable: participant group  
 DSMI: Diabetes Self-Management Instrument  
 DASS21: Depression, Anxiety, Stress Scales  
 C-DMSES: Diabetes Management Self-Efficacy Scale  
 WHOQOL: WHO Quality of life-brief

In relation to the RM-ANOVA, the Time x Group interaction was significantly different between the control and intervention groups from baseline to 3 months follow-up ( $p = 0.02$ ), indicating that change over time differed significantly (see Table

4.17). In the intervention group, the DSMI increased from baseline (mean score = 109.76) to 3 months (mean score = 118.74), and the control group reported increased mean scores from baseline (mean score = 106.62) to 3 months follow-up (mean score = 110.55). A significant time effect ( $p = 0.001$ ) was observed, indicating a change in DSMI from baseline to 3 months follow-up for both groups.

**Table 4.17 DSMI changes between groups**

Mean scores at baseline and 3 months		
Group	Baseline mean(SD)	After 3 months mean(SD)
Intervention	109.76 (18.07)	118.74 (15.49)
Control	106.62 (19.18)	110.55 (16.81)

Baseline n=125; after 3 months intervention group n=104, control group n=110

**Tests of Within-Subjects**

Measure: MEASURE\_1

Source	DSMI	Type III Sum of Squares	df	Mean Square	F	Sig.
DSMI	Linear	2979.34	1	2979.34	37.29	<0.001
DSMI * group	Linear	1149.43	1	1149.43	14.39	<0.001
Error(DSMI)	Linear	16933.82	212	79.87		

**Tests of Between-Subjects**

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	5365382.00	1	5365382.00	10623.52	<0.001	0.98
group	2574.38	1	2574.38	5.09	0.025*	0.02
Error	107070.03	212	505.04			

$\eta^2$  – Partial Eta Squared

DSMI: Diabetes Self-Management Instrument

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

A Kruskal Wallis test was used to analyse the effect of gender on DSMI outcomes after the MI intervention. There was no significant difference between the control and intervention groups at baseline (male,  $p = 0.44$ ; female,  $p = 0.18$ ). At 3 months, both male and female groups were significantly different with DSMI (male,  $p = 0.005$ ; female,  $p = 0.002$ ) and higher mean rank scores (male = 63.70; female = 62.52) in the intervention group (Table 4.18).

**Table 4.18 DSMI analysed by gender at 3 months**

Gender	Group	3 months n(Mean rank)	$\chi^2$	p-value
Male	Intervention	46 (63.70)	7.88	0.005**
	Control	61 (46.69)		
Female	Intervention	58 (62.52)	9.55	0.002**
	Control	49 (56.86)		

Kruskal Wallis Test; grouping variable: participant group  
 DSMI: Diabetes Self-Management Instrument

A Kruskal Wallis test was also used to analyse which age group appeared to have the best DSMI outcomes after the MI intervention. The results indicated no significant difference in the young ( $p = 0.13$ ) and retired ( $p = 0.12$ ) but a significant difference in the middle age group ( $p = 0.04$ ). At 3 months follow-up, there was also no significant difference in the young ( $p = 1.00$ ) and retired ( $p = 0.09$ ), but a significant difference in the middle age group ( $p < 0.001$ ), with higher mean rank scores (middle age = 88.89) in the intervention group (Table 4.19).

**Table 4.19 DSMI analysed by age level at 3 months**

Age levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Young age	Intervention	2 (3.50)	<0.001	1.00
	Control	4 (3.50)		
Middle age	Intervention	75 (88.89)	14.26	<0.001***
	Control	75 (62.11)		
Retired age	Intervention	27 (33.48)	2.81	0.09
	Control	31 (26.03)		

Kruskal Wallis Test; grouping variable: participant group  
 Age levels: 1<40 years; 2=41-64 years; 3>65 years (retired age)  
 DSMI: Diabetes Self-Management Instrument

There was no significant difference in regards to employment between the control and intervention and DMSI at baseline (unemployment,  $p = 0.45$ ; employment,  $p = 0.21$ ). At 3 months follow-up, both the unemployed and employed groups were significantly different in both the control group and intervention group (unemployment,  $p = 0.004$ ; employment,  $p = 0.002$ ) (Table 4.20).

**Table 4.20 DSMI analysed by employment status at 3 months**

Employment	Group	3 months n(Mean rank)	$\chi^2$	p-value
Unemployment	Intervention	32 (41.09)	8.13	0.004**
	Control	35 (27.51)		
Employment	Intervention	72 (84.95)	9.34	0.002**
	Control	75 (63.49)		

Kruskal Wallis Test; grouping variable: participant group  
DSMI: Diabetes Self-Management Instrument

Participants in both groups reported decreased DASS-21 mean rank scores from baseline to 3 months (see Table 4.16). Differences between baseline and 3 months for these values were then computed and compared between groups using a Kruskal Wallis test. Analyses revealed a significant within subject effect for DASS-21 in both groups. In the intervention group, the DASS-21 decreased from baseline (mean rank = 126.50) to 3 months (mean rank = 108.10), and the control group also reported a decrease from baseline (mean rank = 124.50) to 3 months (mean rank = 106.93). The Kruskal Wallis test showed no significant between group differences at baseline ( $\chi^2 = 0.04$ ,  $p = 0.82$ ) or at 3 months follow-up ( $\chi^2 = 0.01$ ,  $p = 0.88$ ).

The Relative Risk was not statistically significant on the Likelihood ratio (1.32,  $p=0.24$ ), this revealed that the MI intervention was not effective. The Odds Ratio of 0.55 (95% CI: 0.19 to 1.54) revealed the MI intervention was not effective in changing DASS-21 levels.

The Time x Group interaction was not significant ( $p= 0.458$ ), indicating that change over time was not different in the two groups. A significant time effect ( $p< 0.001$ ) was observed, indicating a significant change in DASS-21 from baseline to 3 months for both groups (Table 4.21).

**Table 4.21 DASS-21 changes between groups**

Mean scores at baseline and 3 months		
Group	Baseline mean(SD)	After 3 months mean(SD)
Intervention	8.16 (8.80)	6.23 (8.06)
Control	9.14 (10.78)	7.14 (9.57)

Baseline n=125; after 3 months intervention group n=104, control group n=110

#### Tests of Within-Subjects Contrasts

Measure: MEASURE\_1

Source	DASS 21	Type III Sum of Squares	df	Mean Square	F	Sig.
DASS 21	Linear	254.38	1	254.38	15.86	<0.001
DASS 21 * group	Linear	0.02	1	0.02	0.002	0.96
Error(DASS 21)	Linear	3398.53	212	16.03		

#### Tests of Between-Subjects Effects

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	23796.03	1	23796.03	151.76	<0.001	0.41
group	86.50	1	86.50	0.55	0.45	0.003
Error	33241.16	212	156.79			

$\eta^2$  – Partial Eta Squared

DASS21: Depression Anxiety and Stress scale

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

Participants in both groups were able to increase their Diabetes Management Self-Efficacy Scale (C-DMSES) mean rank score from baseline to three months (see Table 4.16). Differences between baseline and 3 months for these values were then computed and compared between groups using a Kruskal Wallis test. Analyses revealed a significant within subject effect for C-DMSES in both groups. The Kruskal Wallis test revealed no significant difference at baseline ( $\chi^2 < 0.001$ ,  $p = 0.98$ ), but a significant difference at 3 months follow-up ( $\chi^2 = 7.99$ ,  $p = 0.005$ ).

The Relative Risk was statistically significant on the Likelihood ratio (7.31,  $p = 0.007$ ), this revealed that the MI intervention was effective. The Odds Ratio of 0.44 (95% CI: 0.24 to 0.80) revealed the MI intervention was effective in changing C-DMSES levels.



In relation to the RM-ANOVA, the Time x Group interaction was not significant ( $p = 0.240$ ), indicating that change over time did not differ in the two groups (see Table 4.22). In the intervention group, the C-DMSES increased steadily from a baseline mean score of 148.43 (SD= 30.37) to a 3 month mean score of 162.61 (SD = 23.62). The control group reported a baseline mean score of 147.42 (SD = 32.18) to a 3 months mean rank score of 153.33 (SD = 27.14). A significant time effect ( $p < 0.001$ ) was observed, indicating a significant change in DMSES from baseline to 3 months for both groups.

**Table 4.22 C-DMSES change between groups**

Mean scores at baseline and 3 months		
Group	Baseline mean(SD)	After 3 months mean(SD)
Intervention	148.43 (30.37)	162.61 (23.62)
Control	147.42 (32.18)	153.33 (27.14)

Baseline n=125; after 3 months intervention group n=104, control group n=110

**Tests of Within-Subjects**

Measure: MEASURE\_1

Source	C-DMS ES	Type III Sum of Squares	df	Mean Square	F	Sig.
C-DMSES	Linear	7050.37	1	7050.37	39.30	<0.001
C-DMSES * group	Linear	2636.66	1	2636.66	14.69	<0.001
Error(C-DMSES)	Linear	38030.29	212	179.38		

**Tests of Between-Subjects**

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	10131355.04	1	10131355.04	7082.92	<0.001	0.97
group	1988.86	1	1988.86	1.39	0.24	0.007
Error	303243.15	212	1430.39			

$\eta^2$  – Partial Eta Squared

C-DMSES: Diabetes Management Self-Efficacy Scale

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

An analysis of gender group on C-DMSES outcomes indicated no significant difference between the control and intervention groups at baseline (male,  $p = 0.92$ ;

female,  $p = 0.88$ ). At 3 months there was no significant difference between the male groups ( $p = 0.07$ ) and female groups ( $p = 0.03$ ) (Table 4.23).

**Table 4.23 C-DMSES analysed by gender at 3 months**

Gender	Group	3 months n(Mean rank)	$\chi^2$	p-value
Male	Intervention	46 (60.08)		
	Control	61 (49.42)	3.09	0.07
Female	Intervention	58 (59.95)		
	Control	49 (46.96)	4.65	0.03*

Kruskal Wallis Test; grouping variable: participant group  
C-DMSES: Diabetes Management Self-Efficacy Scale

An analysis of age group on C-DMSES outcomes indicated no significant difference between the control and intervention groups in C-DMSES baseline data (young age,  $p = 0.34$ ; middle age,  $p = 0.49$ ; retired age,  $p = 0.10$ ). At 3 months there was no significant difference in the young age group ( $p = 0.48$ ) and retired age group ( $p = 0.20$ ), but a significant difference in the middle age group ( $p = 0.01$ ), with higher mean rank scores (middle age = 84.31) in the intervention group (Table 4.24).

**Table 4.24 C-DMSES analysed by age at 3 months**

Age levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Young age	Intervention	2 (4.25)		
	Control	4 (3.13)	0.49	0.48
Middle age	Intervention	75 (84.31)		
	Control	75 (66.69)	6.16	0.01*
Retired age	Intervention	27 (32.48)		
	Control	31 (26.90)	1.57	0.20

Kruskal Wallis Test; grouping variable: participant group  
Age levels: 1<40 years; 2=41-64 years; 3>65 years (retired age)  
C-DMSES: Diabetes Management Self-Efficacy Scale

The results indicate no significant difference between the control and intervention groups on the C-DMSES at baseline (unemployed,  $p = 0.94$ ; employed,  $p = 0.96$ ). At 3 months, there was no significant difference in the unemployed group ( $p = 0.11$ ), but significant difference in the employed group ( $p = 0.02$ ).

**Table 4.25 C-DMSES analysed by employment at 3 months**

Employment	Group	3 months n(Mean rank)	$\chi^2$	p-value
Unemployment	Intervention	32 (37.97)	2.54	0.11
	Control	35 (30.37)		
Employment	Intervention	72 (82.34)	5.41	0.02*
	Control	75 (65.99)		

Kruskal Wallis Test; grouping variable: participant group  
C-DMSES: Diabetes Management Self-Efficacy Scale

Participants in both the control and intervention groups increased their WHO Quality of Life-brief (WHOQOL) mean rank scores from baseline to 3 months (see Table 4.16). Analyses revealed a significant within subject effect for WHOQOL in both groups. The Kruskal Wallis test showed no significant difference at baseline ( $\chi^2 = 0.09$ ,  $p = 0.75$ ) or 3 months ( $\chi^2 = 1.59$ ,  $p = 0.20$ ).

The Relative Risk was not statistically significant on the Likelihood ratio (0.86,  $p = 0.35$ ), revealing that the MI intervention was not effective in changing WHOQOL. The Odds Ratio of 0.75 (95% CI: 0.42 to 1.36) indicated the MI intervention was not effective in changing WHOQOL levels.

In relation to the RM-ANOVA, the Time x Group interaction was not significant ( $p = 0.680$ ) indicating that change over time was not different in the two groups (see Table 4-26).

**Table 4.26 WHOQOL measure changes between groups by test of within subjects and between subjects**

Mean scores at baseline and 3 months		
Group	Baseline mean(SD)	After 3 months mean(SD)
Intervention	101.16 (10.53)	104.73 (9.43)
Control	101.81 (10.74)	102.91 (10.38)

Baseline n=125; after 3 months intervention group n=104, control group n=110

**Tests of Within-Subjects Contrasts**

Measure: MEASURE\_1

Source	whoqol	Type III Sum of Squares	df	Mean Square	F	Sig.
whoqol	Linear	286.86	1	286.86	18.85	<0.001
whoqol * group	Linear	168.71	1	168.71	11.08	0.001
Error(whoqol)	Linear	3225.90	212	15.21		

**Tests of Between-Subjects Effects**

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	4537563.93	1	4537563.93	23432.57	<0.001	0.99
group	33.09	1	33.09	0.17	0.68	0.001
Error	41052.40	212	193.64			

$\eta^2$  – Partial Eta Squared

WHOQOL: WHO quality of life-brief

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

A Kruskal Wallis test was also used to analyse which gender group appeared to have the best C-DMSES outcomes after the MI intervention. The results indicated no significant difference between the control and intervention groups at baseline (male,  $p = 0.09$ ; female,  $p = 0.16$ ). At 3 months follow-up, there was no significant difference in the male group ( $p = 0.17$ ) but a significant difference in the female group ( $p = 0.002$ ) (Tables 4.27).

**Table 4.27 WHOQOL analysed by gender at 3 months**

Gender	Group	3 months n(Mean rank)	$\chi^2$	p-value
Male	Intervention	46 (49.35)	1.81	0.17
	Control	61 (57.51)		
Female	Intervention	58 (62.63)	9.81	0.002**
	Control	49 (43.79)		

Kruskal Wallis Test; grouping variable: participant group

WHOQOL: WHO quality of life-brief

Table 4.28 presents the influence of employment status on WHOQOL outcomes after the MI intervention. The results showed no significant difference between the control and the intervention group in WHOQOL baseline data (unemployment,  $p = 0.33$ ; employment,  $p = 0.71$ ). At 3 months follow-up, there was no significant difference in the unemployment group ( $p = 0.49$ ) in contrast to employment group which was significant difference in the control group and intervention group ( $p = 0.03$ ).

**Table 4.28 WHOQOL by employment status at 3 months**

Employment	Group	3 months n(Mean rank)	$\chi^2$	p-value
Unemployment	Intervention	32 (32.30)	0.46	0.49
	Control	35 (35.56)		
Employment	Intervention	72 (81.47)	4.34	0.03*
	Control	75 (66.83)		

Kruskal Wallis Test; grouping variable: participant group  
WHOQOL: WHO Quality of Life-brief

The results indicate partial support for the hypothesis. People with Type II diabetes who participated in a motivational interview reported significant differences from baseline to 3 months follow-up in DSMI and C-DMSES mean scores but no significant difference in WHOQOL and DASS-21. In addition, the present study found that DSMI and C-DMSES were significantly different between the intervention and control groups at 3 months follow-up. Moreover, there were significant differences between the intervention and control groups in relation to gender, age and employment status at 3 months follow-up on DSMI, C-DMSES scores. Although WHO Quality of Life-brief (WHOQOL) produced no significant difference between the intervention and control groups, there were significant differences in regards to gender and employment status groups at 3 months follow-up. There was no significant difference on Depression, Anxiety, Stress Scale (DASS-21) scores between the intervention and control group. This finding will be discussed in Chapter 6.

#### 4.5.4 Hypothesis Four

People with Type II diabetes who participate in a MI will have improved social outcomes from baseline to three months follow-up compared to the control group.

This hypothesis was tested by using the Kruskal Wallis test, Relative risk estimate and Group x Time interaction in a two x two Repeated Measures Analysis of Variance

(RM-ANOVA). Data were analysed to establish if the intervention group differed from the control group in social variables over time.

The analysis indicated that participants in both the control and intervention groups increased their Medical Outcomes Study Social Support (MOS-SSS-C) mean rank scores from baseline to 3 months follow-up (see Table 4.29). Differences between baseline and 3 months for these values were then computed and compared between groups using a Kruskal Wallis test. Analysis revealed a significant within subject effect for MOS-SSS-C in both groups. The Kruskal Wallis test showed no significant difference at baseline ( $\chi^2 = 0.98$ ,  $p = 0.32$ ) and also no significant difference at 3 months follow-up ( $\chi^2 = 1.02$ ,  $p = 0.31$ ) (Table 4-29).

**Table 4.29 Comparison social support changes at 3 months follow-up**

Items	Baseline n (Mean rank)	3 months n (Mean rank)	$\chi^2$	p-value
MOS-SSS-C				
Intervention	125 (130.04)	104 (111.89)	1.02	0.31
Control	125 (120.96)	110 (103.35)		

MOS-SSS-C: The Medical Outcomes Study Social Support

In relation to the RM-ANOVA, the Time x Group interaction was not significant ( $p = 0.47$ ), indicating that change over time was not different in the two groups (see Table 4-30). In the intervention group, the MOS-SSS-C increased from baseline mean scores of 79.95 (SD = 13.94) to 3 months follow-up mean scores of 82.08 (SD = 11.66), and the control group reported baseline mean scores of 79.17 (SD = 13.12) to 3 months mean scores of 81.02 (SD = 11.88). A significant time effect ( $p < 0.001$ ) was observed, indicating a significant change in MOS-SSS-C from baseline to 3 months post intervention for both of the groups.

The Relative Risk relative to the MI intervention indicated no statistically significant on the Likelihood ratio (1.99,  $p = 0.15$ ), this revealed that the MI intervention was not effective. The Odds Ratio of 0.66 (95% CI: 0.37 to 1.17) identified the MI intervention was not effective in changing MOS-SSS-C levels.

**Table 4.30 MOS-SSS-C changes between groups**

Mean scores at baseline and 3 months		
Group	Baseline mean(SD)	After 3 months mean(SD)
Intervention	79.952 (13.94)	82.08 (11.66)
Control	79.176 (13.12)	81.02 (11.88)

Baseline n=125; after 3 months intervention group n=104, control group n=110

#### Tests of Within-Subjects

Measure: MEASURE\_1

Source	mossssc	Type III Sum of Squares	df	Mean Square	F	Sig.
mossssc	Linear	209.73	1	209.73	4.71	0.03
mossssc * group	Linear	0.21	1	0.21	0.005	0.94
Error(mossssc)	Linear	9429.50	212	44.47		

#### Tests of Between-Subjects

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	2795974.36	1	2795974.36	10870.72	<0.001	0.98
group	130.33	1	130.33	0.50	0.47	0.002
Error	54526.86	212	257.20			

$\eta^2$  – Partial Eta Squared

MOS-SSS-C: The Medical Outcomes Study Social Support

Note: simplifying assumptions, some of these scale scores based on categorical (eg No/Yes) but for purposes of comparison scale scores treated as it interval

In summary, the key findings did not support hypothesis four. People with Type II diabetes who participated in a motivational interview did not differ from participants in the control group from baseline to 3 months follow-up on Medical Outcomes Study Social Support (MOS-SSS-C) scores, but the intervention group had a higher score than the control group after 3 months follow-up. This finding will be discussed in Chapter 6.

#### 4.5.5 Hypothesis Five

People with Type II diabetes who participate in a MI will have improved metabolic outcomes from baseline to 3 months follow-up compared to the control group. This hypothesis was tested using the independent t test, Relative Risk estimate and the Group x Time interaction in a two x two Repeated Measures Analysis of Variance (RM-ANOVA). Data were analysed to establish if the intervention group differed from the control group on metabolic variables over time.

Participants in both groups demonstrated a decrease their HbA1c levels from baseline to 3 months follow-up (see Table 4.31). Differences between baseline and 3 months for these values were then computed and changes from baseline to 3 months follow-up compared between groups using an Independent t test. Analyses revealed a significant within subject effect for HbA1c in the intervention group but not in the control group. In the intervention group, the HbA1c reduced from baseline mean of 8.97 (SD = 2.17) to 3 months follow-up mean of 8.16 (SD = 1.73). The control group analysis indicated baseline mean of 8.53 (SD = 1.82) 3 months follow-up mean of 8.48 (SD = 1.78), (change from baseline: 0.80 vs 0.05;  $t = 4.25$ ,  $p < 0.001$ ).

**Table 4.31 Evaluation HbA1c changes from baseline to 3months follow-up**

	Baseline Mean (SD)	3 months Mean (SD)	Difference (95% CI)	t	p
Intervention group (n=101)	8.97 (2.17)	8.16 (1.73)	0.80 (0.40 to 1.09)	4.25	<0.001***
Control group (n=110)	8.53 (1.82)	8.48 (1.78)	0.05 (0.39 to 1.10)		

Baseline-3 months follow-up using independent t test

The Relative Risk was statistically significant. The Likelihood ratio exceeded 10 (10.98,  $p = 0.001$ ), indicating that the MI intervention was effective. The Odds Ratio of 0.42 (95% CI: 0.25 to 0.71) demonstrated the MI intervention was effective in changing HbA1c levels.

In relation to the RM-ANOVA, the Time x Group interaction was not significantly different ( $p = 0.80$ ) indicating that change over time was not different in the two groups (see Table 4.32). A significant time effect ( $p < 0.001$ ) was observed, indicating there was a significant change in HbA1c from baseline to three months for both groups.



**Table 4.32 RM-ANOVA Evaluation HbA1c measure changes between groups by tests of within subjects and between subjects**

**Tests of Within-Subjects**

Measure: MEASURE\_1

Source	HbA1c	Type III Sum of Squares	df	Mean Square	F	Sig.
HbA1c	Linear	19.48	1	19.48	23.94	<0.001
HbA1c * group	Linear	14.71	1	14.71	18.08	<0.001
Error(hb1c)	Linear	170.09	209	0.81		

**Tests of Between-Subjects**

Measure: MEASURE\_1  
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	30725.47	1	30725.47	4893.83	<0.001	0.95
group	.37	1	.37	0.05	0.80	<0.001
Error	1312.18	209	6.27			

$\eta^2$  – Partial Eta Squared

A Kruskal Wallis test was also used to analyse which education levels appeared to have the best ADA levels of HbA1c outcomes after the MI intervention. The results indicated no significant difference among the three levels of education at baseline (primary school or less education,  $p = 0.32$ ; high school and vocational education,  $p = 0.63$ ; and bachelor degree or higher,  $p = 0.50$ ). At 3 months follow-up there was a significant difference in bachelor degree or higher group ( $p = 0.002$ ) but not in primary school or less education group ( $p = 0.83$ ) and high school and vocational education group ( $p = 0.12$ ) (Table 4.33).

**Table 4.33 After 3 months ADA levels of HbA1c analysed by educational levels**

Education levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Education 1	Intervention	51 (48.52)	0.04	0.83
	Control	44 (47.40)		
Education 2	Intervention	36 (37.39)	2.37	0.12
	Control	46 (44.72)		
Education 3	Intervention	14 (11.86)	9.67	0.002**
	Control	20 (21.45)		

Kruskal Wallis Test; Grouping Variable: participant group

Educational levels: 1=<primary school; 2=high school and vocational education; 3=>bachelor degree

ADA levels of HbA1c: identified by American Diabetes Association HbA1c levels

Participants in the intervention group were able to decrease their Ac glucose from baseline to three months (see Table 4.34), but the control group did not. Differences between baseline and 3 months for these values were then computed and compared the change from baseline between groups using an independent sample t test. The analysis revealed significant within subject effect for Ac glucose in both groups. In the intervention group, the Ac glucose went down from baseline average scores 169.69 (SD = 86.62) to 3 months scores 157.38 (SD = 73.68), and the control group reported baseline average scores 156.80 (SD = 63.68) to 3 months scores 166.55 (SD = 69.79), (change from baseline: 12.30 vs -9.73), ( $t = 2.04$ ,  $p = 0.04$ ).

**Table 4.34 Ac glucose changes from baseline to 3 months follow-up**

	Baseline Mean (SD)	3 months Mean (SD)	Difference (95% CI)	t	p
Intervention group (n=104)	169.69 (86.62)	157.38 (73.68)	12.30 (0.77 to 43.31)	2.04	0.04*
Control group (n=110)	156.80 (63.68)	166.55 (69.79)	-9.73(0.66 to 43.42)		

In relation to the RM-ANOVA, the Time x Group interaction was not significant ( $p = 0.82$ ), indicating that change over time was not different in the two groups (see Table 4.35). A significant time effect ( $p < 0.001$ ) was observed, indicating a significant change in Ac glucose from baseline to three months for both groups.

The Relative Risk indicated no statistically significant effect according to the Likelihood ratio (0.22,  $p = 0.63$ ).. The Odds ratio of 0.87 (95% CI: 0.50 to 1.51) identified the MI intervention was not effective in changing Ac glucose levels.

**Table 4.35 RM-ANOVA Evaluation Ac glucose measure changes between groups by tests of within subjects and between subjects**

**Tests of Within-Subjects**

Measure: MEASURE\_1

Source	Ac glucose	Type III Sum of Squares	df	Mean Square	F	Sig.
Ac glucose	Linear	176.72	1	176.72	0.05	0.81
Ac glucose * group	Linear	12988.68	1	12988.68	4.17	0.04
Error(Ac glucose)	Linear	659570.75	212	3111.18		

**Tests of Between-Subjects**

Measure: MEASURE\_1  
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	$\eta^2$
Intercept	11307988.15	1	11307988.15	1456.83	<0.001	0.87
group	370.35	1	370.35	0.04	0.82	<0.001
Error	1645552.27	212	7762.03			

$\eta^2$  – Partial Eta Squared

A Kruskal Wallis test was also used to analyse which education levels appeared to have the best ADA levels of Ac glucose outcomes after the MI intervention. The results indicated no significant difference among the 3 education groups at baseline (primary school or less education,  $p = 0.21$ ; high school and vocational education,  $p = 0.41$ ; bachelor degree or higher education,  $p = 0.33$ ). At 3 months follow-up, there was a significant difference in the group with a bachelor degree or higher education ( $p = 0.006$ ) but no significant difference in people with a primary school or less education level ( $p = 0.58$ ) and the group with a high school and vocational education level ( $p = 0.15$ ) (Table 4.36).

**Table 4.36 ADA levels of Ac glucose analysed by educational level**

Educational levels	Group	3 months n(Mean rank)	$\chi^2$	p-value
Education 1	Intervention	52 (49.85)	0.30	0.58
	Control	44 (46.91)		
Education 2	Intervention	37 (38.00)	2.05	0.15
	Control	46 (45.22)		
Education 3	Intervention	15 (12.93)	7.42	0.006**
	Control	20 (21.80)		

Kruskal Wallis Test; Grouping Variable: participant group

Educational levels: 1=<primary school; 2=high school and vocational education; 3=>bachelor degree

ADA levels of Ac glucose: identified by American Diabetes Association Ac glucose levels

In summary, the results support hypothesis five that people with Type II diabetes who participate in a MI had improved metabolic outcomes from baseline to 3 months follow-up compared to the control group. Moreover, there were significant differences between two groups in higher education levels after 3 months follow-up. This finding will be discussed in Chapter 6.

#### **4.6 Summary of findings**

This study extends knowledge in the field of study by investigating the effectiveness of a MI intervention specifically designed to address self-management by the people with Type II diabetes. The findings demonstrated that using the TTM theory as a basis for motivational interviewing with an outpatient population can be effective in increasing stage of change, knowledge, self-efficacy, metabolic control and self-management in people with Type II diabetes. Women, middle aged and employed participants reported more benefits from the MI intervention in regards to stage of change and self-efficacy. Participants with higher education levels had greater improvement with their glycemic control. Although there was not a statistically significant difference in several variables such as quality of life, depression anxiety and stress, social support scores, there was improvement in regards to quality of life, social support and lower scores on depression, anxiety, and stress in the intervention group compared to the control group.

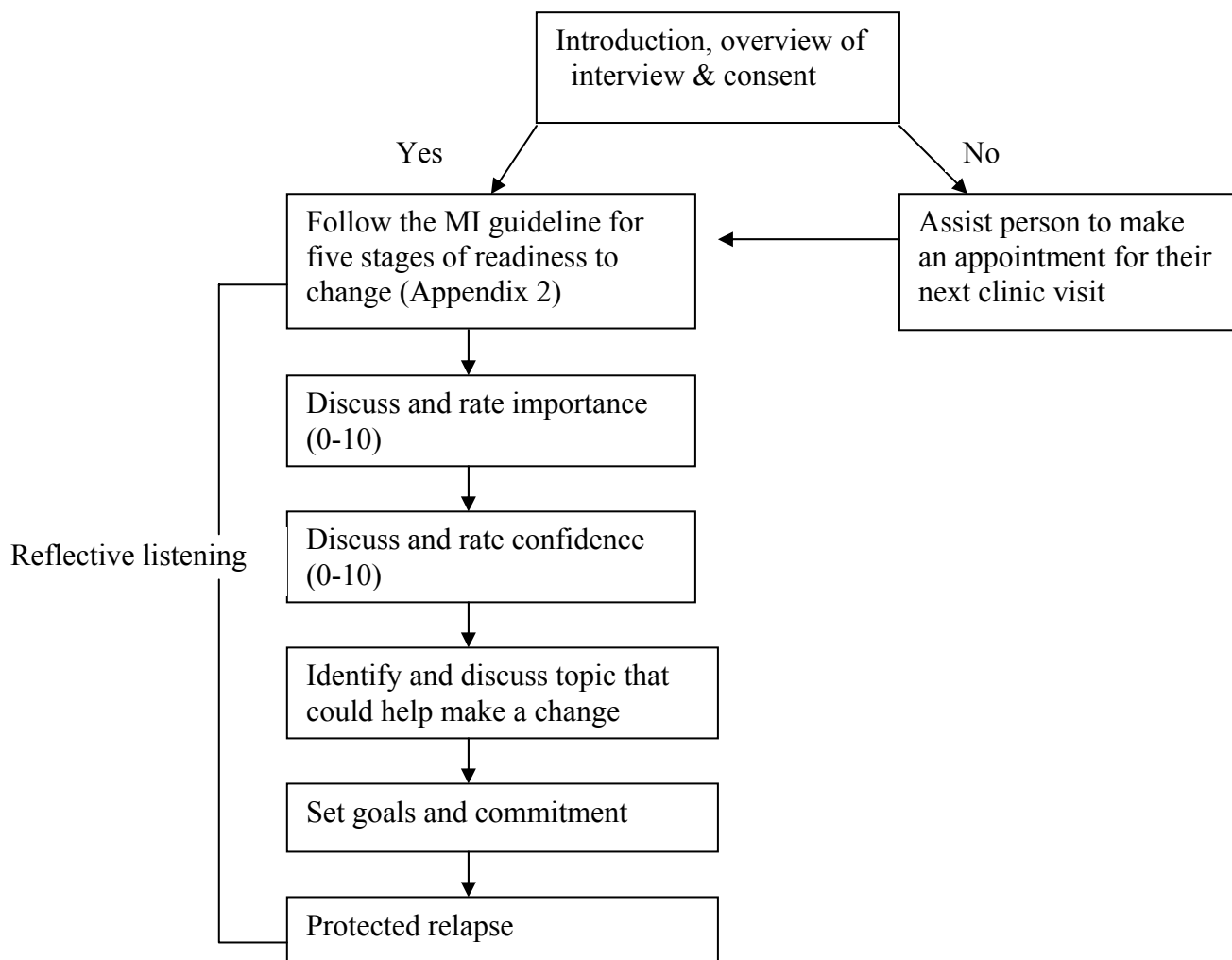
## **CHAPTER FIVE**

### **CHANGE TALK DURING THE MOTIVATIONAL INTERVIEWS**

Chapter Five presents the qualitative analysis of data obtained during the motivational interviews (MI). Analysis of the MI interviews revealed several common areas of discussion that were organized into three overarching domains: barriers to self-management health, facilitators to self-management health, and strategies for staying as healthy as possible. This chapter will present the thematic analysis of qualitative data gathered during the motivational interview. It also describes situations where participants who were encouraged to make a commitment to behaviour change.

#### **5.1 Change talk**

Behavioural self-management is an important facet of diabetes management. This includes insulin medication adjustment, managing food intake, self-testing blood glucose levels, and increasing activity patterns. Commitment language is an indicator of a stage of readiness to change. There is reason to believe that motivation for change is an additive behaviour and can be affected by relatively brief interventions (Figlie, Dunn & Laranjeira, 2005). A motivational interview can play an important role in shaping and encouraging change talk. An analysis of discussions during the motivational interviews in the current study revealed common themes that indicated participants' willingness to change their behaviour in the future. The outline of a motivational interview script is presented in a flow chart (see Figure 5.1).



**Figure 5.1: Outline of motivational interview script**

Ten cases were selected from participants in the current study who represented the five stages of change. As Patton (2002: 185) stated “The validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size”.

The themes and categories were identified manually and analysed using the identified themes and categories. The themes reflected broad issues, for example ‘**need to change**’. The term ‘categories’ was used to identify the specific issues contained in each theme, for example the category ‘why do I need to change’ which was contained in

the theme ‘**need to change**’, and are indicated by underlining. Sections presented in “*Italic type*” indicate example statements made by participants. The script indicates the participant’s number on the transcription interview document which was bound and stored for safe keeping. Pseudonyms were used in this study.

## 5.2 Qualitative sample characteristics

A total of 125 participants completed Phase II of the RCT. The recorded sessions by ten participants were selected and analysed for recurring themes. A purposive sample was used to ensure the views of a range of participants were included in the qualitative analysis. Three males (4) and six females (6) were selected. The initial assessment and comments made during the session represent the five stages of change, including one who did not progress to greater self-management, and another who did progress to greater self-management,

The ten participants’ characteristics are shown in Table 5.1. Their ages ranged from 50 to 68 years. Participants had been diagnosed with Type 2 diabetes in the last 3 months to 29 years ago. Most participants were employed (n=7), and lived with other family members (n = 10). All ten participants were married. Less than half (n = 4) were educated only at the primary school level. Five participants had been diagnosed with diabetes in combination with other diseases. The 10 participants were non-smokers. Baseline HbA1c ranged from 6.1% to 13.1%. At three months follow-up the HbA1c ranged from 6.0 % to 10.1 %. Baseline Ac glucose ranged from 68 mg/dl to 592, and at 3 months follow-up the Ac glucose levels had decreased and ranged from 67 mg/dl to 284 mg/dl.

**Table 5.1 Participant characteristics**

Pseudonym	Age (year)	Duration (year)	Gender	Employment	Live with family	Education	Has other diseases	Diabetes medication
Liao	65	3(month)	male	Y	Y	Primary school	N	Oral
Fan	53	18	Male	N	Y	Primary school	N	Oral
Hsu	66	17	Female	N	Y	No education	eyes	Insulin/oral
Lee	61	29	Female	Y	Y	Primary school	hypertension	Oral
Chao	61	17	Female	Y	Y	Hight school	hypertension	Oral
Lan	65	6	Female	Y	Y	High school	N	Oral
Chung	50	6	Female	Y	Y	Vocational education	hypertension	Oral
Hwang	68	9	Female	Y	Y	Primary school	N	Oral
Chu	59	7	Male	Y	Y	Bachelor degree	Heart disease	Oral
Jam	63	12	Male	N	Y	Bachelor degree	N	Oral

### 5.3 The MI categories and themes

Several themes and categories related to diabetes self-management emerged during the MI intervention. From the analysis of the transcribed interviews four themes emerged, and were identified as: **‘need to change’**, **‘barriers to managing diabetes’**, **‘facilitators to managing diabetes’**, **‘strategies to manage diabetes’**. These simple themes identified reflect the comments of the individuals about managing their diabetes.

#### 5.3.1 Need to change

The most substantial theme identified was **‘need to change’**. This theme included a number of categories that reflected the need to change a number of aspects of daily living that ranged from changing the style of food preparation to changing lifestyles because of the diabetic condition. The first category was ‘why do I need to change’. Based on Stage of change (Transtheoretical Model), two participants in the pre-contemplation and contemplation stages, described difficulty understanding why they needed to change. Fan, a male participant in the pre-contemplation stage,



mentioned that *“I don’t know why I need to change my eating habits. I feel I am pretty good at controlling my diabetes”*. He reported having no problems managing his diabetes, but he had high blood sugar readings. Other participants recounted how they were too busy to change and that their lives did not need changing. For example, Liao, a male participant in the pre-contemplation stage, stated that *“As far as I’m concerned, I don’t have any problems that need me to change my life in order to manage my diabetes. I guess I have problems due to the high blood sugar levels as you know, but there’s nothing that I really need to change. Actually I don’t really think there is anything I can do. However, I am busy and don’t have time to manage my diet, exercise or change my lifestyle because of the diabetes”*.

A second category in the theme **‘need to change’** included ‘change is important, but .... Participants in the preparation and action stages maintained that they did know that change was important, but were tired of the various activities involved in diabetes management. For example, Chao, a female participant in the preparation stage, said *“I do know that these changes are important, but I’m tired of everyone telling me what to eat, when to exercise and how to check blood sugar. Actually, I really want to control my diet and lower my blood sugar, but I don’t know if I’m ready”*. Chung, a female participant in the action stage, explained that *“I’m really working hard to change the way I eat. I am actually doing something about it, but I won’t be able to eat the foods I like. I won’t be able to go to the restaurants I like. I won’t be able to attend my friend’s daughter or son’s wedding ceremony in a restaurant, and I won’t even be able to eat afternoon tea with a friend in a beautiful hotel.”* She also stated that *“I know change is important and I am doing some things now, but I am so tired of the various activities, and I am not confident about changing things more”*. While the statements reflect active change, their negative tone may have future adverse consequences for maintenance of change and psychological well-being.

A third category in the theme **‘need to change’** included ‘changes let me stay as healthy as possible’. While some participants intended to move from the preparation to action or maintenance stages, some strongly resisted the idea of changing their inadequate behaviours. Others tried to manage the diabetes and solve the problems in order to stay as healthy as possible. For example, Hwang, a female participant in the action stage, mentioned that she did change to stay as healthy as possible. *“I’m really*

*working hard to change the way I eat and I do manage the diabetes. I am actually changing my eating behaviour, I won't be able to eat the cakes I like, I am doing exercise with my friend very day, sometimes I feel tired of diabetes, but for my health, you know, I will continue to do it, because changes let me stay as healthy as possible".* Chu, a male participant in the maintenance stage, also mentioned that he managed diabetes in order to maintain a healthy life. *"I've changed my lifestyle a lot. I am really doing something about managing my eating style, exercise, and checking my sugar as much as I can. Meanwhile, I am actually working hard to cut down on sweet cakes, fatty food, drinking wine....wow, that is my favourite, and eating more vegetables. Well, I changed my eating style, because I want to stay healthy and live a longer life".* The positive language of the participants revealed the dynamic process of change.

In summary, participants described several categories identified as **'need to change'**, including 'why do I need to change', 'change is important, but....', 'changes let me stay as healthy as possible'. The current study found that the MI provided information regarding the impact of changes and allowed participants the opportunity to work through some of their ambivalence in regards to change. This analysis provides an understanding of the dynamic process of change and the difficulty faced by individuals to change their lifestyle in order to manage their diabetes more effectively.

### **5.3.2 Barriers to managing diabetes**

The second theme identified was **'barriers to managing diabetes'**. There were several different categories contained in this theme. The first category was the response to managing diabetes 'diabetes, a variety of self-management behaviours'. Most participants recognized that diabetes management is composed of a variety of self-management behaviours, such as meal planning, exercise, self-monitoring and recording blood glucose, taking medication, and following a physician's or health care provider's recommendations. However, meal planning and medication taking were the most common response as to how participants defined diabetes care. For example, Liao, a male participant in the pre-contemplation stage, defined diabetes management as a process that is *"too complicated to avoid carbohydrates and controlling things."* Hsu, in contemplation stage, also described the difficulties arising from an abundance of events meant to manage her diabetes *"I don't know....it's so hard to make these kinds of*

*changes, with all the things that are going on in my life. It's the number of new skills I have to learn."*

A second category in the theme **'barriers to managing diabetes'** included 'frustration and depression'. The need for participants to address multiple issues/skills for managing diabetes at the same time created stress. Moreover, when their blood glucose remained at an abnormal level they sometimes abandoned the changes. For example, Fan, a male participant at the pre-contemplation stage, explained that he was struggling to take care of his diabetes and felt frustrated about managing it, because of the multiple demands. *"I feel frustrated, when I have to do something for my diabetes care, you know, because it is a lot of things to do at the one time. I still struggle with it"*. The potential impact of depression on diabetes was mentioned by a few participants. Depression interfered with their ability to take control of their diabetes management. For example, Chung, a female participant in the action stage, stated that *"I get a little depressed at times. I am so strict with every food intake, but my sugar is still high. I don't know why. I always push myself so hard to control my sugar during the day, but nothing changes. I really feel depressed trying to manage my diabetes, When I get depressed, I just don't want to do anything but lie down"*.

A third category included 'difficulty changing eating habits' in the theme of **'barriers to managing diabetes'**. The most common difficulty in managing diabetes, for both male and female participants, was related to changing eating habits. Many participants found it challenging to modify their food preferences, limit their food intake, and change the way they prepared foods. For example, Hsu, a female participant in the contemplation stage, felt that modifying her eating habits was still challenging even though her daughter did prepare some of her meals and monitored her portion sizes. *"I don't know how to eat properly. I am also unhappy. You know, my daughter prepared some meals for me, but I didn't like them. It is difficult to change my eating habits. It's very hard because you have to watch so much of what you eat and what you can't eat. And when you were brought up eating anything you want to eat, it's hard to change that habit"*.

It was interesting to note how Chao, a female participant in the preparation stage, struggled with her eating habits during Chinese festivals, such as Chinese New Year

and the Moon Cake Festival. *“I really like sweets. It’s so sad. I know I can’t eat them and I can’t eat my favourite sweets ever again, but I can’t control my behaviour, especially when we have festival food with family or friends, such as New Year, Moon Cake Festival....It’s really hard for me to change my habits during these Chinese festival days”*.

Several participants identified a strong link between food and well being. Food and eating was often described in terms of the emotional and behavioural reactions of participants, and for them the changed diet was described as “sad”, “unhappy” and “distressing”. These comments highlight ongoing difficulties with the social dimension of eating in the Taiwanese culture, dissatisfaction with restricted meal planning, and links between food and pleasure.

A fourth category was ‘hard to take regular medication’ in the theme of **‘barriers to managing diabetes’**. The second most common difficulty in managing diabetes for male and female participants related to diabetes medication. Several participants expressed difficulty in taking their medication on time, obtaining their medication, or being afraid of the side effects of the medication. For example, Liao, a male participant in the pre-contemplation stage, indicated that the side effects would worry him. *“If my blood sugar was not too high, then I would skip the medication till the next meal, because I was afraid of the side effects on my body. I thought it would make me sick”*. Fan, a male participant in the pre-contemplation stage, indicated that it was difficult for him to take his medication on time. *“I can’t remember when I should take the different medications, and that’s why I always forget to take them. It is really hard for me to take regular medication”*. For a few participants, their inability to maintain a medication regimen, such as using insulin or other medications, affected their ability to successfully manage their diabetes. For example, Hsu, a female participant in the contemplation stage, revealed that she skipped or altered the insulin dose when she felt unwell. *“Sometimes I don’t feel well enough to inject insulin and I skip it till the next day or alter the insulin dose”*.

A fifth category was ‘experience of an emergency situation’ in the theme of **‘barriers to managing diabetes’**. Many participants had been hospitalized and had experienced one of the many complications of diabetes, such as eye problems, heart

disease and hypertension. Some of the participants reported several emergencies related to their diabetes. They expressed fear that they did not know how to manage their illness, and sometimes their blood glucose was so low that they became disoriented and too weak to get up and call for help. For example, Liao, in the pre-contemplation stage, described an emergency where he changed his eating habits. *“I felt dizzy, and then passed out, because my blood sugar was too low. My son, didn’t know what to do, so he had to call an ambulance to take me to the emergency room, where I had a glucose injection. I know I have to keep my sugar higher to avoid low sugar situations.”* Hsu, in the contemplation stage, had also experienced a multitude of low blood glucose events. *“I try to change my eating habits and do some exercise, but things happen suddenly. I feel dizzy and too weak to get up and call help. My neighbours came and got me some juice to drink. I was scared, and thought I might fall down and hit my head. That’s why I always keep my sugar high, to save my life”.*

A sixth category was ‘gaps in knowledge’ in the theme of **‘barriers to managing diabetes’**. Misconceptions about the condition were often related to the inability of participants to connect several complications with their diabetes, and a lack knowledge of the organ involved in insulin production. Lee, a female participant in the contemplation stage, knew a great deal about diabetes and had experienced a variety of complications, such as hypertension. However, she did not think that these events, which health care providers would recognize as complications, were related to her diabetes management. *“I know all about diabetes, and I also have hypertension, but I did not think that these events, which the doctor would recognize as complications, were related to my condition. They were the doctor’s responsibility, not mine.”* Hsu, a female in the contemplation stage, indicated that she had cataracts in both eyes, but did not make the connection between her eye problems and diabetes management. *“I had two cataracts on each eye. I couldn’t see very well, and a nurse told me that it was a complication of diabetes, but I still can’t understand how they are connected to each other”.* Some participants expressed inadequate knowledge about self-care. For example, Liao, in the pre-contemplation stage, described his limited knowledge in the areas of meal planning and medication administration. *“All I know is that I am supposed to take the pills and things. Nobody has ever sat me down and talked to me about how they work, and exactly what kinds of foods and other stuff I am supposed to eat.”* Fan, a male participant in the pre-contemplation stage, also admitted a lack of knowledge in

the area of meal planning. *“I don’t know what kind of foods I am supposed to eat. I feel hungry every day, but, why is my blood sugar still very high.”*

A seventh category was ‘communication difficulties’ in the theme of **‘barriers to managing diabetes’**. Communication difficulties with health providers were perceived by participants as problems. Some participants mentioned that the ability to communicate with their health provider could affect the management of their diabetes. For example, Liao, in the pre-contemplation stage, mentioned that he could not understand the health provider’s suggestions, and was concerned that they did not care about him as an individual. *“I don’t like the doctor always forcing me to control my sugar. I also feel that they only look at my body, but not at me as an individual. You know, I also can’t understand what they suggested to me about control. I think I have difficulty communicating with my doctor, because I don’t know how to discuss my problems with him”*. One participant was distressed by the lack of support from their health provider, and he did not know how to tell the doctor the problem, and so he felt frustrated. Fan, a male participant in the pre-contemplation stage, said *“I feel that no one can help me. Who can I talk to, they are all very busy. I don’t know how to tell the doctor about my problem. Well, it is difficult to communicate with the doctor, and that’s why I am wandering between hospitals. I feel frustrated about caring for my diabetes”*.

An eighth category was ‘avoid being different from others’ in the theme of **‘barriers to managing diabetes’**. Several participants reported that they were afraid of different from others, because they have diabetes. They did not want their friends or families to treat them as if they are abnormal. Circumstances in their lives may change, but they feared their friends would not understand. For example, Liao, a male participant in the pre-contemplation stage, indicated that he eats and drinks with a friend to be the same, and that in his social life with his friends, he does not want to be different. *“I don’t want to be a target person, and I don’t want to be different. For me, eating or drinking with my friends is communication, a part of my life. I am afraid of being isolated from my friends. I heard one of my friends say that diabetics are sick, because they eat too much sugar. With this disease you can’t eat normally with your friends, so I keep my disease a secret.”* Chao, a female participant in the preparation stage, told her daughter she did not want to eat differently from the family. *“I told my daughter that I don’t want to have different meals to the family, so, my daughter cooks*

*the type of food and amount I can eat, and she eats with me. If she didn't do that, it would be difficult to control my food by myself".*

In conclusion, participants described several categories identified as **'barriers to managing diabetes'**. These included 'diabetes, a variety of self-management behaviours', 'frustration and depression', 'difficulty changing eating habits', 'hard to take regular medication', 'experience of an emergency situation', 'gaps in knowledge', 'communication difficulty', 'avoid being different from others'. The current study found that discussion during the motivational interview fostered the expression of these concerns. Once identified, then the researcher was able to provide advice and in collaboration with the participant, develop 'change talk' opportunities for participants to describe their difficulties, and start thinking differently about their problems, possibly reframe these perspectives, and generate possible solutions.

### **5.3.3 Facilitators to manage diabetes**

The third theme identified was **'facilitators to manage diabetes'**. There were several different categories contained in this theme. The first category was providers of help and support'. Although many participants indicated that they manage their own diabetes, they also identified both formal and informal sources of assistance. Several participants did not express a sense of dependency. Instead, they often affirmed their ability to care for themselves. These responses portrayed a sense of responsibility for their own care. Several participants believed that they needed certain prerequisites to do so. The majority of participants went to hospitals or clinics to get help. Help provided by doctors was mostly in the provision of diabetes supplies, medications and information. For example, Chao, a female participant in the preparation stage, mentioned that her doctor helped her take care of her diabetes, and gave her exercise suggestions that were very useful in controlling her blood glucose. *"My doctor tries to give me the right stuff and the information to read, and he helps me understand what I don't get. He really helps me, and also tells me how to exercise and lose weight, so then I can keep up my optimum sugar levels. He really supports me"*.

Several participants also received help from nurses, dieticians or diabetes educators. Nurses provided help and support for a few participants by administering

insulin and helping with information regarding digestion. For example, Chung, in the action stage, described that *“I talk to my nurse when I have some problems that I can’t solve, and she always tells me what to do.”* Lan, in the preparation stage, also stated that *“I didn’t know how to prepare food, when I was diagnosed with diabetes. I was so worried about it. The diabetic educators were working hard to teach me and my daughter how to manage my diabetes, and they really supported me.* Chu, in the maintenance stage, described how nurses helped him to manage his diabetes. *“A nurse really helped me to organize my eating, monitor my blood sugar and exercise. She made suggestions on how to do things, and gave me information to read. When I feel sad about controlling my sugar, she is there. I feel good when she does things for me”.*

The importance of a doctor in helping with diabetes management was further supported when participants were asked about the type of help and support they needed to take care of their diabetes. Some participants mentioned the importance of seeing a doctor on a regular basis and following physicians’ recommendations. Chu, in the maintenance stage, stated that *“I went to a clinic regularly, because I believe my doctors always give me the correct guidelines to go by.”* Hwang, in the action stage, also mentioned the importance of seeing a physician on a regular basis and following physicians’ recommendations. *“It is important to see your doctor regularly, go to a hospital and listen to your doctor, and follow whatever the doctor says”.*

Several participants recognized how social and emotional support helped them to stay healthy. They talked about receiving social support from a wide variety of sources, including family, friends, spouses and health care providers. They felt that the support helped them to continue managing their diabetes, and encouraged them to continue at a higher level of self-care. For example Chu, in the maintenance stage, stated that his wife was so supportive. *“She has been really supportive. She has learnt about nutrition and how to cook healthy food for me. My son always organizes the transportation or clinic appointments for me.”* *“My wife insists that our family eat together to help me to control my diet...I am not alone in managing my diabetes.”* Hwang, in the action stage, also described that her daughter was a supportive person. On an occasion when she felt like giving up she said, *“When I feel sad about controlling my sugar my daughter is always with me.”* *“I think that support from my friends is really important, especially when I am getting tired and when I feel like giving*



up.” *“My daughter always supports me and reminds me to take my medicine and do my exercise.”*

Family members were identified as important providers of several types of instrumental support for participants trying to manage their diabetic condition, such as meal planning, emotional support, transportation, and reminders. For example, Chao, a female participant in the preparation stage, stated that her daughter helped her take care of her diabetes by helping with meal planning, monitoring her eating habits and controlling her portion sizes. *“My daughter, always looks after me, and fixes something I can eat, instead of what she wants to eat. I am glad she is with me on that account, because I would be eating stuff I know I am not supposed to eat, like rice with meat sauce, cake, ice cream and oily noodles. I can just eat a skillet full. When she is with me she just gives me a spoonful and that is all I get. If she was not there, I would take more than a spoonful.”* In addition, her daughter helped her administer her medications. *“I have to take my medicine. My daughter gets it all and she just prepares it. She puts each pill I am supposed to take each time together, and she also helps me to remember everything.”*

Lee, a female participant in the contemplation stage, indicated that her daughter helped her take care of her diabetes by providing support during emergency situations. *“My sugar got really low one day and I just got really nervous. My daughter had to bring it back up. I got dizzy but that’s the only thing that happened to me.”* More generally, family members provided help in the form of transportation. Liao, a male participant in the pre-contemplation stage, mentioned that because of his poor vision, he was unable to drive and depended upon his son for transportation. *“I have to depend on my son to get to and drive me to hospital.”* Family members are recognized as important providers of emotional support. Chu, in the maintenance stage, stated that *“Sometimes I feel unwell or frustrated in taking care of my diabetes. My wife is always with me and says words to encourage me. She is really close to my heart.”*

The second category was ‘accepting diabetes’ in the theme of **‘facilitators to manage diabetes’**. Accepting diabetes as part of their lives was an important step in diabetes management for many participants. The relationship between accepting diabetes, or at least not being in denial, and effective diabetes management was

mentioned in their self-management behaviours, such as meal planning, exercise, or accepting their health provider's suggestions. Jam, a male participant in the maintenance stage, indicated that he accepted that diabetes was a part of his life. *"I told myself diabetes was part of my life when I was diagnosed, so I started to learn how to eat and exercise to control my diabetes. I also accepted my doctor and nurse's suggestions about losing weight."* Hwang, a female participant in the action stage, mentioned that she also accepted diabetes and changed her eating habits. *"I must accept I have diabetes, and tell myself that I have to change some things. I am on the way, because I check my blood sugar to adjust my food intake. It has taken many years to control festival food intake, and I also tell my family and friends not to eat carbohydrates with me."*

The third category was 'managing diabetes to avoid complications' in the theme of **'facilitators to manage diabetes'**. Some participants viewed diabetes management as a serious process, and were knowledgeable about the consequences of uncontrolled diabetes, such as hospitalization, kidney disease, heart disease, coma, amputations, blindness, stroke and death. This knowledge most likely stemmed from their own personal experiences with complications or exposure to family members and friends with complications. For example, Fan, a male participant in the pre-contemplation stage, recognized the seriousness of diabetes when one of his relatives suffered a diabetic stroke. *"I had an uncle who had a stroke. He came out of it, but he had to be in a wheelchair and be taken care of by other people. When I see the things he is going through, I know diabetes is serious, and I have to manage it."*

For some participants the prevention of disease plays a part in their decision to continue managing their disease. They stated that disease prevention was not their primary motivator to self-manage diabetes, but did influence their behaviour to avoid complications. For example, Chu, a male participant in the maintenance stage, mentioned that *"I always keep in my mind the need to control my sugar or get complications."* Chung, in the action stage, also expressed concern about the possibility of becoming unwell, further developments in her diabetes and controlling her sugar. *"I ask myself whether I want to stay healthy or get sicker. I decided to control my sugar to avoid complications."* Some participants revealed an extreme fear of becoming sicker because of complications, and this threat served as motivation to take on diabetes

self-management. For example, Chung, a female participant in the action stage, mentioned that *"I have hypertension now, I'm afraid I may become sicker and sicker and get serious complications, so I think it is better to look after my diabetes seriously. I also have the stress from my family forcing me to control my sugar, so I decided to take care of my diabetes."*

Some participants mentioned that they took care of their diabetes in order to avoid complications. For example, Lan, a female participant in the preparation stage, mentioned that she didn't want to have complications. *"I take care of my diabetes because I don't want to get any complications."* Hwang, in the action stage, stated that she managed her diabetes because she did not want to have complications that would be a burden on anyone else, such as her family. *"I manage my diabetes because I don't want anybody to help me more than they have to, as my son and daughter have their own families and they are very busy. I don't want them to have to take care of me if I have serious complications."*

The fourth category was that of 'warning signs or cues for action' in the theme of '**facilitators to manage diabetes**'. Some participants indicated that they started taking better care of their diabetes when they thought they were getting sick. Normally, this optimal behaviour was dependent on physical symptoms. Symptoms such as slow-healing cuts and sores, frequent urination and infections were therefore used as a cue for action for these individuals, both in seeking medical care in the hospital and as a prompt for diabetes self-management. For example, Fan, a male participant in the pre-contemplation stage, mentioned that he would check his blood glucose only when he felt bad. *"I never checked my blood sugar until I started feeling bad or something and then I would go ahead and take a pill."* Liao, in the pre-contemplation stage, also mentioned that he performed the required self-management behaviours only when he felt sick. *"I think I am well, so I start messing up again, and then I start getting really sick, and then I start managing my diabetes. I am supposed to do it until I am well again."* This risky behaviour pattern was more often expressed by participants in the pre-contemplation stage or contemplation stage. This behaviour pattern represents a substantial risk to the health of individuals with diabetes. For example, Liao, a male participant in the pre-contemplation stage, indicated that he did not want to change his eating habits or his life. *"I feel well, I am not sick, I don't want to change my life. You*

*know I have eaten rice and sweet things for 65 years. I can't stand my eating being controlled and not being able to eat my favourite food."*

In contrast, several participants stated that they had developed the ability to seek help when they need some ideas to improve their health in order to control their diabetes. For example, Lan, a female participant in preparation stage, indicated that *"I have to learn to control this new thing in my life, and I have to seek help to develop my ability to take care of it."*

In conclusion, participants described several categories in the theme identified as **'facilitators to manage diabetes'**. These included 'providers of help and support', 'accepting diabetes', managing diabetes to avoid complications', warning signs or cues for action. Some participants identified the motivational interview as a facilitator for diabetes self-management. According to their respective stage of change, some participants described their facilitators, while others expressed concern about the ability to change. It seemed that the majority of facilitators were predicated on the avoidance of negative or adverse consequences (e.g., fear of complication; being a burden to others). Few participants focused on the benefits of living a healthy lifestyle.

#### **5.3.4 Strategies to manage diabetes**

The fourth theme identified was **'strategies to manage diabetes'**. There were several different categories contained in the theme. The first category was that of 'goal setting for diabetes management'. Diabetes management goals are an important component of a diabetes plan (American Diabetes Association, 2003). There are a variety of goals for taking care of diabetes. The common goal is to stay healthy and control the diabetes in order to avoid complications and live longer. For example, Chao, a female participant in the preparation stage, expressed her interest in weight loss to control and help manage her diabetes. *"I want to lose up to ten kilograms, so I do my meal planning and exercise."*

It was also interesting to note that several participants mentioned that they wanted to get their diabetes under control so that they would not have to take any more medication. For example, Hsu, a female participant in the contemplation stage,

expressed a desire to control her diabetes without continuing to take insulin. *“I want to get off insulin, or only take oral medication.”* Fan, a male participant in the pre-contemplation stage, also mentioned controlling blood glucose and no more medication. *“I want my blood sugar to reach normal levels, then reduce my medication or get rid of it.”* Jam, a male participant in the maintenance stage, mentioned that managing diabetes meant he was ready to change his eating habits and do regular exercise. *“I’m ready to make these changes in the way I eat, and I can exercise at least 5 times a week.”*

For several participants goal setting and competition were important parts of their active lifestyles. These factors pushed them to achieve a higher level of fitness. Goal setting encouraged them to challenge themselves and gave them something to work towards. For example Chu, a male participant in the maintenance stage, mentioned that *“I exercise with my friends, and we have a goal, so in order to reach that goal we push each other. I cannot commit to exercise early in the morning, so I have to schedule it later in the day. That means that it is going to have to be put into the schedule after I have already done other things, usually work. I have set my goal to go, so I have to make it a priority. I don’t think about the difficulty of the exercise, I just think it is a good habit.”*

The second category was ‘check sugar to regulate food intake’, in the theme of **‘strategies to manage diabetes’**. Checking blood glucose is an important component of a diabetes plan (American Diabetes Association, 2003). Another common approach to managing blood glucose levels is through regulating food intake. Some participants mentioned that they took care of their diabetes by either watching the types of food or limiting the amount of food they consumed. For example, Hwang, a male participant in the action stage, indicated he checks his blood glucose to regulate his food intake. *“I check my blood sugar to regulate my food intake, and I take care of my diabetes by eating healthy food. I also try to select the types of food that I want to eat.”* Chung, a female participant in action stage, also mentioned portion sizes. *“I do have an eating plan and I try to eat what I want, but in moderation, because I always check my blood sugar to regulate the food.”*

It was interesting to note that a few participants mentioned that they did not check their blood glucose because of pain from the needle sting. A few participants found the punch pain to be a serious physical strain every day, forcing them to ignore an important component of blood glucose monitoring. For example, Hsu, a female participant, in the contemplation stage who had to inject insulin every day, did not regularly check her blood glucose. *“I know checking my sugar is an important skill, but you know, I can’t bear the needle stinging pain. Injecting insulin and checking blood sugar is a serious physical strain for me every day, so I only check my blood sugar when I feel sick.”* Another participant, Fan, in the pre-contemplation stage, stated that *“I have a sugar machine, but I only use it when I feel unwell. I am afraid of needles and the needle stinging pain, and for me it is like a never ending punishment.”*

The third category was ‘other ways to keep healthy’ in the theme of **‘strategies to manage diabetes’**. Participants mentioned that they had a variety of strategies to stay as healthy as possible. For example, Lee, in the contemplation stage, stated that she used a pillbox to help remind her to take her pills. *“I can take my pills regularly, because I use a pillbox to remind me.”* Chu, in the maintenance stage, communicated with a doctor about changing his medication, which became two pills. *“I discussed my medication issue with my doctor, who was concerned about me taking my medication on time. He gave me only one pill per day which was easy for me to remember.”* Chu, in the maintenance stage, also did daily physical exercise. *“The doctor said I had to exercise in order to manage my diabetes. Therefore, I became a Tai-Chi instructor and I had to exercise every day. I am happy, because that is the other way to keep living with my illness.”*

It is interesting to note that some participants used home remedies or Chinese medicine for the care of their diabetes. For example, Chao, a female participant in the preparation stage, mentioned using nutritional supplements such as vitamins to help treat her diabetes. *“I take prescription medication and I also take three different kinds of vitamins, such as B6 and A. I know I have to take them, because these pills are a way to keep healthy.”* Lan, a female participant, in the preparation stage, also mentioned that Chinese medicine helps her to treat her diabetes. *“I have Chinese medicine to help me control my blood sugar levels and give me energy to manage the diabetes”*.

In conclusion, participants described several categories in the theme identified as **'strategies to manage diabetes'**, including 'goal setting for diabetes management', 'check sugar to regulate food intake' and 'other ways to keep healthy'. The current study found that, while participants described **'strategies to manage diabetes'**, there was evidence that they had started to think more broadly about these (according to their stage of change) and in action stages for example, had made changes to integrate the healthy behaviours into their daily life. The routine nature of these activities enabled them to better manage their diabetes. Interestingly, there were several issues of concern to be noted. Some participants reported that they did not check their blood glucose because of needle pain, and participants used home remedies or Chinese medicine to treat their diabetes without mentioning it to their doctors.

#### **5.4 Summary of qualitative results**

Participants identified several themes that influenced their diabetes self-management. These included **'need to change'**, **'barriers to managing diabetes'**, **'facilitators to manage diabetes'** and **'strategies to manage diabetes'**. Participants described several categories identified as **'need to change'**, including 'why do I need to change', 'change is important, but...', 'changes let me stay as healthy as possible'. Interestingly, while participants described their difficulties as **'barriers to managing diabetes'**, they could identify their problems and started to think about them. Participants identified several categories within the theme of **'barriers to managing diabetes'**. These included 'diabetes, a variety of self-management behaviours, frustration and depression', 'difficulty changing eating habits', 'hard to take regular medication', 'experience of an emergency situation', 'gaps in knowledge', 'communication difficulty', 'avoid being different from others'. The theme of **'facilitators to manage diabetes'** emerged and contained several different categories such as 'providers of help and support', 'accepting diabetes', managing diabetes to avoid complications', warning signs or cues for action. Participants who were attempting to manage their diabetes described strategies clustered into the theme of **'strategies to manage diabetes'**. These included 'goal setting for diabetes management', 'check sugar to regulate food intake' and 'other ways to keep healthy'.

The motivational interview provided opportunities for individuals to openly discuss their concerns, reveal knowledge deficits, and discuss possible ways forward. The stage of change assessment was reflected in comments made by participants. Revealing participants' thoughts about their condition provides insights into the change process as individuals grapple with their chronic condition. These themes and categories will be discussed in Chapter 6.



## **CHAPTER SIX**

### **DISCUSSION**

The present study was designed to determine whether participation in a motivational interview by Taiwanese people with Type II diabetes would improve their self-management and well-being. This chapter discusses the major findings and begins with an overview of the strengths and limitations of the study. Results from the qualitative and quantitative data analyses are integrated and discussed in relation to the relevant literature and presented according to each hypothesis. The chapter addresses motivational interviewing in regards to stage of change, demographic variables, knowledge, psychological outcomes, social support and metabolic control.

#### **6.1 Strengths and limitations of the study**

This study has several methodological strengths that aimed to address some of the shortcomings identified in previous research. First, the study used a range of outcome variables known to impact on the ability of a person with diabetes to self-manage. Unlike some studies presented in the literature review, the current study aimed to be comprehensive in the selection of outcome measures and encompassed stage of change, metabolic outcomes, as well as personal, psychological and social domains. This approach enabled a better understanding of the factors affecting self-management in two ways: (1) by identifying those variables amenable to change through a motivational interview; and (2) identifying those factors that place individuals at risk of poor self-management and of which health care providers may be unaware (such as depression, anxiety, loneliness) but attempt to modify. Second, the study used a rigorous approach to develop the intervention. Steps included a comprehensive review of the literature, selection of a theoretical framework, and conduct of a pilot study. Third, the study confirmed the utility of the Transtheoretical Model (TTM) to guide a clinical intervention and efficiently enable the person's needs and their readiness to change to be identified. More importantly, the motivational interview appeared to be compatible with the needs of the participating cohort and enabled individuals to express their interests and concerns. A facilitative approach aimed to communicate in a way that resolved ambivalence and moved the person

toward change. In a broader sense, this study adds to our knowledge of motivational interviewing as an effective strategy to facilitate self-management by people with Type II diabetes. Fourth, the use of standardised instruments allows for replication and comparisons to be drawn with the general population of Type II diabetes sufferers in other studies. Finally, the sample size had sufficient power to permit a range of statistical analyses to detect a true difference between groups. An RCT is considered the gold standard in clinical research. This design was enacted within the limited resources available to the researcher and enabled an objective evaluation of the intervention for this cohort.

Although findings from this investigation supported the effectiveness of a MI intervention for facilitating diabetes self-management, limitations must be acknowledged. One of the limitations of this study was its brevity with respect to time intervals for measurement. Follow up outcomes were measured at 3 months. Although changes in HbA1c were identified at this time, a longitudinal design with a 6 and 12 month follow-up should be employed in order to demonstrate a pattern of behaviour change. The extended time frame would have given participants more time to implement strategies, and demonstrate stronger stability in HbA1c levels. Even though the study had the full support of the participating hospital, it was, however, unfunded and not feasible to conduct as a longitudinal study.

In regards to research process, it was not possible to blind the research nurse conducting the intervention to participant allocation, as is often the case with clinical interventions. However, the study was strengthened by having another person conduct the 3 month follow-up assessments. Results may have also been positively influenced by response bias. The intervention was delivered by a clinical nurse who had worked in a Diabetes Clinic for three years. As such, the nurse was well known to some participants receiving the intervention. It could be that participants responded positively to self-report measures in an attempt to “please” the nurse or to demonstrate gratitude for the opportunity for additional attention during the interview. This effect was minimized to some extent by the inclusion of metabolic outcome measures which correlated with measures of other domains and outcomes of the follow-up assessments conducted by another nurse. Despite these limitations, the study produced statistically

significant results for participants and demonstrated the effectiveness of the motivational interviewing intervention.

## **6.2 Discussion of findings**

Results of this study confirmed some of the significant findings of previous research investigating the effects of a Motivational Interview (MI) with people with Type II diabetes (e.g., Clark et al., 2004; Jackson et al., 2007; West et al., 2007). The results of the current research confirmed that the MI intervention facilitated participants' progress towards self-management with consequent improvement in their Stage of change, personal, psychological, social, and metabolic variables at 3 months follow-up.

### **6.2.1 Effect of MI on Stage of change**

The motivational interview process was matched to each participant's stage of change and proved effective in creating movement to higher levels of change. As a result of change, the intervention conferred health benefits for participants in this study at 3 months and hopefully in the longer term. These findings are consistent with earlier studies that aimed to promote lifestyle and physical activity change using motivational interviews (Clark et al., 2004; Jackson et al., 2007; West et al., 2007).

As the majority of participants in the intervention group advanced their Stage of change, closer examination and discussion of the changes are warranted. A greater number of intervention group participants moved from stage 2 (contemplation) to stages 3 (preparation), 4 (action) and 5 (maintenance). Very few control group participants advanced their stage of change. The current findings are congruent with those of Mau et al. (2001) who also shaped the content of their intervention to match participants' stage of change. Their intervention also included culturally-appropriate content for their cohort of indigenous Hawaiians. The inclusion of peers and family further assisted the adoption and maintenance of healthy behaviours (Mau et al., 2001).

#### Pre-contemplation stage

People at the pre-contemplation stage do not think they have a problem nor see the need to change in the next six months. In the current study, the number of

intervention group participants in the pre-contemplation stage decreased significantly from baseline 19 (15.2%) to 6 (5.8%) at 3 months, but fewer changed in the control group. These results highlight the effect of the MI intervention in moving participants from pre-contemplation to the contemplation stage. The results are congruent with Clark et al. (2004) who reported that an individually tailored intervention helped participants at the pre-contemplation stage. The current findings suggest that intervention programs should perhaps provide participants in the pre-contemplation stage with more one-on-one attention to facilitate initial movement.

In addition, the current study found that people in the pre-contemplation stage expressed weak motivation to adopt any self-management lifestyle changes relating to their diabetes. Participants in the current study described difficulty understanding why they needed to change. For example, a male participant in the pre-contemplation stage said *“I don’t know why I need to change my eating habits. I feel I am pretty good at controlling my diabetes”*. The ‘readiness to change’ model enabled participant’s thinking to become explicit and therefore issues could be more easily addressed (Prochaska & DiClement, 1998). Clearly the importance of self-management for the prevention and delay of diabetic complications should be emphasized with pre-contemplation stage participants, together with the need to make and sustain long-term lifestyle changes (O’Connor et al., 2004).

#### Contemplation and preparation stages

The current study found that the greatest advancement of Stage of change was between stage 2 (contemplation) and stage 3 (preparation). The results confirmed the findings of Prochaska and Velicer (1997) in that people in stage 2 (contemplation) are considering lifestyle changes and in stage 3 (preparation) are adopting self-management lifestyle changes. If health professionals hope to promote self-management and reduce long-term side effects of diabetes, it is important to motivate people to begin to self-manage (Parchman et al., 2002). The research findings indicate that MI is effective in helping people who are considering making change to begin to self-manage their diabetes.

The present study found that respondents in the contemplation and preparation stages at baseline were more likely to have progressed to the action or maintenance

stages compared with respondents initially in the pre-contemplation stage. This finding was consistent with studies on dietary fat reduction and exercise (Kim et al., 2004; Mau et al., 2001). The finding also confirmed Prochaska and DiClemente's (1998) report that people in the contemplation and preparation stages had typically considered some plan of action. For example, in the preparation stage, individuals may join a health education class, consult a counsellor, or buy a self-help book. Data from the qualitative interviews proved helpful in understanding these issues and supported the conclusions of Miller and Rollnick (2002) who suggested that health care providers can encourage and empower participants to realize that they have the ability to change. Even if the changes are small, they can have a significant impact on health.

In the current study, the qualitative data indicated that a person enters the change process by moving to the contemplation stage, and weighing the costs and benefits of change versus adverse consequences. For example one participant said: *"I have hypertension now, I'm afraid I may become sicker and get serious complications, so I think it is better to look after my diabetes seriously."* Some participants mentioned taking care of their diabetes in order to avoid complications because they did not want to be a burden on family members. Not wanting to be a burden on others could therefore be used to motivate behaviour change.

#### Preparation and action stage

The qualitative data revealed some participants in the preparation and action stages knew that change was important, but described being "tired" of the various activities involved in diabetes management. Patients with diabetes commonly report feeling overwhelmed, frustrated, or "burnt out" by the daily hassles of disease management and by the unending, often burdensome self-care demands (Calhoun, 2005; Parchman, Arambula-Solomon, Noel, Larne & Pugh, 2003; Polonsky, 2002). Some people report feeling angry, guilty, or frightened about the disease, and often are unmotivated to complete diabetes self-care tasks. The prospect of acute and long-term complications can make the disease even more burdensome. Interestingly, some studies have identified that even though participants felt overwhelmed or frustrated by the daily hassles of diabetes management, fear of complications emerged as a powerful factor for managing diabetes (Fisher, 2003; Lee et al., 2006). Motivational interviewing aims to elicit concerns and incorporates personal aspirations for future behaviour. Through

empathic listening about the problem, discussion can trigger motivation to change (Clark & Hampson, 2001; Clark et al., 2004).

#### Action and maintenance stages

People in stages 4 (action) and 5 (maintenance) usually report positive self-management behaviours (Prochaska & Velicer, 1997). In the current study, 2 people (1.6%) in the control group at baseline were already in stage 5 (maintenance). Three months later, only one person remained in stage 5. In the intervention group at baseline there were 3 people (2.4%) in stage 5 (maintenance) but at three months this number increased to 11 people (10.6%). Evidently, most participants found it easier to start a diabetes-management regimen than to maintain one, a conclusion consistent with other studies (Lustman, Williams, Sayuk, Nix & Clouse, 2007; Rekieta, 2002). Maintenance requires individuals to use strategies that prevent relapse and continue healthy behaviours (Singer, 2007). Participants in this stage may be actively involved in social support groups and may even become role models for others. The positive language of some participants in the qualitative study revealed the dynamic process of change in the maintenance stage. It is likely that with time, the selected strategies become part of normal daily life, and this success inspires confidence that the healthy behaviour can continue. However, very few studies have followed participants beyond 12 months. Longitudinal studies are needed to assess maintenance and relapse potential.

#### Utility of the Transtheoretical Model (TTM)

This study used the TTM to understand the dynamic processes through which an individual transits when making intentional behaviour changes toward self-management. The concept of TTM is based on the idea that people differ in their levels of readiness to change, thus the MI requires counselling strategies and techniques to bring about self-management. Participants are encouraged to set different goals based on their readiness to change. The TTM also facilitates the assessment of physical, psychological and social issues and the development of interventions to address individual needs.

This study used TTM as a conceptual framework to guide a behaviour change intervention. Most self-management interventions are designed without a theoretical framework. When there is a mismatch between participants' stage of readiness to change and the intervention strategy used, they are more likely to drop out of the

program (Gilliland et al., 2002). Matching the motivational interviewing strategies to people's stages of change can increase healthy behaviours (Clark et al., 2004; West et al., 2007).

### **6.2.2 Demographic variables**

Few studies have focused on personal characteristics and stage of change. An interesting finding of the present study was that the MI intervention was more effective for female, middle-aged and employed participants. These results are discussed in the following section.

Previous studies that tested a motivational interviewing intervention with people with Type II diabetes (Clark et al., 2004; Jackson et al., 2007) did not report gender differences. Female participants in the current study were more likely to report greater improvement in their Stage of change levels. Most female participants progressed from the contemplation stage to the preparation and action stages, while most male participants in the intervention group were still in the contemplation stage at 3 months follow-up. There was no statistically significant change in the control group.

Other studies that used a motivational interview intervention, but not stage of change reported varying gender differences. Delahanty et al. (2006) and O'Connor et al. (2004) found that male participants progressed at a greater rate in regards to physical activity, and self-efficacy, and were likely to report less stress when managing their diabetes than female participants. Gender differences identified in the current study may be related to the fact that women are more willing to talk about their problems and seek help to resolve their problems than men (Toobert et al., 2002). It could be that female participants in the present study felt comfortable with the motivational interview intervention and found it easy to talk about their concerns. Furthermore, the intervention was delivered by a female clinician. It could be that female participants also felt at ease speaking to another woman who could empathise with their concerns. Women in contemporary society experience more social and financial pressure to work outside the home, but continue to also carry more responsibilities inside the home for housework and childcare than their male partners (Norberg et al., 2007; Whittemore et al., 2005). The MI intervention gave female participants a chance to express frustrations, relate to

another woman about their health care concerns, and develop stress management strategies for their particular circumstances.

Results from the present study are also similar to those of Brewer (2005) who indicated that African-American diabetic women who participated in group discussions were significantly more likely to change their behaviour than male participants. This change in behaviour was linked to the social support derived from others in the group. The current findings are also consistent with results of a study with female cigarette smokers (Ruggiero, Tsoh, Everett, Fava & Guise, 2000). Liburd et al. (2007) suggested that understanding gender identity is an important component of cultural competency for health care providers and can influence outcomes.

Gender identity within the Taiwanese culture was particularly relevant to the current study. In traditional Taiwanese society, a man is supposed to be cared for by his wife, who prepares the meals and often has responsibility for the health of family members (including medication administration). Men have power and authority relative to outside institutions and women are responsible for the daily affairs of the family. Based on these Taiwanese cultural characteristics, it is anticipated that some of the processes required for diabetes management will be according to traditional gender roles. Ponzo et al. (2006) highlighted similar issues from his work with Italian men some of whom had never learned how to prepare their own meals, but relied on their female partners to perform such duties. The current study suggests that females benefited significantly from the motivational interview process because they could readily adopt many self-management responsibilities related to diet, preparation of healthy meals and medication compliance. The results highlight the need for greater attention to be given to gender differences in future research to identify gender-appropriate interventions and behaviours.

The current study also identified the importance of age in adopting life style change. Participants in the middle-aged group reported progress to higher stage of change levels than the other two groups in managing their diabetes regimens. In the current study, middle-aged (41-64 years old) participants were often in full-time employment and had family responsibilities. As a consequence of these demands, perhaps they approached the required lifestyle changes promptly, sought a good level of



physical fitness as part of their lifestyle, and generally held positive attitudes towards change. This finding is confirmed by Humphries (2005) who reported that middle-aged women were more likely to pay attention to their health behaviours than younger women. In contrast, these results differ from those reported by Chang et al. (2005) who found that people who were older, had a middle-school education and had diabetes for a long time were more likely to use self-care strategies.

Data from the qualitative interviews revealed conviction of middle-aged participants to stay as healthy as possible. This confirms similar findings of Samuel-Hodge et al. (2000). Participants in the current study revealed a fear of complications, which may have served as a motivator for diabetes self-management. For example, one 50 year old woman mentioned that *“I ask myself whether I want to stay healthy or get sicker. I decided to control my sugar to avoid complications.”* Participants reported that as a result of ineffective diabetes self-management, many had been hospitalized and experienced one or more diabetes-related complications such as visual dysfunction, hypertension and heart disease. In addition, many participants felt that a diagnosis of diabetes played an important role in prompting them to alter their lifestyle, especially in limiting the kinds and amount of food that they consumed. For example, they had to limit their sweet food and rice intake, and could not eat all the foods they used to eat before they were diagnosed with diabetes. Other studies have also reported that people with diabetes recognize the advantages of managing their diabetes in order to avoid complications and being a burden to their family (Lee et al., 2006).

In the current study, the employed group made more progress on the Stage of change scale than the unemployed group at 3 months follow-up. Over two thirds of participants (68.8%) worked outside home. This is similar to other studies that found middle aged women with Type II diabetes suffered from multi-role demands such as coping with a chronic condition, and the pressure of balancing work, and family responsibilities (Norberg et al., 2007; Whittemore et al., 2005). During the motivational interview a focus is given to the person’s present interests and concerns. Identified issues can be used as the basis for goal setting and prompt the person to move toward the next Stage of change (Miller & Rollnick, 2002). Results of the current study indicate the need for health care services to focus on improving the lives of an increasing number

of middle aged women who are facing the challenges of managing diabetes, careers, and their families.

### **6.2.3 Effect of MI on Knowledge**

Intervention group participants improved significantly in their level of diabetes knowledge from baseline to 3 months follow-up, compared to the control group. Lee and Shiu (2004) found diabetes knowledge correlated significantly with self-management practices. Although some RCT intervention studies found that knowledge was not statistically associated with glycemic control (Adolfsson et al., 2007; Gerber et al., 2005; Keyserling et al., 2002), the present study found that MI had a positive effect on knowledge and HbA1c levels.

There is no doubt that diabetes knowledge is an essential component in diabetes management in order to prevent complications (Persell et al., 2004). Results of the present study highlight the need for health care providers to understand an individual's readiness to change in order to provide appropriate information that encourages the acquisition of knowledge to manage their condition. Simply providing information is not enough to motivate people with diabetes. Heisler, Piette, Spencer, Keiffer and Vijan (2005) suggest that health care providers need to promote participants' capacity to define the problems they are facing in managing their diabetes. This may be achieved by identifying challenges, developing skills, setting realistic goals, and implementing strategies to meet those goals.

Gaps in diabetes knowledge were identified despite an ongoing education program offered as part of routine care at the participating hospital. There were misconceptions about blood glucose, metabolism, management of hypoglycemia, and how diabetes can contribute to multiple complications. For example, one participant in the pre-contemplation stage described his limited knowledge in the areas of meal planning and medication administration. *"All I know is that I am supposed to take the pills and things. Nobody has ever sat me down and talked to me about how they work, and exactly what kinds of foods and other stuff I am supposed to eat."* Another participant in the pre-contemplation stage also admitted a lack of knowledge in the area

of meal planning. *“I don’t know what kinds of foods I am supposed to eat. I feel hungry every day, but don’t know why my blood sugar is still very high.”*

Many participants had been hospitalized and experienced some complications from their diabetes, such as cataracts, heart disease and hypertension. The most common goals for managing diabetes relate to controlling blood glucose levels in order to prevent complications (UKPDS, 1998). In the current study, some participants did not know how to manage their blood glucose especially in an acute emergency (e.g., hypoglycaemic episode). One participant reported experiencing several hypoglycemic events that required admission to the emergency room but did not prompt him to gain a better understanding of his condition. Conversely, another participant in the pre-contemplation stage described an emergency situation which motivated him to change his eating habits. Other studies have also found that fear of hypoglycemia can prompt a change of behaviour and was associated with decreased health service utilization (Currie et al., 2006). The magnitude of fear of hypoglycemia was associated with the severity of symptoms and frequency of episodes. A personal history of diabetes complications or prior exposure to family members and friends with diabetes-related complications might play an important role in enhancing participants’ knowledge of complications and determining how seriously diabetes is perceived (Malek, 2006). Results from the current study are similar to those of Shiu and Wong (2002) who found that hypoglycemia and hyperglycemia were perceived as a constant threat to people with diabetes.

Clearly, more effort is needed to improve people’s understanding of diabetes. The most effective way to optimally manage diabetes is to implement appropriate meal planning, self-monitoring blood glucose (SMBG), regular physical activity, and consistent medication use (American Diabetes Association, 2007). The current qualitative interview data revealed that some participants did not know how to control their glucose and HbA1c levels. Heisler et al. (2005) stated that people who know their HbA1c values report better assessment of their glycemic status and diabetes care than those who did not. Knowledge alone is not sufficient to translate into appropriate diabetes care (Norris et al., 2001). Participants in the current study with a low level of educational attainment may have struggled to understand the physiology of diabetes. Gerber et al. (2005) suggest that linguistic barriers and lower education levels need to be targeted in

order to offer culturally sensitive and appropriate health education for individual knowledge needs. This once again highlights the need for detailed assessment of clients' abilities, needs and concerns in order to shape intervention strategies.

### Knowledge and demographic differences

In the current study, knowledge levels improved significantly more in women than men. This is congruent with results reported by Brown et al. (2000) who found that gender was an important factor in diabetes knowledge, and that males and females held differing views about their ability to integrate diabetes self-management into their lifestyle. Males expressed stronger perceptions of control and reported more social support for diabetes diet control (possibly from female family members) compared with female participants.

Knowledge levels were significantly higher in the middle-aged group (41-64 years), followed by the retired age group (>65 years old). Chang, Chiou, Lin, Lin and Tai (2005) found that people who were older, middle-school educated, and had longer duration of diabetes had a higher chance of using any self-care method than other groups of people. Conversely, Sinclair, Girling and Bayer (2000) reported that elderly people (>65 years old) with predominantly Type II diabetes displayed more indications of cognitive dysfunction that was associated with greater dependency and poorer ability to undertake diabetes self-care. Rothman et al. (2004) suggested that low literacy was a significant barrier to self-management especially in older people. Therefore, when assessing stage of change, consideration should be given to the influence of age and lifestyle on diabetes self-management.

Consideration should also be given to education level of participants. Lee and Shiu (2004) reported a positive relationship between education level and diabetes knowledge. This is predictable as participants with only primary school education or less may have difficulty understanding the information and advice given. Data from qualitative interviews in the current study confirmed that some participants had difficulty with the language used by health care providers. For example Liao, a participant with a primary school education at the pre-contemplation stage, mentioned that he could not understand the health care provider's suggestions and was concerned

that they did not care about him as an individual. Rothman et al. (2004) indicated that low literacy is an important barrier for diabetes self-management.

The ability to communicate with health care providers could affect diabetes knowledge and therefore the ability to manage diabetes. Karter et al. (2000) and Hadwiger (2001) indicated that poor communication abilities and negative financial factors were barriers to managing diabetes. Several participants in the current study believed that improving communication with their health providers was a feasible and important goal to improve their health. Heisler, Bouknight, Hayward, Smith and Kerr (2002) also reported that the frequency of communication with health care providers enhanced participants' decision making and better management of their diabetes.

#### **6.2.4 Effect of MI on psychological outcomes**

This study included four psychological measures, the Diabetes Self Management Instrument (DSMI), Depression Anxiety Stress Scale (DASS-21), Diabetes Management Self Efficacy Scale (C-DMSES), and WHO Quality of Life-brief (WHOQOL). Mean score comparisons at baseline and 3 months revealed significant change in DSMI, C-DMSES, but no significant difference in DASS-21 and WHOQOL scores. There was partial support for hypothesis three.

##### Diabetes self-management (DSMI)

The intervention group did improve significantly on diabetes self-management outcomes from baseline to 3 months, compared to the control group. The findings provide important evidence that motivational interviewing was effective in improving diabetes self-management to control diabetes. Participants in the intervention group increased their diabetes self-management scores from 109.76 to 118.74. Calhoun (2005) found that MI facilitated lifestyle changes such as introduction of a healthy diet, weight management, increased exercise levels and increased insulin sensitivity, resulting in better glycemic control. This finding is also similar to other studies using a brief motivational intervention for chronic conditions. Habib et al. (2005) and Jensen et al. (2004) for example, reported increased engagement in pain self-management behaviour following motivational interviewing.

Qualitative interview data indicated that one of the barriers to managing diabetes was implementing the full range of self-management behaviours. Most participants recognized that diabetes management requires meal planning, exercise, self-monitoring and recording blood glucose, taking medication, and following medical recommendations. For example, in the current study one participant stated that it was “*too complicated to avoid carbohydrates and control things.*” Interestingly, although participants identified a variety of self-management behaviours they did not perform all of these on a daily basis.

Accepting diabetes as part of their daily life was an important step in self management for many participants. The relationship between accepting diabetes, or at least not being in denial, and effective diabetes management was mentioned. One participant reported accepting that diabetes was a part of her life when it was diagnosed and changing her eating habits. “*I told myself diabetes was part of my life, so I started to learn how to eat and exercise to control my diabetes.*” This notion of acceptance has been reported by other studies. Participants who accept diabetes management as a part of their life perceived benefits related to living longer and avoiding complications (Brewer, 2005).

#### Depression Anxiety & Stress Scale (DASS-21)

The motivational interview was not statistically associated with depression, anxiety and stress outcomes and there was no significant difference between the intervention and control groups. The DASS-21 mean rank scores did decrease from baseline to 3 months for both groups (intervention: 126.50 to 108.10; control: 124.50 to 106.93) but the data revealed some concerns about having a chronic condition. Participants described ‘frustration’ and depressive symptoms that interfered with their ability to manage. Developing multiple skills for managing diabetes was stressful, particularly if the person’s condition remained unstable despite their best efforts. Frustration often resulted in participants abandoning change. For example, Fan, a male participant, explained that he was struggling to take care of his diabetes, and felt frustrated about managing it. Ciechanowski, Katon and Russo (2000) reported that depressive symptom severity was associated with poorer diet and medication regimen adherence, functional impairment, and higher health care costs in primary care diabetic patients. Similarly, Berlin, Sass, Davies and Hains (2002) linked the variety of

self-management behaviours to stress. However, they also found that individuals who chose to disclose their illness may prevent negative or incorrect perceptions related to self-care and eating behaviours and consequently minimise stress.

People with diabetes commonly feel overwhelmed, frustrated, or ‘burnt out’ by the daily hassles of disease management and by the unending, often burdensome self-care demands. Many report feeling angry, guilty, or frightened about the disease, and lacked motivation to complete diabetes self-care tasks. The toll of short-term and long-term complications can make the disease even more burdensome. Thus, quality of life issues are strongly influenced by the day-to-day burden of living with diabetes (Polonsky, 2002). Although there were too few participants suffering from depression to give statistically significant results in the current study, the qualitative data revealed that participants’ feelings about managing diabetes was associated with stress and depressive symptoms at times.

Participants in the current study described how they struggled with their eating habits during special occasions (e.g., Chinese festivals). In the present study, the qualitative data revealed how eating related to the emotional and behavioural reactions of participants, and was described by them in terms such as ‘sad’ or ‘unhappy’. This finding is congruent with that of Delahanty et al. (2002) who reported that emotional eating, poor dietary restraint and being upset while dieting were significantly correlated with depression or anxiety. Therefore the emotional changes associated with chronic disease management need to be explicitly addressed by health care providers.

#### Diabetes management self-efficacy scale (C-DMSES)

Results indicated that the intervention group improved significantly in diabetes management self-efficacy outcomes from baseline to 3 months compared to the control group. The findings provided important evidence that motivational interviewing was effective in making participants feel capable of changing their behaviours. Participants in the intervention group rapidly increased their diabetes management self-efficacy scores from 148.43 to 162.61 while participants in the control group reported less dramatic improvement (from 147.42 to 153.33). These positive findings confirmed hypothesis three.

Aljaseem et al. (2001) found that greater diabetes self-efficacy predicted more frequent blood glucose testing, less frequent skipping of medication and binge eating, and closer adherence to optimal diet control. Diabetes self-efficacy explained 4% to 10% of variance in diabetes self-management. Similarly, Sarkar, Fisher and Schillinger (2006) reported a relationship between diabetes self-efficacy and self-management behaviour in an urban, diverse, low income population with limited health literacy. They found that self-efficacy was associated with diabetes self-management behaviours in this vulnerable population. Fisher (2003) reported that higher diabetes self-efficacy and less pessimistic outcome expectations predicted more positive feelings of general well-being. There is support from previous studies that diabetes self-efficacy is a critical component in motivation for behaviour change (Shiu & Wong, 2002; Yu, 2004).

The qualitative interview data revealed barriers to enhancing participants' self-efficacy. These were exemplified as 'difficulty changing eating habits' and 'hard to take regular medication.' The most common difficulty related to changing eating habits. For example, one female participant in the contemplation stage felt that modifying her eating habits was still challenging. She mentioned her inability to prepare meals and monitor the portion sizes. *"It's very hard because you have to watch so much of what you eat and what you can't eat."*

Eating habits play an important role in helping participants control their diabetes (Posthauer, 2004; Berlin et al., 2002). Indicators of self-efficacy for managing diabetes include confidence in appropriate food preparation, avoiding high carbohydrate meals and having more low fat meals. Samuel-Hodge (2000) reported that "habit" explained most of the variance in participants' reported ability to maintain their new dietary pattern. Improving dietary competence developed a person's sense of confidence to control their dietary self-management ability (Samuel-Hodge et al., 2002).

The qualitative interview data showed that a common difficulty in managing diabetes for both male and female participants was related to a lack of understanding about diabetes medication. Participants' inability to maintain their medication regimens adversely affected their ability to successfully manage. For example, one female participant at the contemplation stage revealed that she skipped or altered the insulin



dose when she felt unwell. *“Sometimes I don’t feel well enough to inject insulin and I skip it till the next day or alter the insulin dose.”* Grant et al. (2007) found that poor medication adherence and clinical inertia were critical barriers to glycemic control in Type II diabetes. Similarly, Schectman, Nadkarni and Voss (2002) reported that adherence to medication regimens for Type II diabetes was strongly associated with metabolic control in an indigenous population.

Goals are an important component of a diabetes management plan (American Diabetes Association, 2003). For several participants goal-setting was an important part of their active lifestyle. Goals inspired them to achieve a higher level of fitness. For example, one woman said, *“I exercise with my friends, and we have a goal, so in order to reach that goal we push each other.”* Goal-setting encouraged participants to challenge themselves and provided a sense of purpose. Van Sluijs et al. (2005) revealed that self-efficacy was a major correlate of stages of change in fitness-promoting health behaviours and goal achievement. This sense of achievement perpetuates further adherence to, and success with, diabetes self-management.

The present study identified a significant improvement in self-efficacy by female participants but no significant improvement in the male group. Improvements in self-efficacy were also associated with age (middle-aged group) and being employed. These findings differ from Delahanty et al. (2006) who found that female participants had lower levels of physical activity and self-efficacy. It is possible that the MI in the current study enhanced the confidence of these women to undertake new activities.

#### WHO quality of life-brief (WHOQOL)

The motivational interview did not affect quality of life outcomes. The current study found that WHOQOL scores were not significantly different for the intervention and the control groups at baseline. Over time, however, participants’ scores steadily increased in both the intervention (mean scores 101.16 to 104.73) and control group (mean scores 101.81 to 102.91). Very few participants in the current study suffered from severe diabetes complications such as lower-extremity pain or reduced functional status which could impair quality of life. Similarly, participants did not report any severe emotional states; however, previous studies have noted that severe complications

and depression have a strong negative effect on quality of life (Galper, Taylor & Cox, 2003; Goldney et al., 2004; Zhang, Norris, Chowdhury, Gregg & Zhang, 2007).

Quality of life is often neglected in research. Only 4 of the 19 studies on self-management interventions included in the literature review, measured quality of life and none of the motivational interview studies addressed this topic. This gap confirms the view of Norris et al. (2001) that more research was needed about the psycho-social dimensions of health and well-being for people with Type II diabetes.

The qualitative data revealed that participants had a variety of strategies for staying as healthy as possible and equated a 'healthy life' to quality of life. Participants used different strategies to keep healthy such as using a pillbox for enhancing medication compliance or exercising daily (which improves insulin action) (Castaneda, 2003). Morrato, Hill, Wyatt, Ghushchyan and Sullivan (2007) also suggest that regular physical activity has a protective role in reducing the occurrence of long-term complications from diabetes and increasing quality of life.

It is interesting to note that some participants in the current study used home remedies or Chinese medicine to treat their diabetes and keep healthy. "*I have Chinese medicine to help me control my blood sugar levels and give me energy to manage the diabetes.*" However, interview data revealed that participants were not comfortable, nor did they see the need, to discuss their Complementary and Alternative Medicine (CAM) use with their physicians. The lack of dialogue points to a need to educate both consumers and health care providers about the importance of discussing the use of CAM because of potential pharmaco-therapeutic dangers (Beychok, 2007). Donald and Leonard (2006) reported that CAM use was associated with increased likelihood of emergency department episodes. Although CAM use is common in many Asian countries, physicians and patients need to have open dialogue to ensure safe and appropriate integrated medical care (Bell et al., 2006).

There was a significant improvement in WHOQOL for the female group but not in the male group. This finding differs from Chyun et al. (2006) who found that men reported better psychological well-being and a higher quality of life than women.

Results of a study by Vallis et al. (2003) are consistent with the current findings in that females have a better quality of life and healthier eating habits than males. The current findings are also congruent with Snetselaar (2003) who reported that sex, age, marital status and diabetes education were correlated with quality of life. Bell et al. (2005) identified that people with diabetes commonly feel overwhelmed, frustrated by the daily hassles of disease management and the unending, often burdensome self-care demands. This burden was especially evident for people of working age. The current study identified a significant improvement in participants' perceptions of their quality of life in the employed group but not in the unemployed group. It could be that the motivational interviewing prompted the adoption of different behaviours that resulted in better diabetes control, feelings of well-being and hence quality of life.

### **6.2.5 Effect of MI on social support**

There were no statistically significant differences on Medical Outcomes Study Social Support Survey (MOS-SSS-C) scores for the intervention and control group. However, both groups reported increased MOS-SSS-C scores during the study. At 3 months MOS-SSS-C scores for the intervention group increased slightly from 79.95 to 82.08 and from 79.17 to 81.02 for the control group.

This finding is interesting, but should be interpreted with caution. The literature review indicated that social support contributes to self-management (Glasgow, Toobert & Gillette, 2001), and promotes encouragement for behavioural change. When people perceive the external environment as being non-supportive, they may have difficulty transferring what they learn into daily practice (Shiu, Kwan & Wong, 2003; Lee & Shiu, 2004). In the current study, the MI intervention was associated with increased social support scores but not at statistically significant levels. It could be that there was no difference because most participants lived with their family from whom they received support.

Data from the qualitative interviews confirmed that participants have both formal and informal sources of assistance. Health care providers and family members were often reported as sources of support and information. Gallant (2003) reviewed 29 articles and found that health care providers gave most support in the form of diabetes

information. MacPherson, Joseph and Sullivan (2004) reported that peer support provides an opportunity to talk about issues such as how to cook appetizing meals, adherence to low carbohydrate meals, and how to cope with everyday stress. Several participants mentioned receiving help from nurses who administered insulin and provided information. Sally (2007) suggested that nurses have a duty to provide advice and information whilst being vigilant for undetected complications. It is therefore essential for nurses to receive regular education in relation to diabetes; not only to achieve targets, but optimize the standard of care for people with diabetes.

Malek (2006) found that self-help groups, family, nurses and diabetes educators provide support for people with diabetes and influence their adoption of, and adherence to, appropriate behaviours for diabetes management. In the current study family members such as spouses, and daughters were essential in providing instrumental support including food preparation, altering portion sizes, modifying the way food was prepared, medication administration, providing help during emergency situations, transportation, and monitoring. The positive impact of social support on diabetes management has also been reported by Chiang (2003) and Wen et al. (2004) who found that higher levels of perceived family support and greater self-efficacy were associated with higher reported levels of diet and exercise self-care. However, support from family members can also be a source of stress due to concern about being a burden (Wenzel, Utz, Steeves, Hinton & Jones, 2005), as was the case in the current study.

Some participants also reported fear of social stigma associated with their diabetic condition. Some participants did not want their friends or families to treat them as if they were “abnormal” and some feared their friends would not understand. One participant mentioned that he eats and drinks with friends to be ‘the same’ and did not disclose his condition. Shiu, Kwan and Wong (2003) also found that participants in their study did not want be different from their friends or family. Thus, health care providers need to consider feelings of stigma and social isolation for people with diabetes.

### **6.2.6 Effect of MI on metabolic control**

The two metabolic measures included in this study were HbA1c, and Ac glucose. Results of the current study showed that self-monitoring blood glucose (SMBG) and self-recorded blood glucose (SRBG) were significantly improved in the intervention group but not control group. Previous RCTs have reported mixed results on SMBG outcomes (Cho et al., 2006; Trento et al., 2001). No previous study to date, employing a motivational interview intervention has measured SMBG (e.g., Clark & Hampson, 2001; Clark et al., 2004; Jackson et al., 2007; West et al., 2007). Chuang, Lin and Jeng (1999) found that education level, body weight, frequency of hospitalisation, taking traditional Chinese medicines, and SMBG were significantly associated with glycemic control. They also found that participants' SMBG knowledge significantly influenced daily self-management activities. This finding supports the use of motivational interviews for improving metabolic monitoring behaviours and outcomes.

West et al. (2007) found that MI can improve short-term glycemic control and weight loss. Glycosylated hemoglobin (HbA1c) level is the most frequently-used personal outcome variable in the research literature. It is a good indicator of how well participants adhere to their diabetes management regimen (Boule, Haddad, Kenny, Wells & Sigal, 2001; Norris et al., 2002). There is a well documented relationship between glycemic levels and complications. A percentage point decrease in HbA1c (from 9 to 8) represents a 40% reduction in the risk of complications (UKPDS, 1998). In addition, the clinical significance of improved HbA1c levels must be emphasized. Krishnamurti and Steffes (2001) stated that a 1.5 decrease in HbA1c has been estimated to lead to a 24-33% decrease in the 10-year incidence of proliferate retinopathy.

The DCCT (1995) suggest that an HbA1c of 8.1-9.0 is considered fair control. In the current study, HbA1c levels were fair for both groups (control = 8.53; intervention = 8.97) at baseline. At 3 months, the HbA1c was 8.16 in the intervention group, and 8.48 in the control group. Participants in the intervention group achieved a 0.80 reduction in HbA1c levels. Therefore this result would reflect a significant reduction in clinical diabetes complication rates.

There was a significant improvement in HbA1c by the group with a bachelor degree or higher level of education but no significant improvement in groups with less education. These findings are consistent with other reports demonstrating that well-educated people are more likely to understand and apply information for better HbA1c control, than participants with lower education attainment (Temple, 2003). It is therefore essential for diabetes educators to assess an individual's educational background and provide an appropriate education program relative to the person's comprehension (McMurray, Johnson, Davis & McDougall, 2002).

In the qualitative interviews some participants reported monitoring types of food or limiting the amount of food they consumed. Davidson et al. (2004) indicated that controlling the types and amounts of food consumed was an important component of blood glucose monitoring skills. In the current study, one participant who had to inject insulin every day did not regularly check her blood glucose. Some participants did not check their blood glucose because of needle pain which was described as a "serious physical strain every day". Such comments may reflect participants' perception of their diabetic condition as a 'never-ending punishment'.

Although higher frequency of self-monitoring blood glucose (SMBG) is associated with better metabolic control among subjects who were able to adjust insulin doses, close monitoring has also been significantly related to higher levels of distress, worry, and depressive symptoms in non-insulin-treated patients (Franciosi et al., 2001). Simmons et al. (2007) reported that fear of injection or needles in people with Type I diabetes was associated with poor diabetes control. Therefore, the healthcare provider needs to consider these issues and provide optimal choices for self-monitoring blood glucose to minimize pain.

From the qualitative interview data it was found that some participants would only check their blood glucose when they felt "bad", or only performed the required self-management behaviours when they "felt sick", or they wanted to get their diabetes under control so that they would not have to take medication. Risky behavioural patterns were reported by participants in the pre-contemplation or contemplation stage. These participants require a great deal of education and personal attention about the risks of harmful behaviour (Miller & Rollnick, 2002). The qualitative data demonstrated

how the motivational interview allowed for this risky behaviour to be identified in a non-threatening way and for appropriate information to be communicated so that the person could understand the consequences of their behaviour.

The findings provide evidence that motivational interviewing was also effective in improving A<sub>c</sub> glucose levels. At 3 months participants in the intervention group reduced their A<sub>c</sub> glucose from 169.69 mg/dl to 157.38 mg/dl whereas individuals in the control group had begun to reporting increasing values compared to baseline. A similar finding was reported by Channon, Smith and Gregory (2007) in their study with Type I diabetics using a MI intervention significantly improved glycemic levels.

This finding is interesting, but should be interpreted with caution. The American Diabetes Association (2003) provides values of corresponding blood glucose values in mg/dl and glycemic control evaluation guidelines that revealed an average blood glucose level ranging from 121-180 mg/dl, which is considered good control, and an average blood glucose ranging from 181-210 mg/dl which is considered fair control. In the current study, the A<sub>c</sub> glucose levels were considered good for both groups at baseline. A<sub>c</sub> glucose control is related to eating behaviour (Posthauer, 2004). In the present study, the stable results may be related to the fact that most participants monitored their dietary intake (even though they may not have understood the physiology for this), or had it monitored for them by family members. Another potential explanation for A<sub>c</sub> glucose control may be related to educational levels. Current findings revealed that participants with high educational levels were significantly better in their control of A<sub>c</sub> glucose than other cohorts. This is consistent with a previous study (Vallis et al., 2003), which concluded that participants who have more education perceived greater health benefits from A<sub>c</sub> glucose control.

### **6.3 Conclusion**

The results provide important evidence that the Motivational Interviewing (MI) intervention improved the self-management practices and well-being of people with Type II diabetes. The findings also support the importance of the Transtheoretical Model (TTM) as a useful framework for motivational interviewing strategies and evaluating participants' progress. The MI intervention was associated with significant

improvement in Stage of change, diabetes knowledge, diabetes management self-efficacy scores, and HbA1c levels and Ac glucose levels from baseline to 3 months follow-up in comparison with the control group.

The motivational interview seemed more effective with participants who were women, middle-aged, and employed. These findings support the importance of tailoring diabetes interventions for these demographic differences. It would seem particularly important to alter the content and scope of diabetes education to be more easily understood by older and less well educated people. In addition, the educational levels made a significant difference on HbA1c levels and Ac glucose levels at 3 months follow-up, especially for more highly educated participants. These findings support the importance of providing more specific support for participants with low literacy levels. Although there were no statistically significant differences in regards to depression, anxiety and stress between control and intervention groups, many participants reported the ongoing stress of diabetes self-management. The stage of change framework enabled barriers to self management to be identified. Discussion of perceived barriers and accompanying strategies to address such barriers is an effective component of the MI intervention (Miller & Rollnick, 2002). Health care providers need to assess and provide optimal and easily understood information for people with Type II diabetes.

The outcomes of this study are significant for people with Type II diabetes. It is important that health care providers have a clear understanding of people's stage of readiness to change and provide for their needs appropriately. Many factors affecting self-management had been identified in the literature but not comprehensively assessed at the same time. The study findings suggest a number of implications and recommendations for nursing knowledge, practice, education and further research.



## CHAPTER SEVEN

### CONCLUSION

Overall, the findings of the current study support the use of a motivational interview to improve stage of change, personal, psychological, social and metabolic factors in people with Type II diabetes living in Taiwan. All measured outcomes were in the direction of improvement from baseline to 3 months follow-up, lending support to the effectiveness of this brief intervention for improved diabetes self-management. This chapter presents the implications, recommendations and conclusions of the study as well as implications for nursing practice and education.

#### **7.1 Addressing the burden of Type II diabetes**

Growing rates of Type II diabetes around the world has prompted a great deal attention on intervention strategies to enhance individuals' self-management of their condition. While there has been considerable attention given to clinical practice in the control of diabetes, the greatest challenge relates to understanding the motivation of people with Type II Diabetes and how they can be assisted to overcome a range of difficulties in managing their diabetes. Even a small change in HbA1c can lead to significant reductions in diabetes complications. The review of the literature identified a paucity of effective intervention studies and more needs to be done to prevent the growing incidence of Type II diabetes especially in Asian and Pacific-rim countries, as well as better manage the debilitating effects of the condition.

An important barrier to successful self management was identified as the 'burden of disease'. Participants often reported feeling overwhelmed, frustrated, or 'burnt out' by the daily hassles of disease management and by the unending, often burdensome self-care demands. The toll of short and long-term complications can make the disease even more burdensome. Furthermore, fear of complications also emerged as a powerful factor for managing diabetes. Few participants spoke about their diabetic condition in positive terms, even those at the maintenance stage. Given the lack of positive consequences of living with a chronic condition, motivational interviewing can be helpful in providing

opportunities for individuals to express concerns, feel supported and develop strategies to meet the ongoing challenges of the condition.

## **7.2 Use of motivational interviewing in nursing practice**

Clinical nurses are often faced with the challenging task of encouraging people to make behaviour changes to their daily activities. Many breakthroughs in knowledge and education programs have provided individuals with diabetes the opportunity to experience better self-management (e.g., Barlow, Wright, Sheasby, Turner & Hainsworth, 2002; Norris, Engelgau & Narayan, 2001). Even with these breakthroughs, the management of diabetes is largely dependent on people's actions on a daily basis.

The research results provide empirical evidence that motivational interviewing can be used to motivate and empower people to self-manage their diabetes. It is unclear as to the extent to which the effectiveness of intervention was positively influenced by a range of contextual factors. For example, the nurse who delivered the intervention worked in the Diabetes Clinic and was known to some of the participants. Her expert knowledge of the condition may have assisted in establishing her credentials with participants and make them feel at ease with her delivery of the intervention. The intervention was also offered in conjunction with well-established educational and social support programs for diabetes offered at the hospital. As such the motivational interviews may have been effective as an adjunct to these existing services and may be less effective if offered in isolation from other clinical services.

The results indicate that motivational interviewing should be an important inclusion of clinical interventions offered by nurses. As outlined in Chapter 5, the intervention does not require sophisticated counselling skills. It does require some training, practice and intermittent supervision to enhance effectiveness, but the skills are quickly learnt. Importantly, the intervention can be applied to a range of different clinical populations. The effectiveness of motivational interviewing is already well established in a number of areas such as addictions, substance abuse and rehabilitation. To maximize the value of this intervention, it would be important for the intervention to be part of routine care, because diabetes control relies on behaviour modification and self-management.

The findings of the present study are useful for developing a better understanding of readiness for self-management and for motivating self-management behaviour amongst people with Type II diabetes. The current results show that the MI intervention shaped behaviour and moved people through the Stages of Change for self-management. In general practice, nurses possess good assessment skills to evaluate individuals' self-management ability in areas such as diet, exercise, medication regimen and self monitoring blood glucose (SMBG) and provide necessary health information. It is recommended, however, that more nurses be encouraged to lead clinical interventions for behaviour change in clients. This study identified that TTM and MI can be incorporated into routine practice and produce effective results.

### **7.3 Recommendations for program development**

Changes in health behaviour were a central theme in this research. The Transtheoretical Model (TTM) provided a useful theoretical framework that could be applied to improve diabetes self-care and metabolic control (Jones et al., 2003; Kirk et al., 2003; Kim et al., 2004). The TTM identifies a person's stage of readiness, thus enabling interventions to use stage-appropriate strategies, optimising learning and the likelihood of promoting self-care behaviours (Clark et al., 2004; Vallis et al., 2003; Van Sluijs et al., 2005). One key to changing behaviour and fostering self-management is to provide information that reflects a person's need and their readiness to change (Prochaska & Velicer, 1997). In accordance with the theoretical framework of this study, adopting those components of the MI intervention that specifically target and motivate behaviour change in order to increase self-management should be viewed and utilized from the standpoint of a clinical strategy.

Even though the motivational interview in conjunction with TTM was shown to be effective in bringing about positive change in participants, further work is required to develop intervention programs of this nature. Further work is required, for example, to determine whether the MI is more suitable for certain subgroups of people with diabetes such as women, or youth. Women appeared to relate well to this motivational interviewing intervention. This may have been due to the propensity of women to engage with others socially and be comfortable with a counselling or 'talking' approach.

It is also likely that the positive effects were related in large part to the traditional roles played by Taiwanese women in regards to food preparation and health care of the family. The requirements of a diabetes self-management plan (diet, exercise and health care monitoring) are familiar to women and perhaps more easily achieved by them than men. The gender differences identified in the present study highlight the need to develop interventions according to gender roles. For older males in traditional societies, it may be useful to emphasize exercise and reducing alcohol intake rather than meal planning. Where possible, all intervention strategies need target the identified needs of participants.

Disturbingly, gaps in diabetes knowledge were identified despite an ongoing education program offered as part of routine care at the participating hospital. There were misconceptions by participants about blood glucose, metabolism, management of hypoglycemia, and how diabetes can contribute to multiple complications. For example, some contemplation stage participants in this study disclosed that they could not understand what health care providers had suggested particularly in regards to meal planning. Nursing practice should provide participants with adequate knowledge and skills to read a food regimen, identify foods such as carbohydrates, fats, determine portion sizes, understand how to substitute healthier food for less healthy ones, and undertake other activities related to ‘meal planning’. A range of educational resources and modes of delivery need to be developed to better meet the knowledge needs of clients.

This study suggests that engaging in a motivational interview promotes better communication in clinical practice. The motivational interview requires that the nurse take time to build a relationship with the client and develop a sense of trust. Nurses should discover the concerns of individuals, and what motivates them to maintain good health. Nurses need to talk less and listen more to understand client concerns and engage more effectively in problem-solving and goal setting.

Some participants identified the need for regular contact with clinic staff. Regular client contact serves as an opportunity for health education and sharing views on issues regarding barriers to self-management. For example, some clients who are newly diagnosed with diabetes either do not have the opportunity to receive or do not

comprehend the importance of engaging in self-management education. Such opportunities should be included at the beginning of each clinic consultation. Nurses need to use good communication skills with clients and families in order to bring about a more satisfactory treatment outcome, then utilise professional knowledge to manage and resolve conflicting priorities in relation to barriers of self-management.

#### **7.4 Implications for nursing education**

The knowledge gained from this study has implications for nursing education. Nursing education faces the challenge of assisting students to understand how to use established standards of practice while simultaneously generating new and innovative ideas for practice, theory, and research. In reference to this research, clinical nurses and students need to understand the importance of using interventions which effect change in diabetes self-management. The findings of this study could be extended to acute diseases and other chronic conditions where people are required to make changes for self-management. There may be benefit in teaching the relevance and use of strategies of motivational interviews to both nurses and nursing students. Therefore, the importance of strategies to enhance behaviour change as it applies to people with Type II diabetes education should be incorporated into nursing curricula. Similarly, continuing education for clinic nurses can include seminars and workshops on the usefulness of MI strategies in clinical practice.

#### **7.5 Implications for nursing research**

Motivational interviewing processes in diabetes self-management are an under-explored topic in the nursing research agenda. This study has already raised some questions in need of further investigation in Chapter 6 that may expand our understanding of behaviour change issues. The following recommendations are made in relation to future research.

The first recommendation for future research is to conduct a longer follow-up study. A longitudinal study is needed to examine the effects of MI on participants' self-management and behaviour change patterns over time.

The second recommendation that arises is the need for health care delivery to focus on improving the lives of middle aged women who are facing the challenges of managing diabetes, careers, and their families.

The third recommendation for further research is to identify the key components of motivational interviewing that successfully result in behavioural changes in Type II diabetes, with a view to developing training for nurse clinicians working in diabetes clinics who can then use these skills as part of their every day clinical care.

## **7.6 Conclusion**

This study has contributed to the body of knowledge about effects of motivational interviewing with people with Type II diabetes. The theory of Transtheoretical Model (TTM) in conjunction with Motivational Interview (MI) had a positive effect on intervention group participants by improving their Stage of change, as well as psychological, social and metabolic outcomes. The findings are consistent with applications of the MI in other areas of behaviour change as well as providing new insights. These results can enhance our understanding of how participants experience and cope with a chronic condition, and enhance their abilities to perform diabetes self-management.

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## APPENDIX 1

### Research Instruments: English and Chinese Version

Research instruments: English version      Coding number \_\_\_\_\_

#### Part 1: Diabetes Knowledge

Please ✓ one answer into the

	True	Fault	Not sure
1. Aspirin can prevent incidence of heart disease and coronary artery disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Emotion and stress can affect the change of blood glucose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. HbA1c 7% means well control in blood sugar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. My children have more chances to have diabetes, because I am a diabetes patient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Diabetes is controllable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Sugar supplement is sweet enough to recover, while hypoglycaemic were happened.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Hemodialysis is caused long-term insulin injection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. It would be proper to exercise once a week and keep 5-10 minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. hyperglycaemic can result in extremely huger, body weight loss, so diabetes patient need more nutrition supplement than others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Proper foot care can reduce the incidence of amputation for diabetes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. To keep foot hygiene and well control in circulation peripheral, soak the feet greater than 70°C water for 30 minutes everyday.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Angina or infarction is usual side effects of diabetes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Diabetes patients can have lights-sugar fruit like ba-la	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Diabetes patients can use butter or pork lipid.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. When I take flu medication, I should stop diabetes medication.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It would be well-control sugar supplement, when you choose the products are marked low caries or light sugar product.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Diabetes patients can freely have corn, sweet potato, Chinese yam, but only not rice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. It would result in stroke if you can't control your blood sugar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. When diabetes patients have cold seat, trembling, palpitation, or any sign of hunger should have sugar supplement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. You don't need to control your diet, when your blood sugar is fine.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. You can adjust your medication dose when your diabetes uncomfortable symptoms disappeared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## **Part 2: Stages of Change**

Which statement best describes you (Please tick only one answer)

- 5.  I am self-management my diabetes, and I have been doing so far more than the past 6 months.
- 4.  I am self-management my diabetes, but I have been doing so far less than the past 6 months.
- 3.  I am not self-management my diabetes, but I plan to start in the next 30 days.
- 2.  I am not self-management my diabetes, but I plan to start in the next 6 months.
- 1.  I am not self-management my diabetes and I do not plan to start in the next 6 months.

### Part 3: Diabetes Management Self-Efficacy Scale (C-DMSES)

Below is a list of activities you may have to perform to manage your diabetes. Please read each one and then circle the number that best describes how confident you usually are that you could carry out that activity. For example, if you are completely confident that you are able to check your blood sugar levels when necessary, circle 10. If you feel that most of the time you could not do it, circle 1 or 2. If you feel that all of the time you could not do it, circle 0

Circle one number on each line

<b>I am confident that:</b>	<b>Cannot do at all</b>			<b>Maybe Yes Maybe No</b>				<b>Certainly can do</b>			
1. I am able to check my blood sugar if necessary	0	1	2	3	4	5	6	7	8	9	10
2. I am able to correct my blood sugar when the sugar level is too high (e.g. eat different food)	0	1	2	3	4	5	6	7	8	9	10
3. I am able to correct my blood sugar when the sugar level is too low (e.g. eat different food)	0	1	2	3	4	5	6	7	8	9	10
4. I am able to choose foods that are best for my health	0	1	2	3	4	5	6	7	8	9	10
5. I am able to choose different foods and maintain a healthy eating plan	0	1	2	3	4	5	6	7	8	9	10
6. I am able to keep my weight under control	0	1	2	3	4	5	6	7	8	9	10
7. I am able to examine my feet (e.g. for cuts or blisters)	0	1	2	3	4	5	6	7	8	9	10
8. I am able to do enough physical activity (e.g. walking the dog; yoga; gardening; stretching exercise)	0	1	2	3	4	5	6	7	8	9	10
9. I am able to maintain my eating plan when I am ill	0	1	2	3	4	5	6	7	8	9	10
10. I am able to follow a healthy eating plan most of the time	0	1	2	3	4	5	6	7	8	9	10

C-DMSES (cont): Below is a list of activities you may have to perform to manage your diabetes. Please read each one and then circle the number that best describes how confident you usually are that you could carry out that activity. For example, if you are completely confident that you are able to check your blood sugar levels when necessary, circle 10. If you feel that most of the time you could not do it, circle 1 or 2. If you feel that all of the time you could not do it, circle 0

Circle one number on each line

<b>I am confident that:</b>	<b>Cannot do at all</b>			<b>Maybe Yes</b>				<b>Maybe No</b>				<b>Certainly can do</b>	
	0	1	2	3	4	5	6	7	8	9	10		
11. I am able to do more physical activity if the doctor advises me to	0	1	2	3	4	5	6	7	8	9	10		
12. When doing more physical activity I am able to adjust my eating plan	0	1	2	3	4	5	6	7	8	9	10		
13. I am able to follow a healthy eating plan when I am away from home	0	1	2	3	4	5	6	7	8	9	10		
14. I am able to choose different foods and maintain my eating plan when I am away from home	0	1	2	3	4	5	6	7	8	9	10		
15. I am able to follow a healthy eating plan when I am on holidays	0	1	2	3	4	5	6	7	8	9	10		
16. I am able to choose different foods and maintain a healthy eating plan when I am eating out or at a party	0	1	2	3	4	5	6	7	8	9	10		
17. I am able to maintain my eating plan when I am feeling stressed or anxious	0	1	2	3	4	5	6	7	8	9	10		
18. I am able to visit my doctor once a year to monitor my diabetes	0	1	2	3	4	5	6	7	8	9	10		
19. I am able to take my medication as prescribed	0	1	2	3	4	5	6	7	8	9	10		
20. I am able to maintain my medication when I am ill	0	1	2	3	4	5	6	7	8	9	10		

## Part 4: WHOQOL- Brief

The following questions ask how you feel about your quality of life, health, or other areas of your life. I will read out each question to you, along with the response options. Please choose the answer that appears most appropriate. If you are unsure about which response to give to a question, the first response you think of is often the best one.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last four weeks.

		Very poor	Poor	Neither poor nor good	Good	Very good
1	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	satisfied	Very satisfied
2	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about how much you have experienced certain things in the last four weeks?

		Not at all	A little	A moderate amount	Very much	An extreme amount
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	5	4	3	2	1
4	How much do you need any medical treatment to function in your daily life?	5	4	3	2	1
5	How much do you enjoy life?	1	2	3	4	5
6	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7	How well are you able to concentrate?	1	2	3	4	5
8	How safe do you feel in your daily life?	1	2	3	4	5
9	How healthy is your physical environment?	1	2	3	4	5



The following questions ask about how completely you experience or were able to do certain things in the last four weeks

10	Do you have enough energy for everyday life?	1	2	3	4	5
11	Are you able to accept your bodily appearance?	1	2	3	4	5
12	Have you enough money to meet your need?	1	2	3	4	5
13	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
15	How well are you able to get around	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	satisfied	Very satisfied
16	How satisfied are you with your sleep?	1	2	3	4	5
17	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18	How satisfied are you with your capacity for work?	1	2	3	4	5
19	How satisfied are you with yourself?	1	2	3	4	5
20	How satisfied are you with your personal relationships?	1	2	3	4	5
21	How satisfied are you with your sex life?	1	2	3	4	5
22	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24	How satisfied are you with your access to health services?	1	2	3	4	5
25	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to how often you have felt or experienced certain things in the last four weeks

		Never	Seldom	Quite often	Very often	Always
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

		Never	Seldom	Quite often	Very often	Always
27	Do you feel you have been respected	1	2	3	4	5
28	Can you eat any food what do you want	1	2	3	4	5

## Part 5: DASS21

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

## Part 6: Diabetes Self-Management Instrument-35 (DSMI)

The following statements are about how you feel and how things have been with you during *the past three months*. There is no right or wrong for your answer. Please place an “x” in the column that best represents the way you have been with diabetes. The numbers beside the blank stands for:

- 1= Never (It won't happen.)  
 2= Occasionally (It happens one to three days each week; It happens less than half of a week.)  
 3= Usually (It happens four to six days each week; it happens more than half of a week.)  
 4= Always (It happens everyday.)

		Never	Occasionally	Usually	Always
1	I consider the effect on my blood sugars when choosing foods and portions to eat.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
2	I can participate in the social activities and still manage my diabetes.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
3	I know how to manage food portions and choices when I eat out.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
4	I regard my diabetes management as a way to stay healthy overall.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
5	I am comfortable asking other people with diabetes for tips about managing diabetes.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
6	My daily life style is more healthy than before because of having diabetes	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
7	I have successfully merged diabetes into my daily life.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
8	I pay attention to signals my body gives me related to my blood glucose level.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
9	I pay attention to situations in my daily life that might cause my blood glucose levels to change.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
10	I can recognize which signs and symptoms tell me the most about my blood glucose level.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>
11	I can usually figure out the reasons for changes in my blood glucose levels.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>

12	I compare the differences between my current blood sugar levels and my target blood glucose levels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	I monitor my progress toward my desired goals by keeping track of blood glucose levels and A1c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I take action based on body signals such as thirst, losing my temper, and feeling anxious.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	When I feel as though my blood glucose is too low, I check my blood glucose levels as soon as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	I decide what action to take based on the results of my previous actions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	When I feel unwell but I am not sure if the cause is either high or low blood glucose, I check my blood glucose as soon as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	I can adjust my diabetes routine to fit new situations (such as being away from home, changing my schedule, and celebration).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	When I feel as though my blood glucose is too high, I check my blood glucose levels as soon as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	I am comfortable asking my health care provider questions about my treatment plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	I work with my health care providers to identify the possible causes when my diabetes control is poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	I am comfortable telling my health care provider how much flexibility I want in my treatment plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	I am comfortable telling my health care provider about changes I would like to make in my treatment plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	I tell others (e.g., my friends, my family) about the situations in which I need their help for controlling my diabetes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25	I am comfortable discussing the results of out-of-range blood glucose tests with my health care providers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	I ask others (e.g., my friends, my family) to help me with my high blood glucose reaction if needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	I am comfortable asking my health care provider about resources that could help me manage my diabetes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	I check my blood glucose to help me make self-care decisions (e.g., medications, diet, exercise).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	I manage my food choices to help control my blood glucose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	I take my diabetes medications at the times prescribed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	I exercise enough to help control my blood glucose and my weight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	I keep my weight within the range set up by health care provider and me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	I see my diabetes provider every 1-3 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	If I get a low blood glucose reaction I know how to treat it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	I take the amount diabetes medication that has been prescribed for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Part 7: The Medical Outcomes Study Social Support Survey (MOS-SSS-C)

Next are some questions about the support that is available to you.

1. About how many close friends and close relatives do you have (people you feel at ease and can talk to about what is on your mind)?

Write in number of close friends and close relatives: \_\_\_\_\_, \_\_\_\_\_

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

	Non of the time	A little of the time	Some of the time	Most of the time	All of the time
2. Someone to help you if you were confined to bed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Someone you can count on to listen to you when you need to talk.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Someone to give you good advice about a crisis.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Someone to take you to the doctor if you needed it.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Someone who shows you love and affection	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Someone to have a good time with	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Someone to give you information to help you understand a situation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. Someone to confide in or talk to about yourself or your problems	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. Someone who hugs you	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. Someone to get together with for relaxation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. Someone to prepare your meals if you were unable to do it yourself	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. Someone whose advice you really want	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14. Someone to do things with to help you get your mind off things	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. Someone to help with daily chores if you were sick	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16. Someone to share your most private worries and fears with.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17. Someone to turn to for suggestions about how to deal with a personal problem	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18. Someone to do something enjoyable with	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19. Someone who understand your problems	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
20. Someone to love and make you feel wanted.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

## Part 8: Research Demographic Form

Chart ID number: \_\_\_\_\_

The following demographic questions will help us put together a general description of the people taking part in this study. Please answer each of the following questions by filling in the blanks with the correct answers or by choosing the single best answer.

1. Birth date: \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_(Day/Month/Year)
2. Gender:   1 Male                   2 Female
3. What is your marital status? (tick one box)  
1 Single (Never married)  
2 Married  
3 Separated/Divorced  
4 Widowed
4. What is the highest level of education you have completed?  
1 No education  
2 Primary school  
3 High school  
4 Vocational education (certificate level)  
5 Bachelor degree  
6 Master degree  
7 Other, please specify \_\_\_\_\_
5. What year were you first told you had diabetes? \_\_\_\_/\_\_\_\_ (Month/Year)
6. Do you have a work?  
1 No (**please answer 7**)  
2 Yes → please tick one box:  
1 Farmer           2 Mining/Quarrying           3 House builder  
4 Plumber       5 Small business from home   6 Grocery from home  
7 Restaurants   8 Courier                           9 Bank/Insurance  
10 Real estate agent   11 Executive manager   12 Teacher  
13 Social worker       14 Gymowner                   15 Office worker  
16 Public service worker   17 Home duties
7. What kind of religion do you have?  
1 No religion  
2 Buddhism  
3 Taoism



- 4 Christianity
- 5 Catholicism
- 6 Atheism
- 7 Islam
- 8 Belief but no fix
- 9 Consistentism
- 10 Other

8. Do you live with your family?

- 1 No
- 2 Yes

9. Do you have other diseases?

- 1 No
- 2 Yes (If yes please specify disease's name \_\_\_\_\_ )

10. Do you monitor your blood sugar? (check one box)

- 1 No
- 2 Yes → a. How many days a week do you test your blood sugar?  
\_\_\_\_/\_\_\_\_ (days/weeks)

b. One days that you test, how many times do you test your blood sugar? \_\_\_\_/\_\_\_\_ (days/weeks)

11. Do you keep a record of your blood sugar results?

- 1 No
- 2 Yes → How often do you record your blood sugar results? \_\_\_\_/\_\_\_\_  
(days/weeks).

12. Do you smoke? (within 6 months)

- 1 No
- 2 Yes

## Research instruments: Chinese version

### 第一部份：知識與認知

編號 \_\_\_\_\_

針對下面的情況，請您勾選□內

	對	錯	不知道
1. 阿斯匹靈可以預防糖尿病心血管疾病	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. 情緒和壓力會影響血糖的變化	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. 糖化血色素 7%以下表示糖尿病控制良好？	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 如果我是糖尿病患者，我的子女比一般人有更高的機會得糖尿病	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 糖尿病是可控制的	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. 代糖的甜度高，發生低血糖時可以立即服用效果很好	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. 長期注射胰島素來控制糖尿病會導致洗腎	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. 正確運動為每週一次，每次 5-10 分鐘	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. 當血糖高時因會造成體重減輕及飢餓感，所以要比平常人多補充食物。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 適當的足部護理可以降低糖尿病人截肢的發生率	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. 糖尿病人，每天要以攝氏 70 度以上的熱水浸泡 30 分鐘以保持足部衛生以及血液循環暢通	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. 心絞痛或心肌梗塞是常見的糖尿病併發症	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. 糖尿病人可以多吃芭樂等比較不甜的水果	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. 糖尿病人可選擇奶油、豬油來食用	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. 感冒時服用感冒藥, 要停止糖尿病藥物的使用	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. 市售包裝標示低卡或低糖食品，是控制血糖很好的食品	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. 糖尿病人可任意食用玉米、蕃薯、山藥，只要不是米飯就好	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. 中風的發生與糖尿病沒有關係	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	對	錯	不知道
19. 糖尿病人當有冒冷汗、發抖、心跳加速、饑餓的症狀時，應該立刻服用含糖的食物。	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. 當血糖控制良好時即可以不必控制飲食	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. 當糖尿病症狀消失時可以自動減少藥量	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 第二部份 (單選、5選1)

- 5 過去六個月我一直很認真的執行糖尿病自我管理 (飲食、運動、藥物治療)。
4. 我在過去六個月中，已經開始認真執行糖尿病自我管理 (飲食、運動、藥物治療)。
3. 雖然患有糖尿病，但打算在一個月內開始採取糖尿病自我管理 (飲食、運動、藥物治療)。
2. 雖然患有糖尿病，但想在未來六個月內採取糖尿病自我管理。
1. 雖然患有糖尿病，但仍不想採取任何行動。

### 第三部份

以下為你在糖尿病自我管理中可能要做的事項。請仔細閱讀每一個項目，然後選出最能代表你自己執行這件事的信心程度。例如：如果你認為自己在「當有需要時我有能力自行檢測血糖」非常有自信的話，請圈選 10；如果你覺得大部份時間你無法做到的話(很少自信的話)，請圈選 1 或 2；完全無法做到(完全沒自信的話)請圈選 0。

我有信心可以做到： 完全無法做到 也許可也許不可以 完全可以做到  
請在每一列中圈選出一個數字

- 
- |   |   |   |   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|---|---|---|----|
| 1. 當有需要時，我有能力自行檢測血糖……………                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2. 當我的血糖太高時，我有能力調整我的血糖值<br>(例如：食用不同種類食物)……………     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3. 當我的血糖太低時，我有能力調整我的血糖<br>(例如：食用不同種類食物)……………      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 4. 我有能力選擇最有利於我健康的食物……………                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5. 我有能力選擇不同種類食物來維持健康的飲食計畫                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6. 我有能力將我的體重控制在理想範圍內……………                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 7. 我有能力自行檢查我的腳(例如：傷口或起水泡)……                       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 8. 我有能力做足夠的身體活動<br>(例如：溜狗、瑜珈、園藝、或伸展運動等)……………      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 9. 當我生病時，我仍然能維持我的飲食計畫……………                        | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10. 大部份的時間內，我都能確實遵守我的健康飲食計畫                       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11. 當醫師建議我多做一些身體活動，我有能力確實做到                       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 12. 當我身體活動量增加時，我有能力自行調整我的<br>飲食計畫……………            | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 13. 當我外出時，我仍然能遵行健康的飲食計畫 ……                        | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 14. 當我外出時，我有能力選擇不同的食物種類，來<br>維持我的飲食計畫……………        | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 15. 在特殊節日時，我仍然能遵守健康飲食計畫……                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 16. 當我在外用餐或參加聚會時，我有能力選擇不<br>同種類食物來維持我的健康飲食計畫…………… | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 17. 當我面對壓力或焦慮時，我仍然能維持我的飲食計畫                       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 18. 我能每年至少去看醫生四次，以監測我的糖尿病狀況                       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 19. 我能夠依醫師處方按時服藥……………                             | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 20. 當我生病時，我仍然能維持我的糖尿病藥物治療…                        | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
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#### 第四部份

以下問卷詢問您對於自己的生活品質、健康、以及其他生活領域的感覺。請您回答所有的問題。如果您對某一問題的回答不確定，請選出五個答案中最適合的一個，通常會是您最早想的那個答案。

我們的問題所關心的是您最近兩星期內的生活情形，請您用自己的標準、希望、愉快、以及關注點來回答問題。請選出最適合您在最近兩星期內對自己健康的滿意程度，如果您極滿意自己的健康，就在「極滿意」前的□內打「√」。請仔細閱讀每個題目，並評估您自己的感覺，然後就每一個題目選出最適合您的答案。謝謝您的協助！

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1. 整體來說，您如何評價您的生活品質？  
1極不好 2不好 3中等程度好 4好 5極好
  2. 整體來說，您滿意自己的健康嗎？  
1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意
  3. 您覺得身體疼痛會妨礙您處理需要做的事情嗎？  
5完全沒有妨礙 4有一點妨礙 3中等程度妨礙 2很妨礙 1極妨礙
  4. 您需要靠醫療的幫助應付日常生活嗎？  
5完全沒有需要 4有一點需要 3中等程度需要 2很需要 1極需要
  5. 您享受生活嗎？  
1完全沒有享受 2有一點享受 3中等程度享受 4很享受 5極享受
  6. 您覺得自己的生命有意義嗎？  
1完全沒有 2有一點有 3中等程度有 4很有 5極有
  7. 您集中精神的能力有多好？  
1完全不好 2有一點好 3中等程度好 4很好 5極好
  8. 在日常生活中，您感到安全嗎？  
1完全不安全 2有一點安全 3中等程度安全 4很安全 5極安全
  9. 您所處的環境健康嗎？(如污染、噪音、氣候、景觀)  
1完全不健康 2有一點健康 3中等程度健康 4很健康 5極健康

10. 您每天的生活有足夠的精力嗎？

1完全不足夠 2少許足夠 3中等程度足夠 4很足夠 5完全足夠

11. 您能接受自己的外表嗎？

1完全不能夠 2少許能夠 3中等程度能夠 4很能夠 5完全能夠

12. 您有足夠的金錢應付所需嗎？

1完全不足夠 2少許足夠 3中等程度足夠 4很足夠 5完全足夠

13. 您能方便得到每日生活所需的資訊嗎？

1完全不方便 2少許方便 3中等程度方便 4很方便 5完全方便

14. 您有機會從事休閒活動嗎？

1完全沒有機會 2少許機會 3中等程度機會 4很有機會 5完全有機會

15. 您四處行動的能力好嗎？

1完全不好 2有一點好 3中等程度好 4很好 5極好

16. 您滿意自己的睡眠狀況嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

17. 您對自己從事日常活動的能力滿意嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

18. 您滿意自己的工作能力嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

19. 您對自己滿意嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

20. 您滿意自己的人際關係嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

21. 您滿意自己的性生活嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

22. 您滿意朋友給您的支持嗎？

1極不滿意 2不滿意 3中等程度滿意 4滿意 5極滿意

23. 您滿意自己住所的狀況嗎？

1  極不滿意 2  不滿意 3  中等程度滿意 4  滿意 5  極滿意

24. 您對醫療保健服務的方便程度滿意嗎？

1  極不滿意 2  不滿意 3  中等程度滿意 4  滿意 5  極滿意

25. 您滿意所使用的交通運輸方式嗎？

1  極不滿意 2  不滿意 3  中等程度滿意 4  滿意 5  極滿意

26. 您常有負面的感受嗎？（如傷心、緊張、焦慮、憂鬱等）

1  從來沒有 2  不常有 3  一半有一半沒有 4  很常有 5  一直都有

27. 您覺得自己有面子或被尊重嗎？

1  完全沒有 2  有一點有 3  中等程度有 4  很有 5  極有

28. 您想吃的食物通常都能吃到嗎？

1  從來沒有 2  不常有 3  一半有一半沒有 4  很常有 5  一直都有

## 第五部份

填表說明：

請小心閱讀以下每一個句子，並在其右方圈上一數字，表示「過往一個星期」如何適用於你。答案並無對錯之分。請不要花太多時間在某一句子上。

評估量表：

0=不適用；1=頗適用，或間中適用；2=很適用，或經常適用；3=最適用，或常常適用

1	我覺得很難讓自己安靜下來	0	1	2	3
2	我感到口乾	0	1	2	3
3	我好像不能再有任何愉快、舒暢的感覺	0	1	2	3
4	我感到呼吸困難（例如不是做運動時也感到氣促或透不過氣來）	0	1	2	3
5	我感到很難自動去開始工作	0	1	2	3
6	我對事情往往作出過敏反應	0	1	2	3
7	我感到顫抖（例如手震）	0	1	2	3
8	我覺得自己消耗很多精神	0	1	2	3
9	我憂慮一些令自己恐慌或出醜的場合	0	1	2	3
10	我覺得自己對將來沒有甚麼可盼望	0	1	2	3
11	我感到忐忑不安	0	1	2	3
12	我感到很難放鬆自己	0	1	2	3
13	我感到憂鬱沮喪	0	1	2	3
14	我無法容忍任何阻礙我繼續工作的事情	0	1	2	3
15	我感到快要恐慌了	0	1	2	3
16	我對任何事也不能熱衷	0	1	2	3
17	我覺得自己不怎麼配做人	0	1	2	3
18	我發覺自己很容易被觸怒	0	1	2	3
19	我察覺自己在沒有明顯的體力勞動時，也感到心律不正常	0	1	2	3
20	我無緣無故地感到害怕	0	1	2	3
21	我感到生命毫無意義	0	1	2	3



## 第六部份

以下句子是關於您對於您的糖尿病的感受及處理方式，請圈選一個最能代表您最近三個月以來的狀況。您所填答的沒有所謂對或錯的答案，只要按照您自己的感受及狀況誠實地填答即可。空格旁的數字代表

1：從來沒有(每天都沒有)

2：偶爾(一星期中約有一至三天會如此；一星期中有一半以下的時間會如此)

3：經常(一星期中約有四至六天會如此，一星期中有一半以上的時間會如此)

4：總是(每天都如此)

	從來沒有	偶爾	經常	總是
1 當我選擇食物的種類和份量時，我會考慮它們對血糖的影響	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2 我能在參加各種社交活動時，仍能控制好我的糖尿病	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
3 當我外出吃飯時，我知道該如何選擇食物的份量和種類	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
4 我將糖尿病的自我照顧，當成是一種維持健康的方式	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5 我能自在地向其他有糖尿病的人，請教一些處理糖尿病的方法	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6 糖尿病使我的日常生活型態比以前更健康	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7 我已經成功地把糖尿病照顧融合在我的日常生活中	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8 我會去注意與我的血糖數值相關的身體症狀(例如：口渴，四肢無力，焦躁不安，多尿)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
9 我會去注意日常生活中，哪些狀況，可能會影響我的血糖變化	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
10 我會去辨認哪些身體症狀，是與我的血糖數值最相關	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
11 我通常會知道造成我血糖改變的原因	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
12 我會去比較自己目前的血糖數值與標準血糖的差距	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
13 我會記錄血糖和糖化血色素的數值，來瞭解	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

它距離我想要的目標多遠					
14	我會根據身體的症狀（例如：口渴，四肢無力，焦躁不安，多尿）採取行動	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
15	當我覺得好像血糖太低時，我會儘快驗血糖	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
16	我會根據過去處理血糖的經驗，來決定現在的狀況該採取何種行動	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
17	當我感覺身體不舒服，但又不確定是因低血糖或高血糖造成時，我會儘快驗血糖	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
18	我會調整我平常執行的糖尿病照顧方式，以適應新的狀況（例如：外出，作息變更，節慶）	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
19	當我感覺好像血糖太高時，我會儘快驗血糖	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
20	我會直接詢問醫療人員，與糖尿病相關的問題	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
21	當我的血糖控制不良時，我會和醫療人員討論，以找出其可能的原因	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
22	我能自在地告訴醫療人員，我想要一個可以配合我生活作息的糖尿病控制計畫	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
23	我能自在地告訴醫療人員，我將如何改變糖尿病照顧方式	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
24	我會告訴家人或朋友，在什麼情況下，我需要他們幫忙控制我的糖尿病	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
25	即使我的血糖檢驗結果超過正常範圍，我仍會和醫療人員討論	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
26	有需要時，我會請家人或朋友，協助我處理高血糖的反應	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
27	我會詢問醫療人員，有哪些資源能幫助我控制糖尿病	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
28	我會驗血糖，以幫助我決定如何調整自我照顧方式（例如：服用藥物，飲食，運動）	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
29	我管制我的飲食，以幫助我控制血糖	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
30	我依照醫師處方的時間去用藥	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
31	我保持足夠的運動量（例如：快走、慢跑、爬	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

山 )來控制我的血糖和體重

- |    |                        |                            |                            |                            |                            |
|----|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 32 | 我控制我的體重在我與醫療人員共同設定的範圍內 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 |
| 33 | 每隔一到三個月，我去看糖尿病門診       | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 |
| 34 | 假如我發生低血糖，我知道該如何處理      | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 |
| 35 | 我依照醫師處方的劑量去用藥          | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 |

## 第七部份

以下的問題是一些有關你可獲得的社會支持。

1. 你有多少個相熟的親人及朋友（這是指你覺得容易相處及能傾訴心事的對象），請寫下相熟的親人及朋友的數目：\_\_\_\_\_，\_\_\_\_\_

人們有時會向別人尋求伴隨、幫助或其他形式的支持，請問在你需要時，你有多少時候能得到以下每一種的支持呢？

	時 完全沒有時	候 少許時候	有些時候	大部份時候	所有時候
2. 如果你只限於臥床活動，有人是會給予你幫助。	1	2	3	4	5
3. 在你需要找人傾訴的時候，你能夠指望某些人來聆聽你。	1	2	3	4	5
4. 對艱苦危難的情況，有人給你很好的忠告。	1	2	3	4	5
5. 如果你有需要，有人是會帶你去看醫生。	1	2	3	4	5
6. 有人向你表達摯愛及對你的歡心。	1	2	3	4	5
7. 有人和你一起歡度時光。	1	2	3	4	5
8. 有人給予你一些資料，以幫助你明白當時的處境。	1	2	3	4	5
9. 有人得你信任或可向他傾訴你自己的事或你的問題。	1	2	3	4	5
10. 有人會呵護你。	1	2	3	4	5
11. 有人和你聚在一起輕鬆一番。	1	2	3	4	5
12. 如果你不能為自己燒飯，有人是會為你預備。	1	2	3	4	5
13. 有些人的忠告是你真正渴求的。	1	2	3	4	5
14. 有人和你一起 做一些事，使你能放下心裡的事情。	1	2	3	4	5
15. 當你身體不適，有人是會替你處理日常鎖事。	1	2	3	4	5
16. 有人分擔你最心底的恐懼及擔心。	1	2	3	4	5
17. 可向一些人求取有關如何處理個人問題的意見。	1	2	3	4	5
18. 有人和你一起做一些享樂的事情。	1	2	3	4	5
19. 有人明白你的問題。	1	2	3	4	5
20. 你愛一些人及有人令你感到被需要。	1	2	3	4	5

第八部份 個人基本資料

病歷

號：\_\_\_\_\_

(1) 出生日期：西元\_\_\_\_\_年\_\_\_\_\_月\_\_\_\_\_日\_\_\_\_\_

(2) 性別：1男 2女

(3) 婚姻狀況：1未婚/單身 2已婚/同居 3離婚/分居 4喪偶

(4) 教育程度：1不識字 2國小/小學 3國中/初中 4高中/高職  
5大專/大學 6研究所及以上 7其他\_\_\_\_\_

(5) 您什麼時候被告知您患有糖尿病 \_\_\_\_\_年\_\_\_\_\_月

(6) 請問您目前有工作嗎?

1沒有

2有 → 1農林漁牧業 2礦業及土石採取業 3製造業

4水電燃氣業 5營造業 6批發及零售業

7住宿及餐飲業 8運輸、倉儲及通信業 9金融及保險業

10不動產及租賃業 11專業、科學及技術服務業

12教育服務業 13醫療保健及社會福利服務業

14文化、運動及休閒服務業 15其他服務業

16公共行政業 17家庭主婦

(7) 宗教信仰

1無

2有 → 1無 2佛教 3道教 4基督教 5天主教 6無神論

7回教 8信有神但沒有特定宗教 9一貫道 10其他

(8) 目前有人與您同住嗎?

1無

2有

(9) 請問您目前除糖尿病外另患有哪些疾病？

1  無

2  若有，請列出：\_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (依嚴重性列出前三項)

(10) 您會自己測量血糖值嗎？

1  不會

2  會→a 在一星期中您自己會測量幾天的血糖 \_\_\_\_\_ 天

b 在一天中您自己會測量幾次的血糖 \_\_\_\_\_ 次

(11) 您會自己記錄血糖值嗎？

1. 不會

2. 會→在一天中您自己會測量幾次的血糖 \_\_\_\_\_ 次

(12) 您現在抽菸嗎？（最近六個月前還有抽菸也算）

1  沒有

2  有

## APPENDIX 2

### Script of Motivational Interview

This research involved individuals who had been diagnosed with Type II diabetes. It was important to note that the theory with regard to techniques and strategies was listed in chapter two and chapter three. The framework of how this intervention was intended to proceed is listed below. The quotes interwoven were summaries from actual clinical experiences of the interviewer, and the quotes were from the participants who took part in this study. This was followed by an overview of how the interview actually proceeded. The interviewer wanted to open the intervention by gently directing the interview and getting the interview off on the right foot.

#### **Task One: Agenda setting**

**Actions:** Introducing one-self, establishment of discussion areas, and gentle direction was towards enhanced awareness of self-management of dietary, exercise and self-monitoring blood glucose (SMBG).

#### Opening and gently directing the interview

Opening: *“Hello Mr./Ms. \_\_\_\_\_my name is \_\_\_\_\_and I am from the \_\_\_\_\_ University: PhD nursing student and working in \_\_\_\_\_Hospital as a diabetes case manager. Now, I am working with the Type II diabetes research project and am following up on the questionnaires you received before. I would like to follow up on the information that I have got from questionnaires, We will spend about 40-60 minutes to discuss, would that be all right with you today?”*

#### **If no state:**

*“When you have a chance to come the clinic, could you call me at this number... and I will be here. Or could we make an appointment for next clinical time?”*

**If yes, ask:**

*“What would you like to discuss today?” Or” what would you most concern about? Dietary changes, exercise, monitoring your blood sugar levels or perhaps something else is more important to you right now?”*

**Then ask**

*“You know I was wondering if you might be willing to share with me your story with regards to manage diabetes at home, I mean what has its been like for you since you were diagnosed with diabetes.”*

In this statement, allowing the participants to describe their experience or to tell their story about diabetes care at home (e.g. when they were diagnosed, difficulties that they encounter, their friends put a stigma on them, they have broken the relationship with their friends due to drinking to much win, etc...). Interviewer could gain information during shared their story with her/him. It was helpful in the collaborative effort for the interviewer. The interviewer could gently guide the individual to share experience with us. When we elicited the person’s story with regard to managing diabetes at home, this was the time to approach the person respectfully and ask for their unique perspective. Sample dialogue scripts below for motivational interviews are given below.

This section was towards raised awareness of diabetes self-management in dietary, exercise and monitoring sugar. Statements were in response to participant statements:

Pre-contemplation stage

Participant example – *“I don’t think high blood sugar or low blood sugar will hurt my body, because I don’t feel any uncomfortable in my life. Even though doctors tell me that my blood sugar is ‘too high’, I only feel that sometimes I will be hungry at midnight, drinking a lot of water, and many times for toilet, I think that is normal for aged people.”*

Reflective statements:

*“You mean that it is the normal situation for aged people wake up at midnight for food or toilet, and you think that is not because high blood sugar reaction.”*



Ask open ended questions:

*“What do you think that the high blood sugar (or low blood sugar) will be?”*

Participant example – *“I don’t think that is good thing for me to check blood sugar very day regularly to control diabetes.”*

Reflective listening:

*“Tell me more about the perspective using your words to describe what is high blood sugar (or low blood sugar).”*

Open ended questions:

*“What are the worst things you can imagine happening if someone continued without checking their blood sugar levels regularly?”*

Reflective listening:

*“Tell me more about the things in your life. What do you feel about managed diabetes at home.”*

Participant example – *“As far as I’m concerned, I don’t have any problems that need to change my life for diabetes, I guess I have faults due to the high blood sugar levels as you know, but there’s nothing that I really need to change. Actually I don’t really think there is anything I can do. However, I am busy and don’t have time to manage my diet, exercise or change my life style for diabetes.”*

Reflective statements

*“It sounds like you are busy, unhappy about all this and wondering what you might be able to do for high blood sugar levels. You feel like maybe there is nothing you can do with diabetes, sort of hopeless.”*

Open ended questions:

*“Tell me about how you manage your diabetes at home.” Or “How is it going with your diabetes such as dietary, exercise or self-monitoring blood glucose?” Or “what concerns do you have about how diabetes may affect your life or your family?”*

## **Task Two: Elicit ambivalence**

Actions: Reflective statements, open ended questions, proactive information gathering, reflective listening, rephrasing, summarization, affirmation, role with resistance.

### Contemplation stage

Participant example: *“I know I need to make some changes but I’m not sure I can make them.”*

Open ended questions:

*“Tell me about how you feel about changing your diet, exercise and self-monitoring blood glucose patterns.”*

Participant example – *“I really think I would like to control diet” or “I have been thinking that I need to choose what I eat” or “I think that I need to cut down on what I eat” or “I think that I need to start an exercise program’ or “I think that I need to start check my blood sugar”.*

Reflective statements:

*“You’re unhappy with controlling your diet.”*

*“You want to change your eating style.”*

*“You want to cut down on the amount of sweet and fat you eat.”*

*“You want to excise more.”*

*“You’re worry about you blood sugar levels.”*

Participant example – *“I don’t know....it’s so hard to make these kinds of changes, with all the things that are going on in my life.”*

Reflective listening:

*“Tell me more about the things in your life that prevent you from making these changes.”*

Participant example – *“I would like to make changes, but I’m not sure I can’t.”*

Rephrasing:

*“What I hear you saying is ‘You can’t control diet’ or you can’t exercise.”*

Participant example – *“I would really like to get my sugar down but I just don’t have the time to check my blood sugar and do exercise.”*

Reflective statements:

*“So, on the one hand you really want to lower your blood sugar and on the other hand you find it really hard to eat less sweet, check blood sugar and exercise.”*

### **Task Three: Assess importance**

Action: assessment of importance and confidence, utilization of confidence and readiness strategies designed to elicit change talk, questions to explore importance and build confidence.

#### Preparation stage

*“I am not sure how you felt about making these changes, can you help me understand by answering 2 questions?” “How important is it for you to make these changes? If ‘0’ was ‘not important’ and ‘10’ was ‘very important,’ what number would you give yourself?” “If you decided right now to make these changes, how confident do you feel about succeeding? If 0 was ‘not confident’ and 10 was ‘very confident,’ what number would you give yourself?”*

Utilization of confidence and readiness strategies designed to elicit change talk

If participant’s indicate that they feel this is not an important change (rating importance <5 on 1-10 scale).

*“Tell me why you didn’t rate it as a one, two or three etc.?”*

If participants indicate that they feel this is an important change (rating importance > 5 on 1-10 scale).

*“You rated the importance of this change as an 8, why didn’t you rate it as a 5?”*

If participant’s indicated that they don’t feel very competent about making changes (rating importance <5 on 1-10 scale).

*“Tell me why you didn’t rate it as a one, two or three etc.?”*

If participant indicate that they feel confident about making this change (rating importance > 5 on 1-10 scale).

*“You rated your confidence as an 8, why didn’t you rate it as a 5?”*

Participant example – *“I have tried to diet, exercise and check sugar before, and I haven’t had a lot of success.”*

Affirmation:

*“It is really hard to change the way you eat.”*

Participant example – *“I have cut down a lot on what I eat and I try to exercise and check sugar, but I don’t always have the time.”*

Affirmation:

*“It sounds like you have already done a lot of good things to help your diabetes.”*

#### **Task Four: Reduce resistance**

Action: Emphasis on personal choice and control, reassess importance and confidence, meet force with empathy, reflective listening summarize, affirm.

#### Action stage

Participant example – *“I do know that these changes are important but I’m tired of everyone telling me what to eat, when to exercise and how to check blood sugar.”*

Emphasis on personal choice and control

*“You are right, these are important changes, but they are your choice to make and you will make them when you are ready. I’m here to say that I will help you to make changes when you are ready.”*

Participant example – *“I really want to control diet and lower my blood sugar but I don’t know whether I’m ready”*

Reassess importance and confidence

*“I sounds like you really value these changes, but you’re not sure whether you can make them, tell me how confident you feel about making these changes.”*

Participant example – *“Maybe I would like change, but I’m going to eat or exercise what I want when I want it.”*

Meet force with empathy:

*“Eating and exercise are important to you, and you don’t like being told what to do.”*

Participant example – *“I would like to make changes, but I can’t now when I’m working all the time and I’m never home.”*

Reflective listening

*“It’s hard for you to plan meals and exercise when you’re not at home to do it.”*

Participant example – *“I’m really working hard to change the way I eat, I am actually doing something about it, but, I won’t be able to eat the foods I like, I won’t be able to go to the restaurants I like, I won’t be able to attend my friend’s daughter (or son) wedding ceremony in restaurants, and I won’t even be able to eat at the afternoon tea with my friend on beautiful hotel.”*

Summarization

*“So, if you make the recommended changes, you will never be able to eat anything you like again.”*

Participant example – *“I do well for a while when I diet, exercise, and check my sugar but then I find myself slipping into my old habits after 2 to 3 weeks, I did reduce my sugar to 150 mg/dl last two month, but can’t decrease anymore.”*

Affirmation

*“It sounds like you have done a good job in the past and have found a way to make a diet and exercise program work.”*

Participant example – *“I am really doing about managing my eating style, exercise, and check my sugar as I can, meanwhile, I am actually doing hard work abut to cut down sweet cake, fatty food, drinking win....wow, that is my favourite, and eat more vegetables etc....”*

Summarizing

*“So it sounds like there are a number of good things you do now to manage your diabetes, you exercise when you can, you have stopped drinking win and you have tried*

*to increase you intake of vegetables. At the same time you would like to get more exercise, and check your blood sugar more often. Does this sound right?*

### **Task Five: Negotiating a plan**

Action: Setting goals, considering change options, arriving at a plan, eliciting commitment.

#### Maintenance stage

Participant example – *“I think I can be successful in making changes in one area.”*

Considering change options

*“What change do you want to make?” “You would like to start exercising, what sort of exercises could you do?”*

*“Tell me how you could cook differently to decrease how much sweet or starch you eat.”*

Participant example – *“I think I can make some changes, I just don’t know where to start.”*

Setting goals

*“Would you like me to give you some information about exercise? First tell me what you know about exercise.”*

Once permission is obtained advice may be given.

*“Would you like me to give you some information about cutting down on starch in your diet? First tell me what you know about changing you dietary starch intake.”*

Participant example – *“ I think I can change the way I eat , one of my friends told me that exercise and blood sugar monitoring helped her.”*

Arriving at a plan

*“The exercise and blood sugar monitoring is great, would you let me help you to find out when and where their diabetes group club are.”*

Participant example – *“I’m ready to make these changes in the way I eat, and I can exercise at least 5 times a week.”*

Eliciting commitment

*“So, this is something you think you want to do.”*

Participant example – *“I may need a boost right now to help me maintain the changes I’ve already made.”*

Arriving at a plan

*“The maintain you behaviour is great, would you let me help you to find out where the diabetes group club are.”*

### **Task Six: Question/answer**

Action: Allowing subject to control the flow of information.

*“I know that you have a lot of information to deal with, do you have any questions at this time? Please feel free to contact me any time for clarification. This is my phone number.....”*

### Summary

In Phase II, the motivational interview starts with opening and gently directing the interview. This focused on eliciting the participant’s personal experience or story with managing diabetes at home. This is important for allowing the researcher to understand each patient’s story and to allow the participant to understand that they possess regarding their own health is the most powerful tool with which they may accomplish change. Researcher was hold Phase I questionnaires data base, with this approach, the researcher was able to follow the lead of the patient, gently guide the interview, and focus on what the individual considered the most important aspect of diabetes management to them as an individual. During the stage of change within motivation interview strategies, the researcher used the key principles of motivation interviewing namely de-emphasis on labelling, individual responsibility, internal attribution, cognitive dissonance, directing dissonance towards changes that increase self-esteem, self-efficacy, and dissonance. The strategies of motivational interviewing that asked open-ended questions, affirmation, reflective listening, awareness, eliciting self-motivational statements, summarising, and alternative. In some instances during or at the end of interviews, participants requested that the researcher assist them in securing an appointment to meet with the diabetes case manager or the nutrition

specialist. In addition, there were some individuals who wanted appointments with both the nutritionist and the diabetes educator. Appointments were made by the researcher in the cases where a referral was requested. The researcher met with the diabetes educator, diabetes case manager or the nutrition specialist, there was very consistent and quite positive feedback response from participants.

Interestingly, in one specific case during the interview, the participant was not well-disposed towards the researcher *“you are the expert, I don’t know everything, you tell me how to do, but you were not me you didn’t know the pain of my life to be a diabetes patient.”* At that moment the interviewer didn’t say anything, then using an empathic voice said: *“To be a diabetes patient is not easy is it?” “You have been struggling with this disease for a while?” “Would you like to share your experience with me about what happened in your life to manage your diabetes?” “Actually I was hoping you would share with me as you are the expert on you, you know much more about yourself than any doctor or other health provider. So I would like to hear, what are your thoughts about how changes could occur to allow you to have more control over your diabetes?”* Finally, this participant wanted to see a diabetes case manager to manage this disease for individual requirements. In future approaches using this treatment manual as a guide may be helpful in developing additional interventions appropriately tailored to the needs of individual participants.



## **Strategies of Motivational Interviewing**

There are several methods to represent as the strategies of Motivational Interviewing (MI). These strategies have authorized by Miller & Rollnick (2002). These strategies are mainly basic counselling skills derived from client-centred counselling. They are used in MI to get clients talking about their behaviour exploring their ambivalence and verbalising reasons for changing.

### Ask open-ended questions

Open-ended questions are used to get clients to start talking about dysfunctional behaviour. It encourages clients to do most of the talking in the early stages of the interaction. Closed-ended questions are de-emphasised in the early stages of motivational interviewing.

### Affirmation

It is important to affirm and support the client. This can be done in the form of compliments and statements of appreciation and understanding. The process of reflective listening can be quite affirming. The interviewer listens empathically to what the client has to say and attempts to reflect it back.

### Reflective listening

The interviewer reinforces clients' statements of self-perceived problems in order to increase their awareness of these problems and encourage them to continue talking about them. The interviewer also restructures the content of information that he/she does not want to reinforce, to place it in a perspective that is more consistent with change.

### Awareness

Consciousness-raising is directed toward increasing dissonance by placing information on the side of the balance favouring change. It is important that the interviewer provides information on the negative aspects of the behaviour in a non-confrontational manner.

### Eliciting self-motivational statements

By the attribution principle that “I learn what I believe as I hear myself talk,” the interviewer evokes from clients’ statements that will motivate them to change. The main purpose of this strategy is to help clients to resolve ambivalence. The interviewer can directly ask clients for these statements, ask clients to elaborate on the topic, or elicit them as part of a decisional balance exercise.

### Integrating objective assessment

The interviewer presents to clients feedback on the results of assessment, interpreting findings and helping clients to understand their situation. The decision of what to do is left to individual clients.

### Summarising

The interviewer sums up all of the client’s self-motivational statements, phrasing these as reflections of what the client has said. The client is then asked to comment on this summary in an attempt to elicit self-statements on the need for change. Summaries reinforce what has been said, demonstrate that the interviewer has been listening carefully, and prepare the client to move on.

### Alternatives

When the client reaches a point of dissonance which motivates him/her to act upon the dysfunctional behaviour, the interviewer presents alternatives and helps the client to evaluate them. The principles of motivational interviewing are consistent with the client-centred style of motivational interviewing. It is the way to make clients feel comfortable about verbalising for themselves the reasons for concern and arguments for change. They also help to show empathy and respect for the client. It is important to remind interviewers to avoid the counter-productive interviewing techniques discussed below.

### Question-answer trap

This happens when the interviewees fall into a pattern of asking a question and the participant answers with a one-word response. However the use of open-ended questions encourages participants to engage more, and allows for more collaboration in the discussion. A rule described by Miller and Rollnick (2002) is to avoid asking three questions in a row. One way to avoid this is to follow the person's lead allowing the conversation to flow more easily.

### The expert trap

If the interviewer acts or speaks as if they are the lone expert with all the answers, the interviewee will be unlikely to see the efforts of the provider as collaborative. The interviewer must work to acknowledge the expertise of the participant. This allows and encourages a more collaborative approach between patient and provider. If the participant says *"I don't know, you tell me you're the expert."*

The provider might reflect:

*"Actually I was hoping you would share with me as you are the expert on you, you know much more about yourself than any doctor or other provider. So I would like to hear, what are your thoughts about how changes could occur to allow you to have more control over your diabetes?"*

This approach is likely to lead to more conversation than lecturing or appearing to be the expert would lead to.

### Labelling trap

Interviewers need to avoid any emphasis that attempts to push or force the person to admit that they have a problem. The old adage of having to "admit a problem first" does not appear to be an effective method of accomplishing change. If the interviewer continues to force or push, increased resistance by the patient is likely to develop. To avoid this situation, it is helpful to emphasize to individuals that labels are merely words, and that focusing on how to address improving behaviour change that is helpful to them as an individual is the goal.

### Premature focus trap

The premature focus trap occurs when interviewers assume that they know what the person wants to talk about and begin a discussion that doesn't fit. This mistake can be avoided by collaborating and asking clients to talk about what they see as important thus allowing time for interviewers to listen.

### Confrontation

Confrontation happens when interviewers present the argument of how important it is for the person to change, inevitably placing the client in the role of opposition, that is, the patient is left to argue against change.

### Blaming trap

Blaming the patient for their problem is also proved counter-productive. This is a trap to avoid, as blame will often increase negative feelings, making change more difficult. The point here should be to remain focused on how the individual can approach improving their diabetes self-management without assigning blame or finding fault.

### Trap of taking sides

Taking sides is the most important trap to avoid. Counsellors fall into it through their own good intentions and through a particular conception of motivation processes. Trap occurs when a counsellor detects some information indicating the presence of a problem (e.g. diabetes or obesity), begins to tell the client that he or she has a serious problem, and prescribes a particular course of action.

## APPENDIX 3

### Information sheet: English and Chinese version

#### Information sheet: English version

(Griffith University Letterhead)

#### **Title: The effects of a motivational interview intervention on people with Type II diabetes –A randomized controlled trial**

The research project investigating a group intervention for people with Type II diabetes has been designed by Ms Shu-Ming Marine Chen, School of Nursing and Midwifery at Griffith University, Queensland (ph 07 555 29191), Professor Debra Creedy, Griffith University (ph 07 555 29229); Dr. Judy Wollin, Griffith University – Logan (ph 07 338 21345).

#### **Purpose of study**

Diabetes poses a major threat to global public health. It is a leading cause of morbidity, mortality, and increasing worldwide health care costs. Increasing evidence indicates that better self-management is an important way to control diabetes. But there are many barriers to behavioural change in people with diabetes.

The presence of intervention program has been found to increase diabetes self-management in order to manage their diabetes condition. Unfortunately, there are 50%-80% of people with diabetes were significantly deficient in both knowledge and skills to manage their condition and less than half of diabetes sufferers achieve ideal glycemic control hemoglobin A1c < 7.0%. This may be linked to the fact that many of these people experience barrier factors such as lack of knowledge, less family support. That hinders the adequate control of their diabetic condition. A number of studies indicated that poor self-management is associated with reduced quality of life and increased diabetes complications.

It is important to maintain self-management on people with Type II diabetes in order to decrease diabetes complications and improve their quality of life. This research will use motivational interview within stages of change to motivate self-management for people with Type II diabetes. This research also will investigate the effects of the intervention on knowledge, depression, self-efficacy, quality of life, social support, and blood glucose, hemoglobin A1c levels,.

#### **What participation in this study involves**

You are being asked to participate in a research study because you have Type II diabetes. If you decide to participate in this study, you will be asked to complete a questionnaire, which will take about 30-40 minutes. In addition you are being asked to consent to us accessing your medical records to obtain information about your medical history, HbA1c and blood glucose levels.

You are invited to attend the research activity. We will provide you the diabetes information that hospital provides for diabetes people.

### **Voluntary participation**

You are free to withdraw your consent and to discontinue participation in this study at any time without penalty or loss of benefits. Your decision will not affect your nursing care, medical treatment, or hospital fees. There will be no cost to you to participate in the interview sessions. You will not be paid for completing the questionnaires.

### **Risks and discomforts**

The only risk associated with participating in this study is that answering questions about your diabetes self-management, emotion, mood, and personal diabetes knowledge may cause you to feel briefly uncomfortable. If you feel uncomfortable responding to any of the items, you are free, to not respond to that item or to withdraw your consent and discontinue participation in this study. It should be noted that if you are found to be unwell during the course of this research you will be advised to seek review by your doctor.

### **Benefits**

You may not receive some benefits from the interviews. Your participation in this research may provide valuable information for developing and implementing appropriate health promotion programs to improve the self-management of Type II diabetes.

### **Confidentiality**

Any information obtained will be kept confidential and your name will not be associated with it, the code number will be used in place of your name. Your record for the study will be kept in a locked file, only the researchers will have access to the records. Although the results of this research may be published for scientific purposes, the reports will be presented as a whole group, therefore, your identity will not be revealed. All conversations and written information provided by the research participants will be confidential and de-identified. Your anonymity will at all times be safeguarded.

### **Contents and questions**

This study has been reviewed and approved by the Griffith University Ethics Committee. If you have any questions about this research, Ms. Shu-Ming Marine Chen will be glad to answer your questions now. If you have questions later, you may contact or speak to Hui Chun Hsu, the manager of the Diabetes Clinic if they have any concerns or issues with the research 08-7368686 (Taiwan). If you have any questions about your rights as a research participant, Hui Chun Hsu will then contact Gary Allen, HREC Griffith University., Research Ethics, Office for Research, Bray Centre, Griffith University, Kessels Road, Nathan, QLD 4111, Telephone (07) 3875 5585 or email [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au)

**Griffith University thank you for participating in this research**

## Information sheet: Chinese version

### 參加者說明書

**研究主題：第二型糖尿病患者介入動機激勵會談對糖尿病自我管理之成效**

本研究主要為探討第二型糖尿病患者自我照顧的介入研究由主持人陳淑銘目前就讀於澳州格理菲斯大學博士班(電話:07 555 29191), 以及Debra Creedy 教授(電話:07 555 29229), Judy Wollin 副教授(電話:07 338 21345)。

### 研究計劃之目的:

糖尿病正威脅全世界人類的健康, 糖尿病導致死亡率及醫療花費的增加. 多處研究結果指出增加自我照顧能力是重要的控制血糖要素, 但研究也指出糖尿病患者仍有許多不良的行為阻斷病患對血糖的自我控制。

目前大部份的介入研究都以自我照顧為出發點來控制病患的血糖, 但有 50%-80%的病患對糖尿病知識是不足需要被教育, 因知識及技巧的不熟悉導致病患無法達到理想的血糖值控制在  $A1c < 7.0\%$ , 這也說明了阻礙糖尿病患者血糖控制的因素有知識及支持系統缺乏, 許多研究已證實自我照顧能力不足會直接影響病患的生活品質及增加糖尿病的合併症。

因此如何增加第二型糖尿病患者對自我照顧的持續行為, 以下降糖尿病所導致的合併症並提昇生活品質, 是一重要課題。本研究是運用動機激勵方式, 依病患不同層度自我照顧的動機及能力給予不同層級的動機激勵。本研究也將找出影響第二型糖尿病患者對知識認知、情緒憂鬱、自我效能、生活品質、社會支持程度與血糖及糖化血色素的相關性。

### 參加者參加研究的說明

因為你是第二型糖尿病患者, 所以你會被問到是否願意參加此研究。假如你決定參加此研究你將會收到一份問卷並花費約 30-40 分鐘來完成。同時你也會填寫一份研究說明書及同意書, 同意研究者查閱你病歷資料中的糖化血色素值及血糖值。

### 自願參與研究權利

參與本研究期間你可以隨時離開或決定不再繼續參與研究的活動, 而你的決定將不會影響你在醫院的醫療照護權利或受罰。你不需要花費任何費用在研究介入上, 也不需要付問卷的費用。

### 危險或不適產生時的處理方式

本研究唯一讓參加者感到不適的有必須要回答問卷中有關自我照顧情形, 情緒憂鬱狀況和個人對糖尿病的知識, 這些可能使參加者會覺得心理不舒服。當有此不適產生時參加者可自由的離開或不回答此問題, 並可決定是否繼續留下來完成

問卷的收集。在同時若有出現醫療上的需求將會建議或轉介你到醫療照護系統做進一步的治療。

### **個人權益**

你可能會從研究中得到好處,本研究的介入方式將提供你有關糖尿病的資料,你可能會因此而得到更多糖尿病的知識,進而增加自我血糖控制而下降血糖值的。

### **隱私的保障**

本研究所收集到的資料將做隱私的保密,你的名字將不會出現於公開場合或被引用。但會以符號做標示,所有參與本研究之個案資料將上鎖於資料櫃中,參加者的姓名、所有的談論及研究所填寫的內容將不會出現於所有文章中,會被保密並以匿名呈現。所有個案姓名或隱私將不會呈現在私人或公開場合。

### **同意書及問題**

本研究經由 Griffith 大學論理委員會審核,假如你對本研究有任何問題陳淑銘研究員很樂意為你回答,假如在之後有任何問題你也可以打電話 08-7368686 (台灣),假如你對你的權利有疑問可找糖尿病衛教護理師徐慧君,徐慧君護理師將會聯絡 Gary Allen, HREC Griffith University(格里菲斯大學倫理研究委員會)。論理委員會辦公室 07-3875 5585 或 e-mail [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au)

**Griffith 大學謝謝你的參與**



## APPENDIX 4

### Consent form: English and Chinese version

#### *Consent form: English version*

(Griffith University Letterhead)

**Title: The effects of a motivational interview intervention on people with Type II diabetes –A randomized controlled trial**

#### **Investigators:**

Ms. Marine Chen, of the School of Nursing at Griffith University, Queensland (ph 07-555 29191),

Professor Debra Creedy, Griffith University, Queensland (ph 07 555 29229) and

Dr. Judy Wollin, Griffith University, Queensland (ph 07 338 21345).

I \_\_\_\_\_ agree to participate in the study. I have read and understood the information sheet, which explains the nature and object and the possible risks of the investigation. The information has been explained to me to my satisfaction. I have been given a copy of the information sheet to keep and will be given a copy of the signed consent form. I understand that I may withdraw my agreement to participate in the study at any time without penalty. I understand that research data gathered from the results of the study may be published provided my name or any identifying data is not used. Before signing this document I have been given the opportunity to ask questions relating to any possible uncomfortable responding might suffer as a result of my participation and I have received satisfactory answers. I have also been informed that I not receive any benefits from participating in this study. If I have any complaints about the conduct of the research or wish to raise any concerns. I understand that I may contact Hui-Chun Hsu, the manager of the Diabetes Clinic of participants have any concerns or issues with the research. Hui-Chun Hsu will then contact Gary Allen, HREC Griffith University, Office for Research, Bray Centre, Griffith University, Kessels Road, Nathan, QLD 4111, telephone: 07- 3875 6618.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed name

Telephone No. \_\_\_\_\_

**Consent for Review Medical Record**

I understand that researcher can have my authority to review of my medical records to obtain information about my medical history, HbA1c and blood glucose levels. I acknowledge that research get this information only for research purpose.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

## Consent form: Chinese version

### 參加者同意書

研究主題：第二型糖尿病患介入動機激勵會談對糖尿病自我管理之成效

研究人員：

主持人陳淑銘目前就讀於澳州格理菲斯大學博士班(電話:07 555 29191)

Debra Creedy 教授澳州格理菲斯大學 (電話:07 555 29229)

Judy Wollin 副教授澳州格理菲斯大學(電話:07 338 21345)

### 參加者的聲明：

我 \_\_\_\_\_ 同意參加此項研究計劃,我了解研究說明書上所陳述的研究可能的潛在危險,研究人員已完整的解釋說明書內容,我已收到說明書複印本並於同意書上簽名,我知道我可以隨時離開或表明不參加研究而不會受罰,我知道當研究發表時我的名字是會被保護而不會出現於公開場合在簽同意書前我有機會發問問題並了解研究中可能發生的狀況,研究者已詳細的為我解答並有時間讓我考慮。我也被告知本研究未有利益性的回饋,如果我仍有疑問時我可以與下述聯絡人詢問或可打電話到 07-38756618, 如果我有研究上的不舒服可打此電話,找糖尿病衛教護理師徐慧君,徐慧君護理師將會聯絡 Gary Allen, HREC Griffith University(格里菲斯大學倫理研究委員會)。

簽名 \_\_\_\_\_ 日期 \_\_\_\_\_ 電話: \_\_\_\_\_

### 研究者病歷查閱同意書

我同意研究者為研究之所需查閱我的病歷資料,例如糖化血色素及血糖值,我知道研究者將此資料只為此研究所用不會用於其他。

簽名 \_\_\_\_\_ 日期 \_\_\_\_\_

## **APPENDIX 5**

### **Research IRB approval**



PINGTUNG CHRISTIAN HOSPITAL

財團法人屏東基督教醫院

60 Ta-Lian Road, Pingtung, Taiwan, 900 R.O.C.  
屏東市大連路60號

Tel: 886-8-7368686  
886-8-7374339  
Fax: 886-8-7378620

**Pingtung Christian Hospital Institutional Review Board (IRB)**

屏東基督教醫院人體試驗委員會

Pingtung Christian Hospital  
No. 60 Ta-Lian Rd Pingtung 900, Taiwan  
Tel: 886-2-7368686-2712  
E-mail: mr001@ptch.org.tw

900 屏東市大連路 60 號  
屏東基督教醫院 醫學研究部  
Tel: 886-2-7368686-2712  
E-mail: mr001@ptch.org.tw

**同意臨床試驗證明書**

送由 Griffith University 博士班學生陳淑銘等主持之「第二型糖尿病患介入動機激勵會談對糖尿病自我管理之成效」已於 2006 年 1 月 1 日人體試驗委員會審查通過，本委員會執行皆遵行 ICH-GCP 規範，特此證明。

人體試驗委員會主任委員

2006 年 1 月 5 日

Jan. 5, 2006

**Whom It May Concern:**

The following documents have been submitted for review.

**Protocol Title:** The effects of a motivational interview in people with type II diabetes – a randomized controlled trial.

**Protocol Number:** 2006-01-01

**Protocol Version Date:** 2005-12-20

**Informed Consent Form:** 2005-12-09

**Principle Investigators:** Shu-Ming Chen

**IRB No.: 2005-12-08**

Above study is approved by the Institutional Review Board on Dec.29,2005 and valid till Nov.1,2006. The institution and operation of this review board are according to the guidelines of ICH-GCP. According to ICH-GCP, IRB have to review each clinical research case annually and decide whether continue it or not. Therefore. Please send (IRB) your Midterm Report one month before the expiry date.

Your sincerely,

Yau-Jiunn Lee

Chairman

Pingtung Christian Hospital Institutional Review Board  
Taiwan, R.O.C