

Progressive Self-Curing: A Grounded Theory Study of Exercise Behavior Maintenance  
in Older Adults with Type 2 Diabetes

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## **Dedication**

This dissertation is dedicated to Michael McMullin  
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## Chapter 1

### Introduction

Changes in patterns of disease, life expectancy, and lifestyle are having a profound effect on the nation's health (National Center for Health Statistics [NCHS], 2009). There has been a shift from acute to chronic disease (Kinsella & Wan, 2009). And, life expectancy has been lengthening while lifestyles have become increasingly reliant on technology.

#### **Illness trends in United States: Acute vs. chronic.**

In the last 100 years there has been a shift in cause of death from acute, infectious disease to chronic disease (Kinsella & Wan, 2009). The ten leading causes of death in 1900 in the United States were pneumonia and influenza, tuberculosis, diarrhea and enteritis, diseases of the heart, strokes, nephritis, accidents, cancer, senility, diphtheria (National Office of Vital Statistics, 1947). This contrasts with the ten leading causes of death in the United States in 2006 which were heart disease, cancer, stroke, chronic lower respiratory disease, accidents, diabetes, Alzheimer's disease, influenza and pneumonia, renal diseases and septicemia (Centers for Disease Control and Prevention [CDC], 2009). This shift in cause of death is at least in part due to effective prevention through immunization, improvements in sanitation and living conditions (World Health Organization [WHO], 1996). Furthermore, effective treatment with antibiotics has allowed people to survive acute, infectious diseases throughout the lifespan (WHO, 1996).

## **Changes in life expectancy.**

### ***Historical worldwide epidemiological shifts.***

Worldwide changes in life expectancy are explained by the theory of epidemiologic transition (Salomon & Murray, 2002). This theory explains changes in population growth based on changes in fertility and mortality. As societies experience modernization, there is a shift from high mortality and high fertility to low mortality and fertility (Kirk, 1996). As fertility and mortality decline the population shifts toward the later years (Murray & Chen, 1992). The theory currently describes four eras. The first era, “the age of pestilence and famine” is marked by high mortality rates and life expectancy is 20-40 years (Omran, 1971, 1977). During the second era, “the age of receding pandemics”, mortality declines and life expectancy rises to 50 years (Omran, 1971, 1977). Mortality stabilizes during the third era, “the era of degenerative and man-made diseases,” when chronic disease is the major cause of death (Omran, 1971, 1977). Olshansky and Ault (1986) added a fourth era, “the age of delayed degenerative death”. The addition of this era was based on unexpected rapid declines in chronic disease mortality in the United States starting in the 1970’s. Cause of death by age has remained stable but mortality from degenerative disease has shifted toward older ages with a rapidly declining death rate (Olshansky & Ault, 1986).

### ***United States demographical shifts.***

Theoretically, then, the United States is in the 4<sup>th</sup> era of demographic shift. This era is characterized by the emergence of chronic disease and declining death rates. This combination means that more individuals are living longer with chronic disease (Olshansky & Ault, 1986).

In 1900, the United States life expectancy for all races and both sexes was 47.3 years; while in 2005, it rose to 77.8 years (NCHS, 2009). Life expectancy is expected to increase to 82.6 years in 2050 (U.S. Census Bureau, 2008). The median age of the United States population in 1994 was 34 years; this will peak in 2035 at 39.1 years (U.S. Census Bureau, 2008). This change in peak age is being driven by aging Baby Boomers (individuals born between 1946 and 1964) (U.S. Census Bureau, 2008). In 2006, there were an estimated 37 million people age 65 and older in the United States (12% of the population) (Federal Interagency Forum on Aging-Related Statistics, 2008). This number will grow to 71.5 million (20% of the population) by 2030. The fastest growing segment of the population is aged 85 and older. This age group grew from just over 100,000 individuals in 1900 to 5.3 million in 2006 (Federal Interagency Forum on Aging-Related Statistics, 2008).

#### **Aging and chronic disease.**

Aging is associated with an increasing incidence of chronic illness (NCHS, 2009; Fillenbaum, Pieper, Cohen, Cornoni-Huntley & Guralnik, 2000). At least 80% of older Americans are living with at least one chronic condition and 50% have at least two conditions (Centers for Disease Control and Prevention and The Merck Company Foundation, 2007). Ninety-five percent of health care expenditures among older Americans are for chronic disease treatment (Centers for Disease Control and Prevention and The Merck Company Foundation, 2007). Medicare spending has increased from \$37 billion in 1980 to \$336 billion in 2005 (Centers for Disease Control and Prevention and The Merck Company Foundation, 2007).

Furthermore, chronic illness is associated with increased risk of functional disability. In 2005, 42% of people aged 65 and older reported difficulty performing at least one activity of daily living (Federal Interagency Forum on Aging Related Statistics, 2008). Functional decline has implications for work and retirement, health care needs and the social well-being of older adults (White, Wojcicki & McAuley, 2009; Federal Interagency Forum on Aging Related Statistics, 2008). Limitations in activities of daily living lead to decreased quality of life. The percentage of older adults who report very good or excellent health declines with age (Centers for Disease Control and Prevention and The Merck Company Foundation, 2007).

### **Emergence of type 2 diabetes.**

Type 2 diabetes is one of the chronic diseases that has emerged as a major cause of death and disability over the last century. Type 2 diabetes is a metabolic disorder characterized by an elevated blood glucose level that can result in chronic complications of the eyes, kidneys, peripheral nervous system and cardiovascular system (Lebovitz, 2004). Diabetes is the leading cause of kidney failure, blindness and non-traumatic amputation (CDC, 2008).

Diabetes was the 6<sup>th</sup> leading cause of death in the United States in 2006 (Heron, et al., 2009). The number of adults with type 2 diabetes is escalating rapidly. Worldwide prevalence is predicted to double by the year 2030 (Wild, Roglic, Green, Sicree & King, 2004). The United States is not immune from this epidemic and along with China and India will experience the highest prevalence (Wild, et al., 2004). An estimated 30.3 million Americans will be diagnosed with diabetes by 2030 (Wild, et al., 2004).

While type 2 diabetes is beginning to be diagnosed in younger adults and even children, the majority of type 2 diabetes is still diagnosed in the fifth or sixth decade of life (American Diabetes Association [ADA], 2009). Approximately 23% of individuals older than 60 years have diabetes compared to close to 11% of all adults over the age of 20 (ADA, 2009). As the population ages, the impact of diabetes will intensify. The largest increases in diabetes are expected among adults aged 75 years or greater, from 2 million in 2000 to 8.6 million individuals in 2050 (CDC, 2003).

### **Modern cultural shifts affecting lifestyle.**

#### ***Changes in physical activity.***

In addition to increasing longevity, there have been tremendous cultural shifts accounting for the increase in the numbers of sedentary and obese individuals (Walker, Walker & Adam, 2003). The changes in physical activity through the ages have been enormous. High levels of physical activity were the norm until the 1800s. All the labor required for daily survival and transportation were done by humans and animals. Walking was particularly common—Abe Lincoln, for example, would walk 30 miles to obtain a book he wanted (Walker, et al., 2003). In the last two to three generations, more machines have been invented to carry us about and do our work. Many of us use computers and even robots to do tasks for us while we become increasingly sedentary (Paffenbarger, Blair & Lee, 2001). Now more than 60% of American adults are not regularly active and 25% are not active at all (U.S. Department of Health and Human Services [USDHHS], 2008).

*Health consequences of low physical activity.*

Lack of physical activity has been linked with four of the top seven causes of death in the United States—heart disease, cerebrovascular disease, lung diseases, and diabetes mellitus (NCHS, 2009). Poor diet and lack of physical activity are the leading “actual” causes of death only after cigarette smoking (Mokdad, Marks & Stroup, 2000). Low physical activity (less than one mile per day of walking) contributes to 23% of all deaths from chronic diseases (Walker, et al., 2003). Low activity levels also contribute to obesity which is recognized as an independent risk factor for type 2 diabetes as it directly affects insulin sensitivity (Imbeault, 2007; Levine, 2007). This shift in physical activity has contributed to the increased prevalence of type 2 diabetes since the mid-1970’s (CDC, 2008; Imbeault, 2007).

*Technological advances.*

The United States is in the heart of the technology age (Gane, 2006). Technological advances have eased the work of daily life (Paffenbarger, et al., 2001). Instead of walking and doing chores by hand, use of cars, clothes washers, dishwashers and elevators contributes to Americans expending an average of 111 calories per day fewer today than in 1920 (Heslin, 2007). (This translates to the potential for an individual to gain 11 pounds over a year’s time. [Heslin, 2007]) At the heart of the technology age are extreme processes of social and cultural acceleration (Gane, 2006). The high-end technologies and effective treatments and cures of modern medicine have led to an expectation of a “quick fix” when facing illness (Booth & Chakravarthy, 2006; Imbeault, 2007). The expectations of speedy treatment and instant gratification so

prevalent in modern society today are unrealistic for life-long health (Booth & Chakravarthy, 2006).

### **Type 2 diabetes.**

The prevalence of type 2 diabetes is reaching epidemic proportions. An epidemic is defined as “spreading rapidly among many people in a community, as a disease” (Agnes, 2003). From 1980 through 2006, the number of Americans with type 2 diabetes tripled (from 5.6 million to 16.8 million) (CDC, 2008). Type 2 diabetes is a complex metabolic disease characterized by three major abnormalities: resistance to the action of insulin, defective insulin secretion from the pancreas and increased production of sugar by the liver. For type 2 diabetes, sedentary lifestyles and overeating leading to weight gain are among the common factors that lead to the inability of the pancreas to provide enough insulin to overcome the insulin resistance (Buse, Polonsky & Burant, 2008). The inability of the pancreas to provide enough insulin results in rising blood sugar levels. Abnormal blood sugar levels lead to diagnosis of type 2 diabetes (Buse, et al., 2008). Type 2 diabetes differs from type 1 diabetes which has not been increasing in prevalence (ADA, 2009). In contrast to type 2 diabetes, the major defect in type 1 diabetes is autoimmune destruction of the insulin producing cells in the pancreas creating an absolute lack of insulin (Lebovitz, 2004).

### ***Type 2 diabetes treatment.***

Once a diagnosis of type 2 diabetes is made, recommended treatment always includes lifestyle modifications and may include medications (ADA, 2009). Medications typically prescribed at diagnosis include oral medications to improve insulin sensitivity, for example, metformin or pioglitazone. Another oral medication option is a group of

medications called sulfonylureas. Sulfonylureas stimulate the pancreas to make more insulin. If the blood glucose is elevated to greater 300 mg/dl at diagnosis insulin injections may be recommended (ADA, 2009). Although medications are effective at lowering blood glucose, the cornerstones of therapy are lifestyle modifications including exercise and diet changes (ADA, 2009). These changes are often effective enough to allow avoidance and/or postponement of the need for medications (Buse, et al., 2008).

The American Diabetes Association (2009) recommends that individuals with type 2 diabetes receive individualized diet guidelines. Either low-carbohydrate or low-fat calorie-restricted diets that result in modest weight loss are acceptable (ADA, 2009). Modest weight loss has been shown to reduce insulin resistance, one of the major metabolic derangements in type 2 diabetes (ADA, 2009). Together lifestyle modification of diet and exercise improve the metabolic profile for people with type 2 diabetes (ADA, 2009).

Although the benefits of a calorie-restricted, weight loss diet may be delayed, the benefits in glucose control from exercise are apparent almost immediately (Buse, et al., 2008). However, maximal effect is not reached until several weeks of consistent exercise have been carried out. Furthermore, the positive effects of exercise persist for only a few days after cessation of activity (Buse, et al., 2008). This situation leads to the recommendation that people with type 2 diabetes exercise a minimum of three sessions weekly at moderate intensity (Buse, et al., 2008).

### **Clash of culture and diabetes treatment recommendations.**

Diet and exercise modifications are the cornerstones of diabetes treatment. Yet lifestyle modifications are counter-intuitive to our modern culture. Modern societies

have become progressively sedentary and technology has led to an expectation of accelerated results (Walker, et al., 2003; Gane, 2006). This expectation is in contrast to the results of clinical trials that have shown that engaging in an active lifestyle is highly effective treatment but results are obtained only after several years (Booth & Chakravarthy, 2006). Furthermore, the expectation of accelerated results is in contrast to our increasingly sedentary lifestyles. The knowledge that lifestyle changes could be highly rewarding is not translated to change in the cultural expectations. People in the United States are reluctant to change their increasingly enjoyable lifestyles (Walker, et al., 2003). Thus, it is difficult to change behaviors and reduce the incidence of type 2 diabetes because the changes are not always immediate and take persistence.

#### **Lifestyle and health behavior.**

An individual's lifestyle is a complex, consistent and unique bundle of behaviors. Lifestyle behaviors are a mixture of habits, conventions and reasoned actions that reflect a person's strategy on reaching their life's goals (Christopher & Bickhard, 1992; Lewis & Watts, 2004). They are consistent with an individual's attitudes, values and worldview (Christopher & Bickhard, 1992). A subset of lifestyle behaviors affects our health.

Health behavior can be defined as:

those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions, and habits that relate to health maintenance, to health restoration, and to health improvement. (Gochman, 1982, p.172)

All of our behaviors, then, taken together identify our lifestyle. Health behaviors affect our health and even our mortality. Three health behaviors—smoking, poor diet and physical inactivity—were the root causes of almost 35% of United States deaths in 2000 (Centers for Disease Control and Prevention and The Merck Company Foundation, 2007). Of these three health behaviors, exercise will be the emphasis here due to its importance as an effective countermeasure to the deleterious effects of inactivity, its effect on increasing insulin sensitivity and its ability to quickly improve blood glucose levels in type 2 diabetes.

### **Exercise in the general population.**

Recognizing the essential nature of physical activity, Michael Leavitt, then United States Secretary of Health and Human Services, issued the first ever federal-government physical activity guidelines in September, 2008 (USDHHS, 2008). Outlined in the report are major research findings on the health benefits of physical activity. These benefits include: (1) Reduced risk of many adverse health outcomes; (2) Some physical activity is better than none; (3) Additional benefits occur as the amount of physical activity increased through higher intensity, greater frequency and/or longer duration; (4) Most health benefits occur with at least 150 minutes a week of moderate intensity physical activity; (5) Both aerobic and strengthening activities are beneficial; (6) Health benefits occur for all ages, races and ethnic groups and for individuals with disabilities; and (7) The benefits of regular exercise far outweigh the possibility of adverse outcomes (USDHHS, 2008).

The key physical activity guideline for adults is to avoid inactivity. For additional health benefits adults should increase their weekly aerobic activity to 300 minutes of

moderate intensity or 150 minutes of vigorous intensity. Additionally, adults should do muscle-strengthening exercises that involve all major muscle groups twice weekly (USDHHS, 2008).

In the 2007 Behavioral Risk Factor Surveillance System (BRFSS), a national telephone survey conducted by the Centers for Disease Control and Prevention, 49% of individuals surveyed met the recommended activity levels of 150 minutes of moderate intensity or 75 minutes of vigorous activity weekly. Thirty-eight percent reported more than 10 minutes per week but less than the recommended level; 13.5% reported less than 10 minutes average per week. Twenty-four percent reported no physical activity in the last one month (CDC, 2008).

#### **Exercise in older adults.**

Exercise recommendations for older adults do not differ from those outlined for all adults. However, for adults over the age of 65, additional guidelines include exercises to maintain balance if they are at risk of falls. Older adults should also understand how chronic illness may affect their activity level but be encouraged to continue to be as active as possible (USDHHS, 2008).

The percentage of older adults engaging in regular physical activity declines with age. Twenty six percent of people aged 65-74 years engage in light to moderate leisure time activity for greater than or equal to 30 minutes at least five times per week or vigorous activity greater than or equal to 20 minutes at least three times per week. Over age 85, 10 % of individuals participate in leisure time activity at that intensity (Federal Interagency Forum on Aging Related Statistics, 2008). Only 13% of older people engage in strengthening exercises (Federal Interagency Forum on Aging Related

Statistics, 2008). Strengthening exercises improve balance, decrease falls and improve overall function (Fahlman, Topp, McNevin, Morgan & Boardley, 2007; Federal Interagency Forum on Aging Related Statistics, 2008; Liu & Latham, 2009).

Exercise benefits older adults by reducing the risk of chronic disease; decreasing all-cause mortality; improving sleep patterns; improving control of arthritic pain; lowering the incidence of constipation, venous thrombosis, and edema; increasing socialization; decreasing the risk for dementia; relieving symptoms of depression; maintaining independent living; and enhancing overall quality of life (Duthie, Katz & Malone, 2007; Nadasen, 2008). Exercise may prevent the normally observed decline in physical fitness in aging adults (Buchner, Beresford, Larson, LaCroix & Wagner, 1992). Even among the very frail, functioning can be improved with regular physical activity (Chin, Paw, van Uffelen, Riphagen & van Mechelen, 2008; Federal Interagency Forum on Aging Related Statistics, 2008; Helbostad, Sletvold & Moe-Nilssen, 2004; Konopack, et al., 2008; Sato, Kaneda, WakaBayashi & Nomura, 2009).

Despite the multiple benefits of exercise, older adults are even more likely to remain sedentary than younger adults (Duthie, et al., 2007). Older adults may be less likely to exercise than younger adults due to health problems or pain (Schutzer & Graves, 2004). Arthritis accounts for the majority of exercise-limiting pain in community dwelling elders (Duthie, et al., 2007). Approximately 50% of older individuals have arthritis (Centers for Disease Control & Merck Company Foundation, 2007). Paradoxically, older adults with arthritis who exercise have improved function; arthritis is not worsened; and pain is relieved (Buchner, et al., 1992). In addition, social norms may play a role as many current elderly matured during a time when exercise was not valued

or deemed necessary (Schutzer & Graves, 2004). Furthermore, the common perception is that older adults should slow down and relax and that engagement in vigorous activity is inappropriate (Wagner, LaCroix, Buchner & Larson, 1992).

### **Exercise in type 2 diabetes.**

Similar to the general physical activity guidelines for adults, the American Diabetes Association (2009) recommends that people with diabetes perform at least 150 minutes per week of moderate-intensity aerobic physical activity (50-70% of maximum heart rate) as well as resistance training three times per week. Moderate-intensity aerobic physical activity is equivalent to walking at three miles per hour (USDHHS, 2008). Higher levels of exercise intensity are associated with greater improvements in blood glucose levels and in levels of fitness (ADA, 2009).

Despite the known benefits of exercise, relatively few adults with type 2 diabetes sustain an exercise program at the recommended frequency, intensity and duration (Bjornsen, et al, 2002; CDC, 2008a; Duthie, et al., 2007; Krug, Haire-Joshu and Heady, 1991; USDHHS, 1996). Therefore, strategies are needed to promote not only the maintenance of exercise in older adults with type 2 diabetes, but at an increased frequency and intensity as well (Duthie, et al., 2007).

### **Adoption versus maintenance of health behavior change.**

Although few older adults with diabetes are participating in exercise programs of the recommended frequency, intensity and duration (USDHHS, 2008), current health behavior change models focus on “adoption” of new health behaviors with little attention to “maintenance” (Rothman, 2000). Yet, in chronic diseases such as type 2 diabetes lifestyle modifications need to be maintained for a lifetime. Adults with diabetes who

sustain an exercise program experience fewer complications (U.K. Prospective Diabetes Study [UKPDS] Group, 1998) and improved quality of life (Glasgow, Ruggiero, Eakin, Dryfoos, and Chobanian, 1997). The burgeoning population of older adults with type 2 diabetes, the importance of sustaining an exercise program of adequate intensity and frequency to regulate blood sugar, and the gaps in our understanding of factors that lead to health behavior change maintenance call for urgent research in this area.

### **Statement of the Problem**

The prevalence of type 2 diabetes is rapidly increasing due to epidemiologic shifts, aging of the population and technological culture changes that have led to increasingly sedentary lifestyles. Exercise, the antidote to the multiple negative health outcomes of being sedentary, has been recommended for all Americans (USDHHS, 2008). Furthermore, it has been suggested to be the most important health behavior to adopt for individuals with type 2 diabetes (Buse, et al, 2008). Few individuals with type 2 diabetes exercise at the recommended intensity, frequency or duration, particularly as they age. Although current health behavior models focus on the “adoption” of health behavior, processes that are important to the “maintenance” of health behavior are poorly understood. Exploratory research is needed to advance our understanding of exercise behavior maintenance in older adults with type 2 diabetes.

### **Research Design**

The central purpose of exploratory design is “to develop valid definitions of a concept, describe a process, or yield beginning theories that explain the phenomenon under study” (Brink & Wood, 1998, p.15). Exploratory research may be accomplished with different types of study designs depending on the desired outcome (Brink & Wood,

1998). Brink and Wood (1998) describe three levels of research design: experimental, survey and exploratory-descriptive. This taxonomy is based on the “principle of control,” or “the degree to which the investigator is able to prevent any untoward variance among the variables under study” (Brink & Wood, 1998, p.10). The amount of control is in turn determined by the current knowledge on the topic (Brink & Wood, 1998).

The level of knowledge is highest in experimental design and lowest in exploratory-descriptive designs. Randomized trials, for example, are useful when an intervention is to be tested for efficacy or effectiveness and a lot is known about the variables to be tested and the variable are amenable to control (Brink & Wood, 1998). Because less is known about sustaining exercise behavior change in diabetes, this study calls for an exploratory design. Grounded theory, an exploratory method, will be used to study exercise behavior maintenance.

**Grounded theory.**

*Historical development.*

Grounded theory was first described by Glaser and Strauss in 1967. Since their initial collaborative effort, Glaser and Strauss have followed divergent paths in further developing the grounded theory method (Duchscher & Morgan, 2004). Glaser has been described as “unrelenting in his allegiance to revealing the truth as it is experienced by the research participants” (Duchscher & Morgan, 2004, p. 612). Glaser’s steadfastness to the principles of grounded theory as first described (1967) has led to his method being labeled “classical grounded theory” (Duchscher & Morgan, 2004; Stern, 1994). In contrast, it is suggested that Strauss’s variation on grounded theory be referred to as

“constructivist grounded theory” (Simmons, 1994) or “conceptual description” (Stern, 1994).

Although Glaser and Strauss continue to agree on the purpose of grounded theory, their description of the method is based on distinctly different philosophical underpinnings (Duchscher & Morgan, 2004). The purpose of grounded theory is “the discovery of enduring theory that is faithful to the reality of the research area; makes sense to the persons studied; fits the template of the social situation, regardless of varying contexts related to the studied phenomenon; adequately provides for relationships amongst concepts; and may be used to guide action (Duchscher & Morgan, 2004).

Philosophical divergence between Glaser and Strauss is indisputable (McGhee, Marland & Atkinson, 2007; McCallin, 2006; Duchscher & Morgan, 2004; Simmons, 1994). The exact nature of the argument has been framed most commonly from an epistemological perspective, for example, constructivism vs. objectivism (Charmaz, 2006; Simmons, 1994) and less frequently as positivist vs. post-positivist (McGhee, et al., 2007). While there is argument about how the divergence in methods should be characterized, there are also inconsistencies in the interpretation; for example, just how strongly constructivist is Glaser or Strauss? (Charmaz, 2006; Simmons, 1994). Stern (1994), a self-proclaimed “strict Glaserian”, summarizes the differences:

In Glaser and Strauss we have two brilliant men who both do important work. But they go about it in different ways. The crux of the dichotomy is, I think, that Strauss, as he examines the data, stops at every word to ask, ‘What if?’ Glaser keeps his attention focused on the data and asks, ‘What do we have here?’ Strauss brings to bear every possible contingency that *could* relate to the data,

whether it appears in the data or not. Glaser focuses his attention *on* the data to allow the data to tell their own story (p. 221).

Straussian grounded theory methods are complex, convoluted and abstract making them difficult for novice researchers (Duchscher & Morgan, 2004). Argument could be made that Strauss drifted far enough away from the original descriptions of grounded theory that is he has described a different method entirely (Duchscher & Morgan, 2004; Glaser, 1992; Stern, 1994). In contrast, Glaser describes relatively simple methods (1978). Glaser's uncompromising contention that theory will emerge from the data if the researcher remains open and patient appeals to this researcher's personal philosophy of embracing personal stories and patient-centered approaches. Therefore, Glaser's classical grounded theory was chosen for the current study.

#### ***Classical grounded theory.***

In the present study, grounded theory was used to generate a substantive theory in the area of exercise behavior in older adults with type 2 diabetes. Grounded theory has been used in nursing research since 1970 in a wide range of studies relevant to nurses (Backman & Kyngas, 1999). Grounded theory studies conducted by nurses include capturing the patient and family experiences in acute and chronic illness (Chen & Boore, 2009; Duggleby, 2000; Fenwick, Barclay & Schmied, 2008; Levy, 1999; Mallinson, et al., 2005; Noone, 2004; Walton, 2007) and studying professional practice and nurses' health (Andrews & Waterman, 2005; Drury, Francis & Chapman, 2008; Mills, Francis & Bonner, 2008; Wiitavaara & Barnekow-Bergkvist & Brulin, 2007).

Grounded theory generates middle range theories (Glaser, 1978). In contrast to all-embracing grand theories which describe the "whole of nursing" (Liehr & Smith,

1999, p.88), middle range theories are focused on a limited aspect of reality and include a limited number of variables (Jacox, 1974). Exacting definitions are lacking, but in general practical theory, middle-range theory and grand theory are distinguished one from another by the level of conceptual abstraction (Liehr and Smith, 1999). Liehr and Smith (1999) synthesized definitions of middle range theories in nursing literature and found them described as “testable and intermediate in scope, adequate in empirical foundations, neither too broad nor too narrow, circumscribed and substantively specific and more circumscribed than grand theory but not as concrete as practice theory” (p. 82). Both substantive and formal theories are terminology for middle range theories generated through grounded theory methodology (Glaser, 1978).

In grounded theory, substantive theory focuses on an empirical area of inquiry such as patient care, race relations, and geriatric lifestyles. Still within the scope of middle range theories, formal grounded theory expands a substantive theory by applying it to other empirical areas. An example of this application of middle-range theory building is applying the substantive theory “cultivating relationships” originally discovered through observing interactions between door-to-door milk delivery men and housewives (Simmons, 1993) to interactions between doctors and their clients (Glaser, 1978). A second way to develop a formal grounded theory is to conduct inquiry at the conceptual level; for example, status passes, stigma, socialization (Glaser, 1978).

If the goal is to explain antecedents, consequences, process or other possible relationships between aspects of a problem, grounded theory is appropriate (Glaser, 1978; Brink & Wood, 1998). Grounded theory methodology is designed to enhance our understanding of what is actually happening in an area of interest of which there is

limited scientific literature (Glaser & Strauss, 1967). Thus, the method is well-suited to the present study. Our understanding of health behavior maintenance is limited.

*Stages of classical grounded theory.*

Classical grounded theory has six stages: (1) preparation, (2) data collection, (3) data analysis, (4) memoing, (5) sorting and theoretical outline, (6) writing (Simmons, 2009). In stage 1, preparation, a general research topic is chosen but no hypotheses are generated. Preconceptions are minimized and there is no preliminary literature review (Simmons, 2009).

Data collection begins in stage 2. Data are usually collected through non-structured and open-ended interviews. It is recommended that the interviews be conducted without an interview guide and begin with a “grand tour” (Simmons, 1994, p.27) question; for example, “Please tell me about . . . (fill in general topic area)”. Subsequent questions are formulated based on the respondent’s reply to previous questions. At some point, a theory begins to emerge and questioning becomes more specific. However, interviews generally remain open-ended and continue to result in high conceptual yield to assure that the respondent is being invited to discuss what is important to them and not what might be perceived as important to the researcher (Simmons, 1994).

Data analysis (stage 3) actually overlaps with stage 2 because analysis begins as soon as data are available. Iterative and ongoing data analysis guides the direction of further inquiry. Theoretical sampling is the process by which ongoing data analysis informs data collection. In stage 3 data are analyzed using constant comparative method. Analysis begins when the first data are collected and continues as all incoming data are

constantly compared to previously collected data. Initially data are compared to ideas and then ideas to other ideas (Simmons, 2009).

Memoing (stage 4)—a process in which notes are written about ideas and about the relationship between ideas (Simmons, 2009)—is the “bedrock” activity of grounded theory and is a constant process that begins when first coding data and continues through the write-up stage. Memos “continually capture the ‘frontier of the analyst’s thinking’ as he goes through either the data, codes, sorts or writes” (Glaser, 1978, p.83).

During stage 5, sorting and theoretical outlining, ideas lead to emergence of concepts. Sorting leads to showing the relationships between the concepts and begins to outline the theory.

Finally, in stage 6, writing captures the theory onto paper in an organized manuscript. Although these stages have been described sequentially, stages 2, 3, and 4 are conducted simultaneously in multiple iterations (Simmons, 2009).

### ***Middle range theory.***

Grounded theory leads to development of middle range theory which focuses on a substantive but limited area of inquiry (Jacox, 1974). The generation of middle range theory in regard to exercise behavior maintenance is consistent with the current context of nursing; that is, to “focus on the human developmental potential of health and healing and support a knowledge base that synthesizes art and science; practice and research” (Liehr & Smith, 1999, p. 81).

There exists a limited number of commonly used and studied middle range theories or models of health behavior change; for example, the health belief model, the theory of planned behavior and the transtheoretical model and stages of change (Glanz,

Rimer & Lewis, 2002). These models address health behavior change in general but not behavior change that is specific to exercise (Glanz, et al., 2002). Furthermore, these models are most highly developed to predict adoption of new behavior rather than maintenance of behavior (Rothman, 2000).

Literature on exercise behavior maintenance is particularly scant (Nigg, Borrelli, Maddock & Dishman, 2008). Since health behavior maintenance is underdeveloped in our current health behavior models (Rothman, 2000) and models or theories to explain exercise maintenance are nearly non-existent, grounded theory methodology is appropriate to study exercise behavior maintenance in older adults with type 2 diabetes.

## **Background**

The prevalence of type 2 diabetes is rising at an alarming rate (ADA, 2009) and exercise has been shown to be integral to prevention (Diabetes Prevention Program Research Group, 2002) and treatment of the disease (Snowling & Hopkins, 2006). Yet relatively few individuals at risk for or diagnosed with diabetes exercise at all and those who do exercise are not able to sustain an exercise program at the recommended frequency and intensity (Bjornsen, et al., 2002; CDC, 2008; Duthie, et al., 2007; Krug, et al., 1991; USDHHS, 1996). Additionally, regular exercise may be even less likely in older adults than their younger counterparts (Duthie, et al. 2007). Understanding the processes that underlie maintaining an exercise program in older persons with type 2 diabetes could lead to interventions that could in turn lead to increased activity levels in this population. Adopting an active lifestyle could lead to improved quality of life (Glasgow, et al. 1997) and a decreased rate of complications (Snowling & Hopkins, 2006).

The processes underlying adoption of a new health behavior such as exercise are better understood than those processes underlying maintenance of that behavior over time (Rothman, 2000). Current models of health behavior focus on factors that determine whether a person adopts a new behavior such as exercise. The dominant theories of health behavior change make little distinction between the factors that affect the initiation and the maintenance of behavior change (Rothman, 2000). Although there are several well-studied models in the health behavior change literature including the health belief model, the theory of reasoned action, the theory of planned behavior, the transtheoretical model and the precaution adoption process model, only two include a maintenance phase (Glanz, et al., 2002). These two models, the transtheoretical model and the precaution adoption process model include a maintenance phase; however, the maintenance phases are poorly developed (Glanz, et al., 2002). Descriptions of the maintenance phases rely on individuals continuing strategies from earlier stages of the models and on passage of time. The notion that the same set of skills needed to initiate health behavior change operates to maintain that behavior poorly explains the frequent failure of persons to maintain behavior change (Rothman, 2000).

In a literature review conducted on exercise behavior maintenance in people with type 2 diabetes, studies which tested full models of health behavior change or that clearly identified phases of exercise behavior adaptation vs. maintenance were clearly lacking. In general, current models of health behavior change lack explanatory power for health behavior maintenance. Studies specific to exercise maintenance in people with type 2 diabetes are nearly nonexistent. This situation calls for a new approach so that we may

increase our understanding of the important behavioral processes that underlie the success in people with type 2 diabetes who are able to sustain an exercise program.

### **Purpose**

The long-range goal of this research is to improve the health outcomes and quality of life for persons living with diabetes. The primary objective in this study is to advance the understanding of how persons with type 2 diabetes maintain an exercise program. Understanding the processes underlying persistent exercise behavior may lead to effective interventions that assist persons in exercise behavior maintenance. Maintaining a regular exercise routine could lead to decreased complications and improved quality of life. Although current models of health behavior change emphasize initiation of behavior, a model for explaining health behavior maintenance is lacking and a grounded theory approach to understanding exercise maintenance will prove very useful.

### **Aims**

Using grounded theory methodology, the aims of this study were to:

Aim #1: Identify the common sociological and psychological processes used by older adults with type 2 diabetes who maintain an exercise program.

Aim #2: Develop a substantive theory of exercise behavior maintenance in older adults with type 2 diabetes.

### **Conclusion**

The inability to effectively maintain positive health behaviors is a major contributing cause of many health problems. Our understanding of the processes that contribute to sustained health behavior change are limited (Rothman, 2000). Studies that contribute toward understanding these processes will assist in building a comprehensive

theory of health behavior maintenance. This study aims to use a grounded theory design to discover the processes that affect the maintenance of exercise in older adults with type 2 diabetes, with the ultimate goal of developing a substantive theory of exercise behavior maintenance in older adults with type 2 diabetes.

## **Chapter 2: Literature Review**

### **Introduction**

The qualitative methodology of grounded theory will be used in this study to answer the specific aims around exercise maintenance in older adults with type 2 diabetes. There are some distinct differences in the conduct of a literature review in several of the qualitative methods as compared to those prior to quantitative studies

The purpose of a literature review generally is to highlight the accumulated knowledge about the research topic (Garrard, 2007). In a quantitative study, the review is completed prior to the study as there is an ‘a priori’ approach (Garrard, 2007). In a qualitative study, the review can be done as a ‘focused review’ for certain purposes of framing the problem (McCallin, 2006) and justifying the study (McGhee, et al., 2007). An alternate approach is to complete the literature review after the qualitative study so as not to confound the researcher’s thinking (Glaser, 1978). In the current study, a combination of preliminary and post-analysis literature reviews were conducted.

The preliminary literature review includes background information on type 2 diabetes, exercise, and common health behavior change models as well as a summary of the observational literature on predictors of exercise in older adults with type 2 diabetes. The chapter will conclude with the post-analysis literature review.

### **Literature Review in Grounded Theory**

There is considerable debate in the research community about the place of the literature review in grounded theory (McGhee, et al, 2007). In fact, even the founders of grounded theory, Glaser and Strauss (1967), have developed contrary opinions regarding the literature review (McGhee, et al., 2007).

**Preliminary literature review.**

One approach is to complete a preliminary literature review. The initial review is felt to be important because it enables the researcher to frame the problem in the introduction of the study (McCallin, 2006). Preliminary review of the literature also enables the reader “to identify the researcher’s perspectives as the study begins and provides justification for launching the ground theory study” (McGhee, et al., 2007, p. 336). In summarizing Strauss, McGhee et al. (2007) state that the preliminary literature review is advocated for several reasons: “(1) It stimulates theoretical sensitivity; (2) It provides a secondary source of data; (3) It stimulates questions; (4) It directs theoretical sampling; and (5) It provides supplementary validity” (p. 336). McGhee et al. (2007) go on to state their arguments for a literature review before data collection are “(1) to provide justification for the study, (2) to meet the requirements of ethics boards, (3) to avoid conceptual and methodological pitfalls, (4) to discover the extent of previous knowledge and assess whether grounded theory is an appropriate method, (5) to be ‘open-minded’ but not ‘empty-headed’” (p. 336). At the very least, a preliminary review of the literature should be done to identify if the proposed study or something very similar has already been done (McCallin, 2006).

**Post analysis literature review.**

A second approach in grounded theory is for the literature review to be completed only after the data collection stage (Holliday, 2002; Simmons, 2009). The essence of grounded theory is inductive, beginning not with a hypothesis but with a research situation (McGhee, et al., 2007). This approach is meant to minimize entering the field for data collection with preconceived notions (Glaser, 1978; Simmons, 2009). When the

goal is to discover the main concern of the participants and how they resolve that concern, “energy need not be wasted on speculating about the problem” (McCallin, 2006, p.15). Speculations about the problem could be incorrect and time will be wasted in the “wrong” literature (Glaser, 1978). For example, Glaser (1978) relates the story of a researcher who set out to investigate risk taking in skyscraper window washers. After a considerable amount of “wasted” time, the investigator discovered that the window washers were not concerned so much about risk as they were about the best views. Consequently, time spent on the literature review on risk taking would have been more productive if the researcher had studied voyeurism (Glaser, 1978). Better yet, to have entered the field without any preconceived notions and done the literature review on voyeurism after the analysis (Glaser, 1978). Furthermore, entering the field with preconceived notions may lead the researcher to ignore data that do not fit (McGhee, et al., 2007). Arguments for post-analysis literature review include “(1) to be strictly in keeping with a post-positivist ontology, (2) to prevent the researcher being constrained, contaminated or inhibited, (3) to prevent recognized or unrecognized assumptions, (4) to prevent generating a focus from the literature rather than the data, (5) to promote ‘telling it as it is’ rather than ‘telling it as they see it’” (McGhee, et al., 2007, p. 336).

#### **Debate: Preliminary versus postponed review.**

Grounded theory method continues to evolve (Glaser, 1994; McGhee, et al., 2007). There is currently a trend toward a more constructivist view of grounded theory (Glaser, 1998; Charmaz, 2006). The debate between constructivist grounded theorists and post-positivist grounded theorists will continue to feed the debate about the location of the literature review (Simmons, 2009). Constructivists will come down on the side of

a preliminary review of the literature. Post-positivists will remain stalwart in the roots of classic grounded theory (Glaser & Strauss, 1967) and argue for post-analysis literature review.

Therefore, whether or not a preliminary literature review is completed will be influenced by the researchers' ontological perspective. In addition to purely ontological arguments, McCallin (2006) raises issues with the unrealistic expectations of a postponed literature review. After all, it is the information age and the expectation is that researchers will be up to date in their field (McCallin, 2006). All research starts with some focus; the focus develops further or may even move in an entirely different direction as participant data is added (McCallin, 2006). Further considerations in the decision for the location of the literature review might include the researcher's knowledge of the topic, research experience and external requirements, for example, ethics boards (McGhee, et al., 2007).

### **Approach to Literature Review for This Study**

A combination of preliminary and post analysis literature reviews were accomplished for this study. First, a focused literature review on the general topic of exercise behavior maintenance in older adults with type 2 diabetes was completed which assisted: (1) to explain theoretical underpinnings of the study, (2) in formulation of the research question and population, (3) in stimulating new insights, (4) to identify gaps in the literature, and (5) in providing justification for the study (McGhee, et al., 2008; Johnson & Christensen, 2008). Furthermore, the researcher has several years' experience as a nurse practitioner working with adults with type 2 diabetes. Thus, the preliminary literature review was guided by prior knowledge of diabetes and health behavior change.

Secondly, a post-analysis review of the literature was completed. The purpose of the post-analysis literature review is to “to frame, integrate and assess the literature, reveals gaps in the extant knowledge and state how your grounded theory answers them and position study and clarify its contribution” (Charmaz, 2006, p. 168). To accomplish this purpose, persistent literature searching for health behavior maintenance information was carried out. Also, as the current grounded theory began to emerge, the literature search was guided toward certain constructs. These constructs included monitoring (tracking), boredom, and social support/networks.

The fact that a preliminary literature review was completed and that the researcher has many years experience in caring for adults with type 2 diabetes could not be ignored. A strategy used by the researcher to reconcile that fact and to recognize the second approach was bracketing. Bracketing is a strategy commonly used in qualitative research to deal with the researcher’s pre-study biases about and knowledge of the area of the proposed research topic (Gearing, 2004). Bracketing has its roots in phenomenology. Bracketing refers to the “process of setting aside, suspending or holding in abeyance presuppositions surrounding a specific phenomenon” (Gearing, 2004, p. 1433) and will be discussed in further detail in chapter 3. Bracketing of personal perspectives and providing a full report of the preliminary literature review helps to minimize researcher bias in the data analysis (Gearing, 2004; Glaser, 1978).

This chapter, then, will proceed with a description of type 2 diabetes, exercise and health behavior maintenance concepts. Following these descriptions, a preliminary literature review on predictors of exercise in older adults with type 2 diabetes will be presented. The chapter will conclude with the post-analysis literature review.

## **Type 2 Diabetes Mellitus**

Type 2 diabetes is a disorder of impaired beta-cell function and decreased insulin sensitivity. These abnormalities of defective insulin secretion and insulin resistance result in hyperglycemia (Noble, 2001). There are important genetic predispositions but abdominal obesity, sedentary lifestyle and the loss of muscle mass common in aging all contribute to the development of type 2 diabetes (Noble, 2001). Type 2 diabetes is diagnosed when the fasting blood glucose exceeds 125 mg/dl (normal blood glucose range is 70-100 mg/dl). Large prospective clinical trials have demonstrated a strong relationship between blood glucose levels and the microvascular complications (retinopathy, neuropathy, and nephropathy) of both type 1 diabetes (Diabetes Control and Complications Trial Research Group, 1993) and type 2 diabetes (UK Prospective Diabetes Study [UKPDS] Group, 1998). There is a continuous though not linear relationship between level of blood sugar and the risk of development or progression of these complications with higher average blood glucose levels associated with higher risk of complications (Brownlee, et al., 2008).

Prior to these studies, the blood glucose criterion for diagnosis of diabetes was greater than 140 mg/dl. However, this criterion was lowered to 126 mg/dl based on the estimates for the threshold for the complications of diabetes (Buse, et al., 2008). In type 2 diabetes, macrovascular complications (heart attack and stroke) develop as a consequence of both hyperglycemia and insulin resistance (Brownlee, et al., 2008). Lifestyle interventions including comprehensive education, nutrition and exercise are the cornerstone of type 2 diabetes treatment (Buse, et al., 2008; Noble, 2001).

Type 2 diabetes has a distinctly different pathophysiologic derangement as compared to type 1 diabetes. In type 1 diabetes, there is complete auto-immune destruction of the beta cells in the pancreas. The beta cells of the pancreas are the source of endogenous insulin. With destruction of the insulin-secreting cells of the pancreas, persons with type 1 diabetes must receive exogenous insulin. Without exogenous insulin, marked hyperglycemia, ketoacidosis and death result (Eisenbarth, Polonsky & Buse, 2008). On the other hand, in type 2 diabetes, there are multiple defects including insulin resistance, excess production of glucose in the liver and insufficient amount of insulin from the pancreas (Buse, et al., 2008). Thus, although the two forms of diabetes require regulation of blood glucose levels, the causes of the disease and approaches to treatment are different.

Despite the distinct and different underlying pathophysiology of type 1 and type 2 diabetes, clinically, the distinction is not always clear (Buse, et al, 2008). Over the duration of the disease, many people with type 2 diabetes will require insulin therapy. However, changes in treatment approach do not change the underlying disease mechanism. This situation creates confusion for many people with diabetes and even some health care providers. Aside from treatment requirements, there are other clinical cues to the correct classification. These clinical cues include age of onset (type 1 diabetes occurs more frequently in youth; type 2 diabetes in adults), family history (type 2 diabetes has a stronger familial concurrence), presence of ketosis at time of diagnosis (type 1 diabetes), response to initial treatment (type 1 diabetes requiring insulin; type 2 diabetes responding to diet, exercise and/or oral medications), and obesity (associated with type 2 diabetes) (Buse, et al., 2008).

### **Current treatment of type 2 diabetes.**

Type 2 diabetes care is multifaceted including medications, medical nutrition therapy, diabetes self-management education, and physical activity (ADA, 2009). In addition to these therapies directed primarily at the diagnosis of type 2 diabetes, it is also recommended that individuals with diabetes receive psychosocial care, immunizations and care targeted at preventing and managing diabetes complications (ADA, 2009). Also, in 2009, the American Diabetes Association issued their first ever recommendation for surgical treatment. Bariatric surgery should be considered for adults with a body mass index greater than or equal to 35 kilograms/meter squared and a diagnosis of type 2 diabetes, especially if the diabetes is difficult to control with medication and lifestyle modification.

Diabetes treatment should be focused both on glycemic control and on co-morbid conditions. The largest contributor to morbidity, mortality and the cost of care to individuals with diabetes is cardiovascular disease (ADA, 2009). Seventy five percent of people with diabetes have elevated blood pressure or are on medications for hypertension (CDC, 2008a). A similar percentage of individuals with type 2 diabetes have blood lipid abnormalities (CDC, 2008a). Therefore, management of hypertension and lipid abnormalities, administration of anti-platelet agents and smoking cessation cannot be neglected facets of diabetes care (ADA, 2009).

Effective treatment of both elevated glucose levels and elevated blood pressure decrease the risk for kidney and eye complications. In general, every percentage drop in A1c (a measure of glucose control) results in a 40% drop in eye, kidney and nerve complications (CDC, 2008a). For every 10 millimeters mercury reduction in systolic

blood pressure, the risk of any complication (heart attack, stroke, eye, kidney or nerve) decreases by 12% (CDC, 2008a). Low density lipoprotein control can reduce the risk of cardiovascular complications (heart attack, stroke) by 20 to 50% (CDC, 2008a).

Comprehensive diabetes care then includes attention not only to glucose control but also common co-morbid conditions such as hypertension and lipid abnormalities. Treatment of hypertension, lipid disorders and other complication-related disorders will not be described in detail. However, in general, many of the exercise and diet recommendations for lowering blood glucose also have a favorable effect on blood pressure and lipid levels (ADA, 2009). The next section will describe in greater detail strategies aimed at glucose control: diabetes medication and lifestyle recommendations including diet and exercise.

### ***Blood glucose goals of treatment***

There are five ways to assess blood glucose levels: self-monitored blood glucose, glycosylated hemoglobin (HbA<sub>1c</sub>), fructosamine assay, random or fasting blood glucose and ketone monitoring (Mazze, Strock, Simonson, Bergenstal & Etzwiler, 2000). The glycosylated hemoglobin was the standardized measurement used in research studies that established that glycemic control is associated with risk of diabetes complications (Nathan, et al., 2009). Glycosylated hemoglobin is reported as a percentage of total hemoglobin; it is the fraction of total hemoglobin that has glucose attached (Clark, 2004). Glycosylated hemoglobin reflects average blood glucose control over the preceding two to three months (Clark, 2004). Current glycosylated hemoglobin goals for individuals with type 2 diabetes is less than or equal to 7% (ADA, 2009). Measurements of glycosylated hemoglobin should be taken at least twice per year (ADA, 2009; Clark,

2004). If the glycosylated hemoglobin is greater than 7%, action to intensify diabetes treatment should be taken (ADA, 2009; Nathan, et al., 2009).

### ***Medication.***

Several options of effective medications are available for treatment of type 2 diabetes. Choice of medication therapy should be individualized considering medication effectiveness, side effects, tolerability, ease of use, expense and non-glycemic effects of the medications (Nathan, et al., 2009). It should also be kept in mind that type 2 diabetes is a progressive disease and higher doses and additional medications are required over time (Nathan, et al., 2009).

Along with lifestyle modifications to decrease weight and increase activity, metformin is recommended as initial therapy. Metformin is an oral medication that decreases the amount of glucose produced by the liver and lowers fasting blood glucose levels. The most common side effect is gastrointestinal upset including nausea and/or diarrhea (Nathan, et al., 2009). Metformin used alone does not usually cause blood glucose levels to fall below normal. In contrast to many medication options that may cause weight gain, metformin is weight neutral or may induce a modest weight loss. Metformin has been associated with improved cardiovascular outcomes (UKPDS, 1998). Metformin is considered contraindicated in renal insufficiency and congestive heart failure (Nathan, et al., 2009).

If lifestyle modifications and metformin are not achieving glycemic control goals, additional therapy with either insulin or a sulfonylurea are recommended (Nathan, et al., 2009). Insulin is the most effective treatment at lowering blood glucose levels (Nathan, et al., 2009). If used at adequate doses, insulin will lower blood glucose levels to

therapeutic goals; there is no maximum dose of insulin (Nathan, et al., 2009). A wide variety of insulin regimens are possible with combinations of rapid-acting, intermediate-acting and/or long-acting insulin. An additional benefit of insulin therapy is improvement in the lipid profile (Nathan, et al., 2009). Disadvantages of insulin therapy include: it must be injected; it generally requires increased frequency of monitoring; insulin generally causes weight gain; it can induce low blood glucose levels; and the newer forms of insulin are expensive (Nathan, et al., 2009).

As an alternative to insulin, if lifestyle modifications and metformin are failing to reach blood glucose goals, is treatment with a sulfonylurea. Commonly prescribed sulfonylureas include gliclazide, glimepiride, glipizide and glyburide. Sulfonylureas work by increasing insulin secretion from the pancreas (Nathan, et al., 2009).

Advantages to the sulfonylureas include rapid effectiveness to lower glycosylated hemoglobin by approximately 1.5% and relative inexpensiveness. Disadvantages include weight gain and hypoglycemia (blood glucose levels below normal) (Nathan, et al., 2009).

The use of metformin, insulin and sulfonylureas is backed by strong evidence (Nathan, et al., 2009). Less well-validated treatments include thiazolidinediones, glucagon-like peptide-1 agonists, alpha-glucosidase inhibitors, and amylin agonists (Nathan, et al., 2009). Current consensus recommends limiting these medications to special circumstances (Nathan, et al., 2009). Medication treatment needs to be individualized balancing potential benefits and risks. In this way, the less well-validated medications may be considered in certain situations (Nathan, et al., 2009).

### *Lifestyle*

Major factors that increase the risk of type 2 diabetes are overnutrition and a sedentary lifestyle with subsequent overweight and obesity (Nathan, et al., 2009). Interventions that reverse or improve these factors have a beneficial effect on blood glucose control once diabetes is diagnosed (Nathan, et al., 2009). A combination of exercise and diet can be expected to decrease the glycosylated hemoglobin by 1 or 2% (Nathan, et al., 2009). There are few adverse effects of lifestyle interventions other than the difficulty of incorporating and sustaining the behavior changes and the risk of minor musculoskeletal injury (Nathan, et al., 2009). The major foci of lifestyle modification in the treatment of diabetes are diet and exercise. The recommended modifications will be described next.

#### *Medical nutrition therapy (diet).*

As with medication therapy, diet therapy should be individualized (ADA, 2009). The optimal mix of macronutrients (protein, fat, carbohydrate) for individuals with diabetes has not been identified (ADA, 2009). Individualized recommendations of macronutrient content need to consider factors such as food preferences, kidney function, and blood lipid levels (ADA, 2009). Furthermore, monitoring of carbohydrate intake is a key strategy in achieving blood glucose control (ADA, 2009).

Because modest weight loss has been shown to decrease insulin resistance (a major defect in type 2 diabetes), weight loss is recommended (ADA, 2009). Weight loss can be achieved through calorie restriction. A low-fat or a low-carbohydrate calorie restricted diet has been shown to be effective in weight loss in individuals with type 2 diabetes at one year (ADA, 2009). In addition to restricted calorie intake, it is

recommended that the diet contain less than 7% of total calories from saturated fat and intake of trans fats be minimized (ADA, 2009).

An additional nutrition recommendation is to limit alcohol intake to one drink or less per day for women and two drinks or less per day for men. Sugar alcohols and nonnutritive sweeteners may be used within the Food and Drug Administration acceptable daily intake levels. Although popular, antioxidant and chromium supplementation is not supported (ADA, 2009).

*Exercise.*

Of the lifestyle interventions recommended for persons with type 2 diabetes, exercise is arguably the single most important one in terms of its potential benefits (Buse, et al., 2008). Exercise is associated with improved glycemic control, improved insulin sensitivity and improved cardiovascular fitness. These benefits are apparent almost immediately but persist for only a brief period of time after cessation of exercise, thus, the requirement for a minimum of three exercise sessions weekly (Buse, et al., 2008). Consistent with the evidence of the short-lived physiological benefit, the ADA (2009) recommends 30 minutes of moderate-intensity aerobic exercise on most days of the week (a minimum of 150 minutes of exercise weekly). Moderate-intensity aerobic exercise is defined by the ADA (2009) as exercise that achieves 50-70% of maximal heart rate. Maximal heart rate is calculated by subtracting a person's age from 220; target heart rate for reaching the intensity goal of the aerobic exercise would be calculated by subtracting a person's age from 220 and multiplying it by .50 to .70 (ADA, 2009). Examples of activities that are likely to increase heart rate to recommended levels include brisk

walking, running, swimming and bicycling (ADA, 2009). In addition to aerobic activity, resistance training should be encouraged three times per week (ADA, 2009).

Physical activity and exercise are terms that are often used interchangeably and can create confusion. However, their exact meanings are distinct. Physical activity is “any bodily movement that results in the burning of calories” (Marcus & Forsyth, 2003, p. 6). Exercise is “a subcategory of physical activity; it is physical activity that is planned, structured and repetitive” (Marcus and Forsyth, 2003, p. 6). Historically, physical activity levels in daily life were much higher than they are today (Paffenbarger, et al., 2001; Walker, et al., 2003). This loss of daily physical activity has resulted in a largely sedentary population. This in turn has led to an increased incidence of obesity and chronic disease (CDC, 2008c; Walker, et al., 2003). Although the role of increasing daily physical activity to combat the ill effects of sedentary lifestyles is undoubtedly important (Levine, 2007), exercise (planned, structured, repetitive activity) is recommended in the treatment regimen for type 2 diabetes because of the necessity of regular, moderately-intensive activity (ADA, 2009). It is this planned, structured exercise that has shown to benefit people with type 2 diabetes.

There is, however, a new focus on physical activity that acknowledges a broad range of activities such as taking stairs more often, parking farther away from the door during transportation activities (Marcus & Forsyth, 2003), and returning to non-automated activities of daily living (taking away television remotes, garage door openers, drive-up window, etc.) (Buettner, 2008; Levine, Eberhardt & Jensen, 1999). Arguably, it is loss of these types of activities in our daily lives that has led to the emergence of sedentariness, obesity and chronic illness (CDC, 2003; Imbeault, 2007; Walker, et al.,

2003). Increasing daily physical activity may decrease the prevalence of obesity and its sequelae (Levine, 2007) and may actually help people live longer (Buettner, 2008). The contribution of daily physical activities in maintaining health is beginning to be recognized but formal recommendations regarding physical activity remain to be made (Marcus & Forsyth, 2003).

### **Health Behavior Change Maintenance**

To begin the next section on health behavior change maintenance, some basic orientation to the terminology and health behavior change theories/models will be provided. This information will provide a useful context for understanding the gaps in the understanding of health behavior maintenance.

This background information will start with some definitions. Theory is a “systematic way of understanding events or situations. It is “a set of concepts, definitions and propositions that explain or predict these events or situations by illustrating the relationships between variables” (National Cancer Institute [NCI], 2005, p. 4). Concepts are the building blocks of theory (Fawcett, 1999). Constructs are concepts developed for use in a particular theory. Variables explain how a construct will be measured in a specific situation. Models draw on a number of theories to help understand a particular problem in a certain setting or context (NCI, 2005, p.4). Thus armed with a few key definitions, health behavior change models/theories will be described next.

Health behavior change models are described by their level of influence. There are models of health behavior change at the individual, interpersonal and community levels (Glanz, et al., 2002; NCI, 2005). Individual-level theories focus on intrapersonal factors such as knowledge, attitudes, beliefs, motivation, self-concept, developmental

history, past experience and skill (NCI, 2005). Theories of health behavior at the interpersonal level consider the opinions, thoughts, behaviors, advice, and support of people surrounding the individual and the individual's reciprocal effect on those people (NCI, 2005). A common example of an interpersonal-level theory is the Social Cognitive Theory. Finally, community-level theories "explore how social systems function and change and how to mobilize community members and organizations" (NCI, 2005, p. 22). Although exercise behavior maintenance could be examined from any level of influence, the present study focused on the individual-level; that is, it focused on understanding the processes of older adults with type 2 diabetes who have been able to sustain an exercise program.

Because type 2 diabetes is a chronic illness and the benefits of exercise are short-lived, it is important for people with type 2 diabetes to develop a program of activity that can be sustained. Health behavior change maintenance has been relatively ignored in theories of health behavior change (Rothman, 2000). The most commonly applied theories of individual health behavior are: the health belief model; the theory of reasoned action; the theory of planned behavior; the transtheoretical model; and the precaution adoption process model (Glanz, et al., 2002; NCI, 2005). A brief summary of each of these four commonly applied models follows and is summarized in the top half of Table 1; the lower half of Table 1 includes models that will be described later in this chapter in the post-analysis literature review section. Table 2 summarizes the model structure and strengths and limitations of the models in explaining health behavior maintenance.

**Table 1. Comparison of Models**

<b>Model/Theory</b>	<b>Initiation</b>					<b>Maintenance</b>		
Health Belief Model	Constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy					Self-efficacy		
TRA/TPB*	Constructs: behavioral intention, attitude, subjective norm, perceived behavioral control							
Precaution Adoption Process Model	Stage 1: Unaware of Issue	Stage 2: Unengaged by Issue	Stage 3: Deciding about Acting Stage 4: Decided not to Act	Stage 5: Decided to Act	Stage 6: Acting	Stage 7: Maintenance		
Transtheoretical Model	Stage 1: Pre-contemplation	Stage 2: Contemplation	Stage 3: Preparation	Stage 4: Action		Stage 5: Maintenance	Stage 6: Termination	
<b>Models described in Post-Analysis Literature Review</b>								
Four Phase Behavior Change Process				Initial Response	Continued Response	Maintenance	Habit	
Health Behavior Internalization Model						External Regulation	Introjected regulation	Integration self-regulation
Physical Activity Maintenance Theory						Intrapersonal Constructs: Goal setting Motivation Self-efficacy Interpersonal Constructs Life stress Physical activity environment		

\*Theory of Reasoned Action/Theory of Planned Behavior

**Table 2. Theory/Model Structure, Strengths and Limitations**

<b>Theory/Model</b>	<b>Basic Structure</b>	<b>Strengths related to explaining maintenance</b>	<b>Limitations related to explaining maintenance</b>
Health Belief Model	Value-expectancy Continuum-predictive	Self-efficacy may contribute	Maintenance phase limited to the construct of self-efficacy. Designed to predict prevention behavior.
Theory of Reasoned Action/Theory of Planned Behavior	Value-expectancy Continuum-predictive		No maintenance phase
Precaution Adoption Process Model	Staged	Staged model guides interventions.	Maintenance phase underdeveloped.
Transtheoretical Model	Staged	Staged model guides intervention.	Movement through phases based on time. Heterogeneity within stages. Majority of studies on extinction behaviors
Four Phase Behavior Change Process	Staged	Designed as a maintenance model. Differentiates psychological processes from those used in initiation.	Not researched.
Health Behavior Internalization Model	Continuum but not predictive	Designed as a maintenance model. Addresses psychological processes.	Not researched.
Physical Activity Maintenance Theory	Multi-level	Based on tested concepts.	Not researched. Definitions of concepts not differentiated for maintenance

### **Health Belief Model.**

The Health Belief Model (HBM) was originally developed in the 1950's by social psychologists to explain widespread failure of people to participate in tuberculosis screening (NCI, 2005) and other programs to prevent and detect disease (Janz, Champion & Strecher, 2002). The model was extended in the 1970's to explain people's responses to symptoms and to their behaviors to diagnosed illness (Janz, et al., 2002). The HBM is a value-expectancy theory: "the desire to avoid illness or to get well (value) and the belief that a specific health action would prevent (or ameliorate) illness (expectation)" (Janz et al., 2002, p. 47) determines health-related behavior.

HBM has been altered through the years. Currently, the summary of its basic premise is "people will take action to prevent, to screen for, or to control ill-health conditions if they regard themselves as susceptible to the condition, if they believe it would have potentially serious consequences, if they believe that a course of action available to them would be beneficial in reducing either their susceptibility to or the severity of the condition, and if they believe that the anticipating barriers to (or costs of) taking the action are outweighed by its benefits" (Janz et al., 2002, p. 47-48).

HBM is not a staged model. Its main components are perceived susceptibility (chance of getting problem), perceived severity (seriousness of problem), perceived benefits (how well action will reduce seriousness), perceived barriers (costs of taking action), cues to action (create readiness; prompt action [NCI, 2005]) and self-efficacy (confidence in ability to take action). Self-efficacy was added to the model in 1988. The rationale for its addition was the belief that it addressed the confidence needed to make long-term changes in lifestyle behaviors. These changes are contrasted from the

one-time immunization or screening test decision that originally helped develop the model to explain health-related behavior. The focus of the HBM was on one-time immunization or screening behavior and on cognitive processes. In its original form, the HBM did not address maintenance of behavior. The addition of self-efficacy to the model may extend its explanatory power into the maintenance phase of behaviors that need to be sustained over a prolonged period of time (Janz, et al., 2002).

Self-efficacy has been shown to be correlated with exercise in a variety of settings (McAuley & Blissmer, 2000). However, many studies associate self-efficacy with exercise but do not distinguish between exercise adoption and exercise maintenance (Williams, et al., 2008). Self-efficacy is probably relevant to maintenance of health behavior change (McAuley, Jerome, Elavsky, Marquez & Ramsey, 2003) and therefore the health belief model may have value in predicting health behavior maintenance with its addition of self-efficacy. However, the HBM was primarily designed to predict uptake of one-time behaviors.

### **Theory of Reasoned Action (TRA)/Theory of Planned Behavior (TPB).**

The TRA was first introduced in 1967. TRA explains the relations between beliefs, attitudes, intentions and behavior (Montano & Kasprzyk, 2002). The TPB is an extension of the TRA. Both theories are value-expectancy theories that focus on “individual motivational factors as determinants of the likelihood of performing a specific behavior” (Montano & Kasprzyk, 2002). What distinguishes TPB from TRA is the addition of a construct on perceived control. According to the TRA, the most important determinant of behavior is the person’s behavioral intention (likelihood of performing the behavior). In turn, intention is determined by attitude (belief that

behavior is associated with outcome; outcome has value) and subjective norm (what important others believe). TPB extends TRA by the addition of perceived behavioral control. This construct is meant to account for factors outside of the individual's control that may affect his or her intention and behavior. This construct is similar to self-efficacy; both are concerned with the level of confidence the individual has to perform the behavior in potentially suboptimal circumstances (Montano & Kasprzyk, 2002).

TRA and TPB are not staged models of health behavior change. There is no description of how these constructs would apply to sustaining a health behavior over time. Another important aspect of these theories is their specificity to behavior and population; behavioral, normative and control beliefs are unique to specific behavior and population. Similar to the HBM, these theories focus on cognitive factors, value and expectancy. Thus, although TRA and TPB are helpful in understanding the uptake of a new health behavior, their usefulness in explaining health behavior maintenance is limited. Because of its similarity to the self-efficacy construct in HBM, perceived behavioral control may explain persistence of behavior over time. The HBM, TRA and TPB are prediction models placing each individual along a continuum of probability of change (Weinstein, Rothman & Sutton, 1998). These models are criticized for oversimplifying the change process to a single prediction equation (Weinstein, et al., 1998).

### **Transtheoretical Model and Stages of Change (TTM).**

From its inception, the transtheoretical model's goal was to integrate the field of psychotherapy; it had fragmented into more than 300 theories (Prochaska, Redding &

Evers, 2002). It was the first theory to address the phenomenon that change occurs through a series of stages: the precontemplation; contemplation; preparation; action; maintenance; and termination stages (Prochaska, et al., 2002; NCI, 2005).

During the precontemplation stage there is no intention to take action over the next six months. Individuals in the precontemplation stage are often in a state of denial (Prochaska, Norcross & DiClemente, 1994). In the contemplation stage, the intention is to take action within the next six months. During the preparation stage, the intention is to take action within the next 30 days and some steps may have been undertaken in the direction of the desired change. There is no apparent action during the first three stages. Stage 2 and 3 are “thinking” stages. Stage 2 is marked by problem solving; stage 3, by moving toward solutions and action. Stage 4, the action stage is characterized by overt behavior change for less than six months. The action stage takes the most commitment or time and energy (Prochaska, et al., 1994). Once overt behavior change has been sustained for more than six months, the individual enters the maintenance phase (Prochaska, et al., 2002). Termination is the final stage. Unreachable by the majority of people, termination is the point at which “individuals no longer succumb to temptation and have total self-efficacy. No matter what their state of mind, they are sure they will not return to their old unhealthy behavior” (Prochaska, et al., 2002, p.102). The model is circular; that is, people may enter the model at any point, slip back to an earlier stage, and/or cycle through the process repeatedly (NCI, 2005).

Another construct of TTM, in addition to the stages of change, is decisional balance which is simply identifying the pros and cons of changing (Prochaska, et al.,

2002). Self-efficacy “is the situation-specific confidence that people have that they can cope with high-risk situations without relapsing to their unhealthy or high-risk behavior” (Prochaska, et al., 2002, p.103). There are several processes of change that people use to progress through the stages of change; for example, consciousness raising, counterconditioning, contingency management, and helping relationships. These processes are a combination of overt and covert behavior and cognitive and affective assessments and at least to some extent, different processes may be more helpful at different stages in the change process (Prochaska, et al., 2002).

TTM is the first staged model and the first in this model review to describe stages of change including a maintenance phase. The transtheoretical model originated in the psychotherapy field and in particular on studies of smoking cessation (Prochaska, et al., 2002). It has since been studied in a wide variety of settings but more research needs to be done on acquisition behavior (exercise) as opposed to the more frequently studied extinction behaviors (smoking cessation, alcohol and substance abuse, delinquency, etc.) (Prochaska, et al., 2002). Furthermore, the maintenance phase of the TTM is underdeveloped (Prochaska, et al., 2002). In common with the other models described thus far is a construct that describes the confidence needed by individuals to effect change. In TTM and HBM this confidence is called self-efficacy; in the TRA/TPB theories, perceived behavioral control. Time is an important factor in movement through the stages and six months appears to be of particular significance.

#### **Precaution Adoption Process Model (PAPM).**

The goal of the PAPM is “to explain how a person comes to the decision to take action and how he or she translates that decision into action (Weinstein & Sandman,

2002). The model applies to behaviors that require a deliberate action such as adopting a new precaution or ceasing a risky behavior as opposed to “gradual development of habitual patterns of behavior, such as exercise or diet” (Weinstein & Sandman, 2002). The stage names are quite descriptive of the action (or inaction) taking place at each stage: Stage 1: Unaware of Issue; Stage 2: Unengaged by Issue; Stage 3: Deciding About Acting; Stage 4: Decided Not to Act; Stage 5: Decided to Act; Stage 6: Acting; Stage 7: Maintenance.

In stage 1 the person is unaware of the health issue. Once aware of the issue they progress to stage 2 which is a stage of awareness without engagement. Stage 3 is the beginning of the decision making process which can have two outcomes—stage 4, a decision not to act or stage 5, a decision to act with subsequent movement to stage 6, acting. Stage 7, maintenance, “indicates that the behavior has been maintained over time” (Weinstein & Sandman, 2002). In contrast to the TTM in which people may enter the process at any stage and move back and forth, the PAPM is conceived in a way that people proceed through the stages without skipping any. It is possible to move backwards with the exception that people cannot move back from an awareness state to being unaware (NCI, 2005).

### **Summary of models.**

All of these models emphasize behavior initiation. The transtheoretical model and the precaution adoption process model are the only two models that have a specific stage addressing maintenance. Stages are particularly important in the study of behavior maintenance. Stages refer to getting something done over time (Glaser, 1978). Staged models recognize the complexity of change through identifying specific stages,

an ordering of the stages, common barriers to change faced in the same stage and different barriers to change faced in different stages. The greater complexity explained by staged theories offers the possibility of greater intervention efficiency and effectiveness (Weinstein & Sandman, 2002).

In the transtheoretical model maintenance is identified as the “stage in which people strive to prevent relapse but do not apply change processes as frequently as do people in [the] action [stage of behavior change]” (Prochaska, et al., 2002, p.102). “Action” is the health behavior stage just preceding the maintenance stage in the transtheoretical model and is characterized as overt changes in behavior and intense commitment of time and energy. It is further characterized as the stage in which decisional balance (the pros and cons of the behavior) and other cognitive processes predominate. As people move into the maintenance stage, cognitive processes are somewhat replaced by behavioral processes (Prochaska, et al., 1994). These behavioral processes are not fully described in TTM and further description of the maintenance phase is based on a time perspective.

Limits to the application of the transtheoretical model to understanding maintenance are its assumption of the importance of time and its assumption that while there is some shift toward behavioral processes people generally continue to utilize psychological processes similar to other earlier stages of change (Rothman, Baldwin & Hertel, 2004). The transtheoretical model relies heavily on a continuation of processes used in the early stages of health behavior change to sustain the new behavior in the maintenance stage. Furthermore, entry into maintenance is marked by the passage of

time; that is, once the person has been able to sustain the new behavior for six months, the maintenance phase has been started.

Relying on time to identify passage into health behavior maintenance could be troublesome (Rothman, et al., 2004). Although six months has become a commonly used time interval to define maintenance of health behavior and may be reasonable as a general guide, it could be argued that different health behaviors require different time intervals or even different types of measurement to define the maintenance phase (Rothman, 2000). Definitions for maintenance of different health behaviors are lacking in the literature (Rothman, 2000). This gap has been addressed by health behavior maintenance researchers at the University of Minnesota (Rothman, et al., 2004; Fuglestad, Rothman & Jeffery, 2008). Through research, for example, smoking cessation maintenance is defined as abstinence from smoking for at least 2 months over a 3-month period. This definition has been established through research that supports the hypotheses that there are differences in self-regulatory focus between initiation and maintenance stages of health behavior change (Fuglestad, et al., 2008). In contrast, Fuglestad et al. (2008) define maintenance in weight loss not in terms of time at all but rather, reaching an acceptable weight. Again, this definition is supported by self-regulatory focus hypothesis testing. Specific definitions for exercise maintenance are not specified in the literature.

Similar to the transtheoretical model, the precaution adoption process model is a staged model. Stage 7-Maintenance is defined as repeated behavior at intervals or continuing a habitual behavior over time (Weinstein & Sandman, 2002). While the model draws attention to the needed distinction between action and maintenance, the

basis for the distinction is not described. Furthermore, the model has been described by Weinstein & Sandman (2002), originators of the model, as most applicable to adoption of a new precaution or cessation of a risky behavior requiring deliberate action. How it might apply to behaviors such as diet or exercise described as habitual patterns that are more gradual in development is less well described (Weinstein & Sandman, 2002).

Thus, while there are several frequently used health behavior change models, maintenance of health behavior is specifically address in only two (Prochaska, et al., 1994; Weinstein & Sandman, 2002). Also, in both of these models, the descriptions of the characteristics of the maintenance phase are limited.

### **Maintenance versus Adherence versus Compliance**

In addition to the underdevelopment of health behavior maintenance as a stage within health behavior change models, there are also gaps in our understanding of health behavior maintenance as a stand-alone concept. Agnes (2003) contrasts maintenance, adherence, and compliance. Thus, the definition of adherence is “the extent to which the patient continues the agreed-upon mode of treatment under limited supervision when faced with conflicting demands, as distinguished from compliance or maintenance.” Compliance is “the degree of constancy and accuracy with which a patient follows a prescribed regimen” and finally, “maintenance” is defined in the dictionary as “the extent to which a patient continues good health practices without professional supervision.” (Agnes, 2003). These definitions imply a continuum of patient involvement, and agreement with and ability to carry out specific recommendations of a health care provider.

Adherence and compliance have come under increasing criticism because they imply obedience (Mullen, 1997). Instead, there is growing acceptance of greater patient involvement in establishing good health practices and this trend is particularly evident in chronic disease (Bodenheimer, Lorig, Holman & Grumbach, 2002). “Chronic disease self-management”, the term used by health providers, assumes the patient taking a greater role in caring for their own chronic disease. Self-management first starts appearing in the health care literature in 1982 (Witwer, 2008). While self-management has been variously defined (Buckwalter & Kerfoot, 1982; Grey, Knafl & McKorkle, 2006; Kralik, Koch, Price & Howard, 2004; Lorig, 1982; Pincus, Esther, DeWalt, & Callahan, 1998; Thomas-Hawkins & Zazworsky 2005) common elements are patients recognizing symptoms, understanding the disease process, solving problems, preventing adverse events/complications and performing tasks to manage their condition. The self-management definitions focus on activities carried out by the patient. Also evident in the self-management literature is a needed change in the patient-provider relationship to approaches that are more collaborative, that promote patient participation and that are less prescriptive (Eldh, Ehnfors & Ekman, 2004).

### **Emerging theory of health behavior maintenance (Rothman, 2000)**

Thus far the preliminary literature review has summarized the leading health behavior change models and highlighted their strengths and weaknesses in explaining behavior change maintenance. One vocal critic of current health behavior change model shortfalls in explaining maintenance of behavior change is Rothman (2000). Rothman and colleagues at the University of Minnesota have begun to fill the gap in

understanding behavior maintenance by studying regulatory focus, self-efficacy, and satisfaction in smoking cessation and weight loss interventions.

Regulatory focus is based on the work by Higgins (1998) where regulatory focus is conceptualized to have two foci—promotion and prevention. Individuals higher in promotion focus tend to perform well on new tasks and pursue positive end-states. On the other hand, individuals higher in prevention focus are vigilant to avoiding losses and so are predicted to do better at maintaining positive end-states (Higgins, 1998).

In both smoking cessation and weight loss interventions, Fuglestad et al. (2008) found that a promotion regulatory focus predicted greater success at initiating change. However, people higher in prevention regulatory focus had higher smoking quit rates and more weight loss at 6 months. In a longitudinal study of smoking cessation Fuglestad et al. (2008) found an interaction between self-efficacy and regulatory focus. At high levels of self-efficacy, high prevention focus predicted less success. In contrast, at low levels of self-efficacy, a high prevention focus predicted greater success. Fuglestad and colleagues (2008) have differentiated the task of initiation from the task of maintenance in smoking cessation and weight loss programs. Based on these findings, people high in prevention regulatory focus, self-efficacy and satisfaction would be expected to be more successful at maintaining behavior change than individuals possessing promotion-focused self-regulation and lower levels of self-efficacy and satisfaction.

## **Predictors of Physical Activity and Exercise in Persons with Type 2 Diabetes**

In addition to the work by Rothman (2000) and Fuglestad, et al. (2008) which is focused on building a model of health behavior maintenance, several observational studies have focused on discovering predictors of behavior. For the purpose of the preliminary literature review for the current study, observational studies specific to predictors of exercise and physical activity in older adults with type 2 diabetes were reviewed.

With the assistance of the extensive search strategy outlined by Armour, Norris, Brown, Zhang, and Casperson (2004), twenty eight articles focused on exercise in older adults with type 2 diabetes were identified. Key findings from these studies will be presented next.

### **Summary of key findings.**

Prior to presentation of the key predictors of exercise and physical activity in adults with type 2 diabetes, the setting and sample will be described. Following these descriptions, primary predictors of exercise (key findings) will be presented. These predictors have been divided into (1) sociodemographic and clinical characteristics, (2) health behavior models and constructs and (3) behavioral/psychological constructs. These categories were the major categories of factors explored by the studies included in the review.

### ***Setting.***

Several studies were conducted in locations with the intent to recruit persons from specific racial/ethnic and/or socioeconomic groups. These settings included the Lower Yakima Valley in Washington state (Hispanic)(Coronado, Thompson, Tejada,

Godina, & Chen, 2007), Native Canadian Reserve (Brunet, Plotnikoff, Raine, & Courneya, 2005), public-hospital-affiliated clinic (low income African American (Dutton, Johnson, Whitehead, Bodenlos, & Brantley, 2005), inner city Los Angeles (Hispanic and African American)(Johnson, Bazargan, & Bing, 2000), Texas-Mexico border (Mexican American) (Mier, Medina, & Ory, 2007), East Baltimore (African American) (Pearte, Gary, & Brancati, 2004), urban and rural underserved communities in upstate New York (Shaw, Gallant, Riley-Jacome, & Spokane, 2006), San Francisco Bay area (Latino) (Skaff, Mullan, Fisher, & Chesla, 2003), urban area (African American) (Wanko et al., 2004) and San Antonio (Mexican American) (Wen, Shepherd, & Parchman, 2004). Four studies were carried out within the context of large population-based surveys; one in northern California(Ahmed, Karter, & Liu, 2006) and three in Alberta, Canada(Barrett, Plotnikoff, Courneya, & Raine, 2007; Plotnikoff et al., 2006; Plotnikoff et al., 2007). Geographically, the remaining 11 studies represent the southern (Albright, Parchman, Burge, & RRNeST, 2001), northeastern (Aljasem, Peyrot, Wissow, & Rubin, 2001; Hall, Joseph, & SchwartzBarcott, 2003; Scollan-Koliopoulos, O'Connell, & Walker, 2007; Whittemore, D'Eramo, Melkus, & Grey, 2005), Midwestern(Hays & Clark, 1999; Koch, 2002; Vickers, Nies, Patten, Dierkhising, & Smith, 2006) and western United States (Lin et al., 2004; Nelson, McFarland, & Reiber, 2007) and rural Alberta, Canada (Maddigan, Majumdar, & Johnson, 2005). All studies were conducted in outpatient settings and utilized some kind of diabetes registry to identify people diagnosed with type 2 diabetes.

***Sample.***

There were a total of 72,526 participants across studies. Approximately 47% of the participants were female. Mean age averaged around 60 years across the studies with an age range from 40-83. Sixty percent of the participants were Caucasian, 13% African American, 9% Hispanic and the remaining approximately 20% includes Native Canadians, Native Americans, Asians and those participants identifying themselves as multiethnic. One study (Ahmed et al., 2006) accounted for 61,511 of the participants. Recalculating the major demographic characteristics of the sample with these participants removed due to concerns that this large sample could skew the results demonstrated no significant differences in gender or age. Ethnic/racial distribution was affected, however, with the remaining pool of participants approximately 63% Caucasian, 23% African American and 10% Hispanic. This leaves only 4% for all other ethnic/racial groups.

***Sociodemographic and clinical characteristics.***

Several studies found that males are more likely to report higher levels of activity (Albright et al., 2001; Barrett et al., 2007; Pearte et al., 2004; Plotnikoff et al., 2006; Skaff et al., 2003). This contrasts with studies that found women to either be more active than men or at least engage in more vigorous activity than men (Albright et al., 2001; Plotnikoff et al., 2007). Younger age (Albright et al., 2001; Hays & Clark, 1999; Koch, 2002), higher household income (Pearte et al., 2004; Plotnikoff et al., 2006), higher education level (Hays & Clark, 1999; Plotnikoff et al., 2006) and uninsured status (Albright et al., 2001) were associated with higher levels of activity. In addition, participants concerned with street crime, those with physical complaints and

those who perceived the need to get enough exercise to keep healthy reported higher levels of activity (Pearte et al., 2004)

Higher body mass index, perceived large body image and the perception of being more active than one's counterparts were associated with walking fewer blocks per week and lower levels of leisure time activity (Pearte et al., 2004; Plotnikoff et al., 2006). On the contrary, (Plotnikoff et al., 2007) Plotnikoff et al. found that higher body mass index was associated with increased physical activity.

In comparing exercising and non-exercising groups of adults with type 2 diabetes, the exercising group had had diabetes for a shorter amount of time (Koch, 2002; Plotnikoff et al., 2007). Less difficulty in performing tasks of daily living, lower number of co-morbid conditions (Plotnikoff et al., 2006; Plotnikoff et al., 2007) and perceived good or excellent health (Hays & Clark, 1999) were significantly associated with higher physical activity. Still other researchers have found no significant correlations of sociodemographic and clinical characteristics to exercise (Coronado et al., 2007; Maddigan et al., 2005; Plotnikoff et al., 2007; Whittemore et al., 2005).

### ***Health behavior models and constructs.***

Constructs from common health behavior models were tested in some of the studies. The most common constructs studied were from the health belief model and social cognitive theory. Key concepts of the health belief model are perceived susceptibility (chance of getting problem), perceived severity (seriousness of problem), perceived benefits (how well action will reduce seriousness), perceived barriers (costs of taking action), cues to action (create readiness; prompt action [NCI, 2005]) and self-efficacy (confidence in ability to take action) (Janz, et al. 2002). Fewer perceived

barriers are associated with increased physical activity (Aljaseem et al., 2001; Dutton et al., 2005; Hays & Clark, 1999; Koch, 2002; Wanko et al., 2004; Wen et al., 2004). Perceived barriers were not related to demographic variables (Dutton et al., 2005). On the other hand, those participants who were exercising identified more benefits of exercise (Koch, 2002). No differences between exercisers and non-exercisers were found on the scales measuring perceived seriousness of diabetes or perceived susceptibility to complications (Koch, 2002).

In the study by Brunet (2005), no significant correlations were found between levels of physical activity and the social cognitive theory constructs of self-efficacy (confidence in one's ability to take action and overcome barriers), behavioral capability (knowledge and skill to perform a given behavior), observational learning (behavior acquisition that comes from watching the actions and outcomes of others), outcome expectation (anticipated outcome of the behavior), reciprocal determinism (interaction between the person and the social and physical environment) as a whole. There were significant correlations with single items of social environment ("motivated to do physical activity by the community/school") and self-efficacy items ("I have confidence about participating in physical activity "when I can't notice improvements" and "when having diabetes problems") (Brunet et al., 2005).

Self-efficacy is an important construct in the health belief model, social cognitive theory as well as the transtheoretical model (Glanz, et al., 2002). Allen (2004) completed an integrated literature review examining the link between self-efficacy and diabetes. Ten of 13 studies in the review were correlational studies and all reported a significant relationship between self-efficacy and exercise behavior. In the

individual studies in this review which were all published after Allen's review, self-efficacy was studied not only as part of a conceptual framework model but also as a variable not embedded within a recognized model of health behavior. Higher self-efficacy was associated with higher levels of physical activity in veterans (Nelson et al., 2007) and Mexican Americans (Wen et al., 2004). Self-efficacy was associated with exercise across levels of literacy and race/ethnicity (Sarkar, Fisher, & Schillinger, 2006). This is in contrast to Skaff et al., 2003) who found that for European Americans diabetes self-efficacy was associated with activity while this was not the case for Latinos.

Albright, Parchman and Burge (2001) conducted a cross sectional survey of patients with type 2 diabetes in a family medicine clinic. Dependent variables were diabetes self-care behaviors including activity. Demographic variables (6 items), items about the doctor-patient relationship (4 items), items on personal stress (3 items) and one item about social context were the independent variables. The single item in the social context scale ("My family understands my diabetes") was associated with increased levels of activity. In contrast to Albright et al. (2001) who did not have any relationship between the doctor-patient relationship and activity, Maddigan (2005) found that positive perceptions of the patient-provider relationship were associated with increased exercise adherence. Also, veterans who recalled receiving advice from their provider were more likely to report walking for exercise (Nelson et al., 2007). Consistent with Albright, et al. (2001), family support was found to be an important predictor of increased physical activity among Mexican Americans (Wen et al., 2004) although greater acculturation in this ethnic group was associated with lower activity

(Skaff et al., 2003). Shaw et al. (2006) found that neighborhood resources were important predictors particularly for rural residents. No association between recollections of family self-care exercise behavior and exercise adherence was found by Scollan-Koliopoulos (2007) in a study of intergenerational influences on behavior.

In summary, a limited number of studies testing full behavior change models were discovered. Those few studies that did report on testing of full models failed to show correlations of the whole model or theory to exercise. Individual constructs from theories that do appear to be associated with increased activity are self-efficacy, perception of fewer barriers, perception of benefit, and social support (family and community). The cross-sectional nature of these studies do not allow for conclusions about the relative importance of these constructs to adoption vs. maintenance of physical activity.

#### ***Behavioral/psychological constructs.***

The final category of key findings is behavioral/psychological constructs. Studies in this area have examined alcohol intake, depression and personal stress. Two studies examined the link between alcohol consumption and exercise and found that increased alcohol consumption was associated with lower levels of exercise (Ahmed et al., 2006; Johnson et al., 2000). Depressed patients were significantly more sedentary than non-depressed patients (Lin et al., 2004; Vickers et al., 2006; Whittemore et al., 2005). In addition, Vickers, et al. (2006) found depressed patients to utilize fewer strategies linked to relapse prevention and restructuring of plans. Depressed patients also listed more cons in a decisional balance scale, had lower exercise self-efficacy and had lower positive outcome expectations for exercise. An estimated 20-40% of

individuals with type 2 diabetes also have depression (Anderson, Freedland, Clouse & Lustman, 2001). Furthermore, the presence of depression is significantly associated with diabetes complications (de Groot, Anderson, Freedland, Clouse & Lustman, 2001). Importantly, depression is also linked with heavy alcohol use (Epstein, Induni & Wilson, 2009). Although depression and alcohol use are not constructs in current health behavior models, their role in models specific to diabetes and physical activity should be evaluated. At a minimum, alcohol intake and depression appear to be important clinical concerns for health care providers.

Endorsements of single items within a personal stress scale “My life is out of control because of my diabetes” and “I have other problems more serious than diabetes” were associated with decreased levels of activity (Albright et al., 2001). Personal stress, depression and excessive alcohol intake are all associated with decreased exercise levels. These concepts have been studied in cross sectional surveys and how these concepts fit into a staged theory of exercise behavior maintenance remains to be determined. Comorbid conditions such as excess alcohol intake and depression warrant clinician attention.

In summary, this review of the non-interventional health care literature illuminated many of the gaps in understanding the predictors of exercise behavior in individuals with type 2 diabetes. These gaps include many inconsistencies in the predictive value of sociodemographic and clinical characteristics. Self-efficacy was the only theoretical concept that appeared to be a consistent factor. Self-efficacy refers to the person’s confidence in being able to carry out a specific health behavior. In cross sectional studies, it is impossible to describe the direction of the association. It is just as

possible that exercise self-efficacy helps people start an exercise program as it is that once you have started an exercise program, your confidence in being able to carry it out increases. There were also findings that challenge common logic for example that being uninsured, being concerned about street crime, having physical complaints, or having increased body mass index were associated with higher activity levels. There were consistent findings that higher alcohol consumption and depression were linked with lower levels of physical activity. However, these studies were cross-sectional in nature and did not allow for identification or nor evaluation of a maintenance phase of exercise behavior.

**Conclusion:**

Generally in grounded theory it is not recommended to complete a preliminary literature review (Simmons, 2009). The primary reason for postponing the literature review is so that the researcher enters the field without any preconceived notions about what will be found (decrease the chance of researcher bias) (Glaser, 1978). However, in the current study, preliminary literature review was done to provide background information on diabetes, exercise and health behavior change models. In addition, the preliminary literature review illuminated the gaps in the understanding of health behavior maintenance.

Type 2 diabetes is becoming more prevalent. Type 2 diabetes is a metabolic disease of insulin resistance, deficient insulin secretion and excess glucose production in the liver. These abnormalities are associated with obesity and inactivity. In general, modern society is sedentary; there is less activity associated with activities of daily living and a relatively small percentage of people exercise regularly. Once a

person is diagnosed with diabetes, the cornerstone of therapy is exercise. Yet people with type 2 diabetes are even less likely to exercise regularly than the general population.

Exercise is effective treatment for type 2 diabetes as it improves insulin sensitivity and lowers blood glucose levels. Elevated blood glucose levels are associated with the complications of diabetes which are the leading cause of blindness, kidney failure and non-traumatic amputations. The effect of exercise is almost immediate but the benefits last only a short period of time. Due to the chronicity of diabetes and the effective, but short-lived effects of exercise, it is recommended that people with type 2 diabetes exercise on most days of the week. A near-daily exercise routine must be maintained for a lifetime.

There are at least four commonly used models of health behavior change: the health belief model, the theory of planned behavior, the transtheoretical model and the precaution adoption process model. The strength of these models is their ability to predict what skills are used by people to initiate behavior change. They all lack power in predicting what processes underlie maintenance of health behavior change over time.

The preliminary literature review resulted in discovery of an emerging theory of health behavior maintenance (Rothman, et al., 2004; Fuglestad, et al., 2008). The variables of primary interest in that research are regulatory focus (Higgins, 1998), satisfaction and self-efficacy. Studies in smoking cessation and weight loss have resulted in support of their hypothesis that satisfaction is relevant and that regulatory focus (either prevention or promotion) change from adoption to maintenance of health behavior. Self-efficacy has a moderating effect.

In addition to the emerging theory, a review of the literature uncovered inconsistent findings in predictors of activity in adults with type 2 diabetes. The studies in the review were largely observational, self-report surveys of exercise behavior and predictor variables. As well as inconsistent findings among the studies evaluated, there were inconsistent measures of predictor variables. Despite the inconsistencies, it would appear that exercise self-efficacy, social support, depression and alcohol consumption may be important predictors of exercise. However, no apparent unifying theory that helps predict exercise behavior in adults with type 2 diabetes was uncovered.

Bracketing is an activity used in qualitative research to uncover researcher bias. By using the bracketing process, the researcher can themselves become aware of their biases. As well, by making potential biases transparent, others may judge the validity of the researcher's results. Through full disclosure of the preliminary literature review, through maintaining an attitude of genuine inquiry and by completing bracketing activities prior to and throughout the data analysis process, bias has been minimized.

The lack of adequate models to describe health behavior maintenance calls for research in this area. Armed with a better understanding of the processes that underlie exercise behavior maintenance, effective strategies may be designed to assist others in sustaining an exercise program. This is particularly critical in older adults with type 2 diabetes. The percentage of the population with type 2 diabetes is expected to grow exponentially and persistent exercise is the cornerstone of therapy. Exercise can prevent or postpone the onset of costly (both in dollars and in quality of life) complications.

## **Post Analysis Literature Review**

The preliminary literature review focused on constructs of the topic of interest to the current study; that is, type 2 diabetes, exercise and health behavior maintenance. Prior to the current study, the researcher's knowledge of health behavior change models included the commonly used models (health belief model, theory of planned behavior, transtheoretical model and precaution adoption process model). Thus, these models were reviewed as part of the preliminary literature review. After data analysis, three health behavior maintenance models/theories were uncovered during ongoing literature searches. These models will be described. Two of these models address health behavior change in general (Four Phase Behavior Change Process [Rothman, Baldwin & Hertel, 2004] and Health Behavior Internalization Model [Bellg, 2003]) and one specifically addresses physical activity maintenance (Physical Activity Maintenance Theory [Nigg, et al., 2008]).

In addition to the uncovered models that specifically address health behavior maintenance, several other theories are beginning to appear in the literature in association with health behavior change, behavior maintenance, and/or adherence; some of these theories are beginning to study their contribution to explaining exercise behavior. These theories include self-determination theory (Deci & Ryan, 1985; Ryan, 2008), patient activation (Greene & Hibbard, 2005), Eccles model of achievement-related choices (Eccles, 2005), self-regulation (Carver, 2004; Leventhal, Brissette & Leventhal, 2003; Schmeichel & Baumeister, 2004), personal investment theory (Gray-Lee & Granzin, 1997) and exercise self-schemata (Kendzierski, 1990; Wilcox, 2003).

Each of these theories potentially contributes to the understanding of exercise behavior maintenance and potentially enhances the theory of *Progressive Self-Curing*.

However, consistent with grounded theory methodology, the post analysis literature review is done to identify research that most closely resembles the newly emerged theory. In this case, Newman's Theory of Health as Expanding Consciousness (2000) and the Theory of Integration (Hernandez, 2007) most closely matched the theory of *Progressive Self-Curing*. The post-analysis literature review will conclude with a review of the Theory of Health as Expanding Consciousness (Newman, 2000) and Theory of Integration (Hernandez, 2007). These two theories do not address health behavior maintenance in the traditional approach of health behavior models. However, they do contribute to our understanding of individuals living with chronic illness (Newman, 2000) and of individuals living with diabetes (Hernandez, 2007).

Prior to reviewing the Theory of Health as Expanding Consciousness (Newman, 2000) and the Theory of Integration (Hernandez, 2007), three constructs that provide helpful background to the analysis of the current study will be introduced. These three constructs are boredom, monitoring and social support/social networks.

### **Boredom as a construct in health behavior maintenance.**

No consensus on a definition of boredom exists (Vodanovich, 2003a&b; Martin, Sadlo & Stew, 2006). Boredom generally occurs in situations high in monotony and repetition (Harris, 2000; O'Hanlon, 1981). This is in contrast to the suggestion that boredom may come from overload of stimulation and trivia (Martin, et al., 2006). Boredom may also arise if an individual is forced to do something they do not enjoy (Troutwine & O'Neal, 1981). Sometimes, boredom has been recognized as a very

serious problem; it has been associated with substance abuse, overeating, gambling, a lesser feeling of purpose in life, less volunteering and lower school and work achievement (Harris, 2000). Boredom is generally linked with negative affect including lethargy, low motivation, restlessness, unpleasantness, and frustration (Martin, et al., 2006; Harris, 2000). Although there is no definitive consensus on boredom, its consequences are generally reported as negative. Relevant to the current study is the possibility that routine exercise could be considered boring. After all, routine exercise is repetitive and could be monotonous. If boredom is linked to lethargy, low motivation and frustration, these responses could de-motivate individuals from exercising regularly.

Boredom has most often been studied in school or work settings (O'Hanlon, 1981; Sommers & Vodanovich, 2000). Working in an environment that demands repetitive, machine-paced tasks is one such "boring" environment. Workers in these boring environments had three to seven more times the incidence of health problems including cardiovascular disease, stress disorders, and absenteeism for medical problems (O'Hanlon, 1981). Performance inefficiencies and general dissatisfaction accompany boredom (O'Hanlon, 1981). Habituation (inhibited cortical arousal) is compensated with effort (attempt to restore cortical arousal for peak performance). When effort fails, there is performance failure (O'Hanlon, 1981). When studied in structured environments such as work and school, boredom has been shown to have detrimental affects. Studies addressing boredom in leisure time or more specifically in regular exercise routines were not discovered in the literature search. Study of boredom

in non-monotonous situations could expand our understanding of the phenomenon. The possibility that boredom is a personality trait will be examined next.

In addition, then, to monotonous situations that cause boredom, boredom has been characterized as a personality trait (Farmer & Sundberg, 1986). Multiple studies have identified psychological correlates of the “boredom-prone” individual (Farmer & Sundberg, 1986). These correlates include greater levels of impulsivity and dogmatism; lower levels of vigilance, sociability, assertiveness and lacking traits of a self-actualizing individual (Harris, 2000). Thus, there does appear to be some evidence that boredom may be a personality trait.

In a qualitative study on the phenomenon of boredom, Martin, et al. (2006) discovered four categories of people: those primarily bored at work, those primarily bored at home, those who were almost always bored and those who were almost never bored. The “always bored” also experienced alienation, depression, mental illness, exhaustion, loss of mobility, and loss of purpose (Martin, et al., 2006). On the other end, those never bored had a positive philosophy, spirituality, involvement in many interests, acceptance of the current situation and a sense of humor (Martin, et al., 2006). Individuals who experienced situational boredom (work or home) tended to have fewer social contacts, repetitive and unchallenging environments, no commitments and poor time management (Martin, et al., 2006). Personality-based responses to the tasks of health behavior maintenance could be an important consideration.

## **Monitoring as a construct in health behavior maintenance.**

### ***Historical perspective.***

The ability to measure blood glucose levels was instrumental to the discovery of insulin. It allowed Banting and Best, Nobel prize winners for the discovery of insulin, to demonstrate the blood glucose lowering effect of their pancreas extracts (Marks, 1996). The discovery of insulin almost overnight changed type 1 diabetes from a rapidly fatal disease to a disease that was manageable. This in turn created a compelling reason for measuring blood glucose (Marks, 1996). Early (1950's) blood glucose monitoring techniques required relatively large amounts of blood and relatively cumbersome technology. Technology has advanced rapidly so that now home blood glucose monitoring can be done with very small quantities of blood with sophisticated and compact machines (Marks, 1996). The Diabetes Control and Complications Trial (DCCT) firmly established the benefits of intensive blood glucose management including frequent monitoring (Diabetes Control and Complications Trial Research Group, 1993). The trial demonstrated that tight blood glucose control reduced the risk of long-term complications.

The results of the DCCT increased the frequency of blood glucose monitoring of all people with diabetes—type 1 and type 2. Yet, the value of blood glucose monitoring in individuals with type 2 diabetes who do not take insulin has not been demonstrated (Farmer, et al., 2009). In the DiGEM (Diabetes Glycemic Education and Monitoring) study, Farmer, et al. (2009) randomized adult patients (n=453) with type 2 diabetes who were not on insulin to one of three groups (1) usual care (control), (2) self-monitoring blood glucose with patient training focused on clinician interpretation of results in

addition to usual care, (3) self-monitoring of blood glucose with additional training in patient interpretation and application of results with the idea of enhancing motivation and adherence to healthy lifestyles. At the end of 12 months, there was no difference in blood glucose control between the groups. However, in in-depth interviews the researchers did identify patients who did use blood glucose monitoring to assess the impact of lifestyle choices and motivate adherence (Farmer, et al., 2009). There were also patients who monitored more intensively and had an increased perceived seriousness of diabetes (Farmer, et al., 2009). Although there was no difference in average blood glucose control between the groups, there does appear to be individuals who prefer and/or may benefit from blood glucose monitoring despite their not being on insulin therapy to increase adherence to lifestyle changes. These individuals challenge the tradition of using blood glucose monitoring solely for medication adjustment.

### ***Continuous Glucose Monitoring.***

The newest technology for monitoring blood glucose levels is Continuous Glucose Monitoring System (CGMS). These systems continuously record blood glucose measurements every 10 seconds and the monitor records an average every 5 minutes. The individual wearing the device is also able to input events such as meals and exercise periods (Allen, Jacelon & Chipkin, 2009). Allen, Jacelon and Chipkin (2009) found that continuous glucose monitoring reinforced exercise behavior by visually capturing the decrease in blood glucose levels following exercise. The monitoring increased the participants' sense of accomplishment, helped them see how exercise and diet were related to blood glucose levels and made the need to change diet and exercise behavior "real" (Allen, et al., 2009). Likewise, Yoo, et al. (2008) found

that continuous glucose monitoring improved blood glucose control with significant reduction in calorie intake and significant increases in physical activity.

***Other self-monitoring.***

The historical roots of blood glucose monitoring have led to the use of blood glucose results to be used primarily for medication adjustment. For many patients with type 2 diabetes, however, self-monitoring includes their subjective experiences. Wilde and Garvin (2007) define self-monitoring as “awareness of symptoms or bodily sensations that is enhanced through periodic measurements, recordings and observations to provide information for improved self-management” (p. 343). Once aware of symptoms, patients formulate an interpretation and response (Song & Lipman, 2008). Being aware of a patient’s subjective experience and how it might influence their skills in interpretation and response could have important implications for increasing engagement in self-care behaviors (Song & Lipman, 2008).

**Social networks/social support as constructs in health behavior maintenance.**

Social networks and social support have been shown to be health-enhancing (Heaney & Israel, 2002). Social relationships have a powerful influence on health (Heaney & Israel, 2002). Social networks and social support are the main concepts that have been used in studies of the health-enhancing components of social relationships (Heaney & Israel, 2002) and will be described below.

***Social networks.***

Social network is defined as “a person-centered web of social relationships” (Heaney & Israel, 2002, p. 187). Social networks are further characterized by specific

relationships that may exist within the network; for example the extent to which support is both given and received (reciprocity); extent of emotional closeness (intensity); and extent of multiple functions (complexity). Social networks can also be described by the characteristics of the network as a whole; for example, the extent to which members know and interact (density) or the extent to which members are demographically similar (homogeneity). In a study of the effects of social networks on health, participants described more positive social network influences than negative (Gallant, Spitze and Prochaska, 2007). However, social networks can have negative influences. Negative influences are more readily described coming from family members than friends (Gallant, et al., 2007). This is consistent with findings by Groh, Jason and Keys (2008). In their review of the Alcoholics Anonymous literature, they found that positive effects of social networking were more likely to come from friendships than from family members. There is a positive association between social networks and physical activity (Bertera, 2003; Vance, Ross, Ball, Wadley & Rizzo, 2008). Social networking in both of these studies, however, was measured by amount of contact to discriminate between social networking and isolation (Bertera, 2003; Vance, et al., 2008). This “counting” of social contacts did not evaluate the quality and content of the social network.

In addition to receiving support, an important corollary may be giving support. In support of the importance of altruistic acts to health, Brown, Consedine and Magai (2005) found that giving support was associated with lower morbidity (while receiving support was not). The relationship between lower morbidity and giving support held even when socioeconomic status, education, marital status, age, gender and ethnicity were controlled for (Brown, et al., 2005). One of the most recognized social networks

is Alcoholics Anonymous (AA) (Groh, et al., 2008). Alcoholics Anonymous has a strong tradition of helping others to help the helper. Helping others is felt to lead to trust, purpose and a shift of focus from self to others (Groh, et al., 2008).

***Social support.***

Social support is defined as “aid and assistance exchanged through social relationships and interpersonal transactions (Heaney & Israel, 2002, p. 187). Social support has been categorized into four main types: emotional, instrumental, informational and appraisal. Each type of support provides a different kind of supportive behavior. Emotional social support provides empathy and care; instrumental support, direct services; informational support, advice, suggestions and information and appraisal support, affirmation and feedback (Heaney & Israel, 2002). Social support is always intended to be helpful; importantly, perceived social support is the partnered construct. The receiver of support must perceive it as such (Heaney & Israel, 2002). Social support has been demonstrated to have important causal effects on health (Heaney & Israel, 2002). Social support is associated with increased physical activity in older adults (Rhodes, Martin & Taunton, 2001; Resnick, Orwig, Magaziner & Wynne, 2002).

Finally, worksite social support is highlighted in research conducted by Tessaro, et al. (2000). Training peers in health promotion increased health promotion behaviors including physical activity. Of particular note is that participation due to specific health concerns common to others in their workgroup increased helping behavior (Tessaro, et al., 2000). Both social networking and social support positively influence physical activity behaviors in older adults.

## **Health Behavior Maintenance Models**

In the preliminary literature review, health behavior change models were described. These models for the most part describe behavior initiation or adoption but lack explanatory power for maintenance of health behavior change. On-going literature searches uncovered three models/theories of health behavior maintenance; none of the theories has been researched. The three models/theories are: Four Phase Behavior Change Process Model, Health Behavior Internalization Model and the Physical Activity Maintenance Theory. These models and theory will be described next.

### **Four Phase Behavior Change Process.**

Rothman, et al. (2004) have posited a new behavior change process that solves what they believe to be the shortfall of current health behavior change models; that is, the model incorporates distinct maintenance and habit phases which have distinctly different psychological processes than the initiation and continued response phases. The four phases of their model for behavior change are initial response, continued response, maintenance and habit. The first two phases, consistent with other health behavior change models, rely on self-efficacy beliefs, outcome expectations, personality and situation (Rothman, et al., 2004). While personality and situation continue to have an effect in the maintenance phase, the primary determinant of transition to the next phase, habit, is satisfaction with the new behavior (Rothman, et al., 2004). The final phase is habit and is defined as “self-perpetuating pattern of behavior” (p.135) and prior behavior is the primary determinant to sustain the behavior (Rothman, et al., 2004). Habit is distinguished from maintenance. During maintenance “people choose to

maintain a pattern of behavior based on a repeated assessment of the behavior's value" and during the habit phase, "people continue to maintain the behavior without any consideration of a behavioral alternative" (Rothman, et al., 2004, p.134).

The major contribution of the Four Phase Behavior Change Process is its acknowledgement that different psychological processes operate in initiation and maintenance of behavior. The main difference across the phases of the model is how much thought is given to the behavior. Rothman, et al. (2004) posit that initially new behaviors take a lot of decisional effort weighing the costs, benefits and value. If the activity results are satisfactory, less and less evaluation of the activity takes place and eventually the behavior becomes automatic (habit) and is done without continued deliberation.

#### **Health Behavior Internalization Model (HBIM).**

Bellg (2003) describes the health behavior internalization model. This model of health behavior maintenance is based on a continuum of health-related experience from external regulation through introjected and integrated self-regulation. External regulation, as the name implies, refers to perceived imposition from others to change behavior. At this level the person responds to external rewards and anticipated consequences (Bellg, 2003). The intermediate level of internalization is introjected regulation. At this level, regulation is internal but it is still very close to controlling external regulation. This process results in motivation by guilt and shame and there is often conflict about engaging in the behavior (Bellg, 2003). Individuals at the external or introjected levels have high levels of self-conflict and low acceptance, autonomy, security, perceived support, satisfaction, competence and coping (Bellg, 2003). At the

other end of the regulation continuum is integrated self-regulation where the behavior change is integrated with one's values and sense of self and there is no sense of conflict. In integrated self-regulation, the behavior is self-determined and is "consistent with other values and the way the person wants to be and function in the world" (Bellg, 2003, p. 115). Integrated internalization results in low self conflict and high acceptance, security, autonomy, support, satisfaction, competence and coping (Bellg, 2003).

The HBIM contributes to the discussion by addressing the maintenance phase of health behavior. Presumably all individuals on the continuum are maintaining at least one health behavior change. It is not explicitly stated whether or not individuals progress through the continuum or whether the model is describing a continuum of potential responses to pressure to incorporate health behavior change. The external regulation end of the continuum would appear to be less stable with its multitude of negative attributes as compared to integrated internalization.

### **Physical Activity Maintenance (PAM) Theory.**

Recognizing the importance of sustaining a physical exercise program and the gap in the health maintenance literature, Nigg, et al. (2008) developed the physical activity maintenance theory. Although the physical activity literature includes pieces of a potential model, there has been no research on a cogent framework of physical activity maintenance (Nigg, et al., 2008). Nigg, et al. (2008) believed there was an absence of specific maintenance measures, of experimental interventions addressing maintenance and of a theoretical framework. Therefore, Nigg, et al. (2003) set about building a theory from the physical activity literature. Nigg, et al. (2003) proposed that

their framework is the first “cogent theoretical framework” of physical activity maintenance. Attributes of the PAM theory that distinguish it from the commonly used health behavior models are “(a) it focuses explicitly on physical activity maintenance; (b) it incorporates the triggers for physical activity relapse; and (c) it integrates individual and environmental aspects deemed to be important for maintaining physical activity” (Nigg, et al., 2008, p. 549). The PAM theory is not a staged theory but it is multi-level. The theory contains both intra-personal and inter-personal constructs.

Furthermore, the goal of the theory is to stimulate research in physical activity maintenance. By devising a theory Nigg et al. (2008) hoped to “(1) increase understanding of the mechanisms of physical activity maintenance, (2) increase understanding of the underlying reasons why the mechanisms failed or worked, (3) increase understanding of which mechanisms influence short-term change and which influence long-term change, (4) identify what mediators of physical activity maintenance an intervention should target and (5) design evaluations that can determine why an intervention was (or was not) successful” (p. 555). Thus with the goals of filling the gaps in our understanding of physical activity maintenance and stimulating research in this area, Nigg, et al. (2008) have suggested the theory of physical activity maintenance.

In the theory of physical activity maintenance, intra-personal and inter-personal (context) constructs are seen as mediators. Mediators explain the mechanism by which two variables are associated; they imply a causal process (variable X causes M which in turn causes Y). Variables are identified as mediators in theory building to establish causation (Baron & Kenny, 1986). In the physical activity maintenance theory, mediator

variables explain the relationship between interventions and physical activity maintenance. At the intra-personal level of the theory, there are three mediators affecting the relationship between intervention and outcome (physical activity): goal-setting, motivation and self-efficacy. Each of these mediators provides a unique explanation of physical activity persistence and is defined as a construct specific to the theory (Nigg, et al., 2008) and is likely needed to fully understand behavior maintenance.

Goal setting is task-oriented, operates through commitment and achievement and is related to satisfaction. Three goal-setting constructs specific to physical activity maintenance are satisfaction with goal attainment (satisfaction with progress toward attaining the personal goal), attainment (actually reaching maintenance goals) and commitment (commitment to physical activity maintenance goals) (Nigg, et al, 2008). Goal setting is the only task-oriented behavior at the intrapersonal level. Motivation and self-efficacy, which will be described next, are psychological processes.

Motivation has two constructs specific to physical activity maintenance: self-motivation and pros/cons. Self-motivation is an intrinsic attribute; it a generalized tendency to persist in the long-term pursuit of personal goals (Nigg, et al., 2008). Considering the pros and cons is a construct borrowed from the transtheoretical model of health behavior change but is applied specifically to physical activity maintenance (Nigg, et al., 2008).

Self-efficacy in physical activity maintenance theory is multi-dimensional and addresses “confidence to maintain long-term physical activity when encountering specific barriers” (Nigg, et al., 2008, p. 553). Relapse self-efficacy (how tempted an

individual is to give up regular exercise across a number of different situations) and barrier self-efficacy (negative affect, excuse making, equipment access, weather, as examples) are major self-efficacy dimensions specific to the theory.

Self-efficacy, self-motivation and goal-setting each contribute uniquely to physical activity maintenance and they are interrelated. The interrelatedness is bidirectional; that is they affect and are affected by one another. One example of the bidirectional interrelatedness is that self-efficacy is inherently linked to goal-setting and motivation. On the other hand, high levels of self-efficacy coupled with low motivation may lead to unrealistic optimism and overconfidence and low levels of adherence (Nigg, et al., 2008). Goal-setting, motivation and self-efficacy operate at the intrapersonal level of the explanatory theory and their relationships to one another are bidirectional and complex.

The physical activity maintenance theory also has two constructs at the interpersonal level: environment and life stress. Environmental factors that are salient to physical activity maintenance include access, aesthetics (e.g. pleasant weather, enjoyable scenery) and social support (Nigg, et al., 2008). Life stress is generally thought to negatively impact physical activity maintenance. Life stress includes recent life changes (e.g. marriage, divorce, holidays, changes in work [Miller & Rahe, 1997]) and life hassles (e.g. safety, house repairs, partner violence [Nigg, et al., 2008]).

In summary, the physical activity maintenance model is a multi-level theory with both intrapersonal (motivation, goal-setting and self-efficacy) variables as well as interpersonal (environment and life stress) variables. All the variables mediate the relationship between interventions aimed at physical activity maintenance and actual

degree of physical activity maintenance behavior. The theory is based on research in the physical activity field and has the goal of increasing research on physical activity maintenance (Nigg, et al., 2008).

### **Critique of theory structure**

The theories of health behavior change described above are of three basic structures: staged, continuum and multilevel. There are proponents of all basic structures. After all, behavior change can occur as a continuous process or as a series of distinct stages (Lippke, Ziegelmann, Schwarzer & Velicer, 2009) and most certainly within a multiple level context (Henly, 2007; Raudenbush, 1995).

Stage models are very attractive. A theory that correctly describes an orderly series of stages allows for targeted and sequenced treatments (Weinstein, et al., 1998). A prototype can be described for each stage. Although no individual is likely to match this prototype perfectly, there will be relatively small differences among people in the same stage and relatively large differences between people in different stages (Weinstein, et al., 1998). It is this homogeneity of individuals at particular stages of change that allow for effective, targeted intervention (Lippke, et al. 2009).

Furthermore, staged models have garnered empirical support. In an extensive review of 48 health behaviors, decisional balance (weighing the pros and cons) was shown to be a particularly robust indicator of movement through stages of health behavior change (Hall & Rossi, 2007).

But, perhaps, this notion of homogeneity, stage identification and targeted intervention is an oversimplification. Oversimplification underpins one of the arguments against stage theory posited by Adams and White (2005). Their review

highlights the failure of stage-based interventions to increase physical activity. At least some health behavior change, for example, exercise is very complex behavior (Adams & White, 2005). Stage theories are ineffective in guiding interventions because the complexity of behavior change is not recognized; complex behavior may be determined by factors not in stage theory (Adams & White, 2005).

Additional problems with stage theories have been studied (Herzog & Blagg, 2007; Rodgers & Gauvin, 1998). Rodgers and Gauvin (1998) found motivational heterogeneity between two groups of women both of which had been identified to be in the maintenance phase of the transtheoretical model of health behavior change. One group exercised two times per week, the other three times per week. Those that exercised three times per week had high levels of self-efficacy and higher incentives for stress reduction and mental health (Rodgers & Gauvin, 1998). In another example of difficulty in staging individuals, Herzog & Blagg (2007) could not identify distinct categories of individuals assessed about their intentions and behaviors of smoking cessation. Therefore, in these cases, differences were demonstrated not only between stages but within stages. In addition to possible heterogeneity among individuals within a stage, another criticism of current staged theories has been highlighted by Lippke, et al. (2009). Lippke, et al. (2009) note that stage definitions rely heavily on time frames. They question whether the appropriate time frames have been selected. Furthermore, time frames may be more or less appropriate for different behaviors (Lippke, et al., 2009). In fact, in their recent review of stage theory research, Lippke, et al., (2009) could find no studies testing the duration of behavior pattern performance in any stage. In final arguments against stage theory, Adams & White (2005) and Brug, et al. (2005)

criticize stage theories for focusing on stage progression which is always not associated with behavior change. Furthermore, algorithms for determining current stage of change have not been validated (Adams & White, 2005; Brug, et al., 2005). Some of the difficulty with highlighting attributes of stage theory is that few studies have been designed to distinguish one stage from another (Williams, et al., 2008).

The very same argument of oversimplification that has been waged against stage theory has also been waged against continuum theories (Weinstein, Rothman, and Sutton, 1998). Continuum theories are described as a set of variables that predict behavior (Weinstein, et al., 1998). The individual's "scores" on the variables are entered into a prediction equation and then the individual is placed on a continuum of action likelihood (Weinstein, et al., 1998). The argument follows that it is unlikely that human behavior can be reduced to a simple prediction equation (Weinstein, et al., 1998). Another criticism launched against continuum models is their linear nature. Linearity implies that there need be no matching of intervention to individuals and no sequencing is necessary (Weinstein, et al., 1998).

Continuum theories are variable models and are criticized in contrast to multiple level models. Henly (2007) draws attention to "variable-focused" science vs. "patient-centered" science. Variable-focused science researches how variables influence one another (e.g., self-efficacy increases exercise) but the person has disappeared (Henly, 2007). In quantitative research, participants are chosen by a set of criteria so that the sample will be representative of a population. The situation creates the role of participant as "interchangeable object" (Henly, 2007, p. 147). A solution to the individual disappearing from nursing research is to use multi-level models. Multi-level

models can be used to explain intra- and inter-individual variability (Henly, 2007). Statistical programs that allow mapping a multi-level theory are a relatively recent development (Raudenbush, 1995). Raudenbush (1995) cites a paper by Burstein (1980) as the stimulus for improving research and statistical methods to include multiple levels. Burstein (1980) argues that educational research at the time (1980) was disconnected from reality. Although researchers realized that individuals were inherently intertwined in groups, statistical models were wrong; the models did not structure the data adequately (Raudenbush, 1995). Multilevel structuring of data acknowledges that individuals are affected by both the individual and group features of social structures (Burstein, 1980).

The health behavior change models described in the preliminary literature review and the health maintenance models described in the post-analysis literature review each fit into a theoretical structure. The Transtheoretical Model, Precaution Adoption Process Model and Four Phase Behavior Change Model are staged theories. The Health Belief Model, Theory of Reasoned Action/Planned Behavior and HBIM are continuum models. An additional distinction of continuum models is their predictive value. While HBIM is a continuum model, it does not have predictive qualities. Finally, the Physical Activity Maintenance Theory has a multi-level structure. The basic structure of the theories/models and their subsequent strengths and limitations in explaining health behavior maintenance are summarized in Table 2 above.

### **Other Literature**

Thus far the post-analysis literature review has provided background information on the constructs of monitoring, boredom and social support, health

maintenance models and a general critique of model structures. Before leaving the post-data analysis literature review and consistent with the grounded theory method, additional literature searches were completed to identify other possible approaches to thinking about living with chronic illness.

The analysis of the data for the current study suggested that living with diabetes might transcend the focus on any particular task or behavior. Ovid Medline, CINAHL and PsycInfo searches were initiated. Search terms used included “nursing theory,” “transformation”, “transpersonal psychology” and “humanistic psychology” in different combinations.

The search uncovered evidence that a number of researchers and authors are writing on transformation and human potential including Leonard (1992), Tolle, (1999, 2005), Dacher (2006), Schlitz, Vieten, and Amorok (2007), Wilber (2008) among others. However, two theories appeared particularly pertinent to the current study. These two theories are the Theory of Health as Expanding Consciousness (Newman, 2000) and the Theory of Integration (Hernandez, 2007). The Theory of Health as Expanding Consciousness (Newman, 2000) has unique aspects to offer. The Theory of Health as Expanding Consciousness (HEC) (Newman, 2000) is a nursing theory. Studies of its use in nursing have demonstrated transformation of not just patients (Endo, Miyahara, Suzuki, Ohmasa, 2005; Pharris & Endo, 2007) but also transformation of nurses (Endo, et al., 2005; Pharris & Endo, 2007). Additionally, there is much about HEC that resonates with the theory of progressive self-curing. Therefore, the next section will describe the theory of Health as Expanding Consciousness (Newman, 2000) and the Theory of Integration (Hernandez, 2007).

**Health as expanding consciousness (HEC).**

Health as the absence of disease or disability is not possible for all individuals. Development of the theory of health as expanding consciousness was stimulated by concern for such individuals (Newman, 2007). According to Newman (2007) health as expanding consciousness theory “asserts that every person in every situation, no matter how disordered and hopeless it may seem, is part of the universal process of expanding consciousness—a process of becoming more of oneself, of finding greater meaning in life, and of reaching new dimensions of connectedness with other people and the world.”

***Assumptions of HEC.***

- (1) Consciousness is a manifestation of an evolving pattern of person-environment interactions (Newman, 2007).
- (2) Consciousness is defined as “the capacity of the system to interact with the environment” (Newman, 2000, p. 33) and is the “pattern of the whole that identifies each person” (Newman, 2002, p.9).
- (3) Health and illness are unitary processes. There is no dichotomy of health and illness (Newman, 2009).
- (4) A person is identified by pattern. Behavior is an indication of pattern (Newman, 2000). Patterns evolve through order and disorder (health and disease). Patterns emerge by uncovering the meaning in a person’s life (Newman, 2007).

### *Supporting Theories of HEC.*

David Bohm's theory of reality as undivided wholeness (Newman, 2007) is one of the underlying theories of HEC. The primary order of reality is an underlying pattern. All human functioning is a manifestation of this underlying pattern. Disease and non-disease cannot be separated from the whole (Newman, 2007). The other theory that underlies HEC is Arthur Young's theory of human evolution (Newman, 2007). Evaluation of consciousness in Young's theory has to do first with loss of freedom followed by movement toward total freedom (Newman, 2000).

When old patterns are not working any longer, the individual is faced with a choice. Choice points "occur when disorder is considerable and new directions are needed, for example, when strategies that worked in the past are no longer satisfactory and new solutions need to be found" (Neill, 2005). "The task is to learn how things work, to discover the new rules and to move on to a new level of being and understanding" (Newman, 2007). When an individual is faced with a choice, there is chaos, strain, and uncertainty. Uncertainty is an opportunity to transition from one perspective of life to one at a higher order (Newman, 2007). Movement through this period of chaos is facilitated by the presence of a caring other (Newman, 2007). As expanding consciousness progresses there is a feeling of time slowing and living more intensely in the present. Living more fully in the moment frees people from worldly concerns (Neill, 2005) although dedication to concerns beyond the self begins to occur as consciousness expands (Endo, 1998).

***Paradigm Shift.***

- (1) From treatment of symptoms to search for a pattern (Newman, 2007). A shift from predictable outcomes that “fix” problems to action evolving out of pattern recognition (Newman, 2000).
- (2) From viewing disease as negative to viewing it as part of the process of expanding consciousness. In expanding consciousness, people develop more complex relationship, more meaningful connections with others and achieve greater spiritual freedom rather than freedom from disease (Newman, 2000). Illness is seen as a manifestation of health within the context of the whole (Jones, 2006).
- (3) From viewing the nursing role as helping with the problems of the disease to assisting people to get in touch with their own pattern of expanding consciousness (Newman, 2007). Pattern recognition is “knowing” and understanding one’s own pattern in relation to other people and the environment (Newman 2002, p. 9) As nurse and patient attend to unfolding patterns of interaction with the environment, deeper insights and new vision into potential actions arise (Pharris & Endo, 2007). The agenda for action arises out of the evolving pattern—it is not a predetermined or prescribed intervention (Pharris & Endo, 2007).

***Personal Transformation.***

Newman’s Theory of Health as Expanding Consciousness underlies the processes of personal transformation. Personal transformation is a non-linear process involving self-reflection and the adoption of new and broader self-definitions. As

individuals expand their consciousness with each transformative experience, awareness is enhanced. Through increased awareness, individuals reach toward the highest level of consciousness, absolute or divine love (Wade, 1998). Personal transformation is “a dynamic, uniquely individualized process of expanding consciousness whereby an individual becomes critically aware of old and new self-views and chooses to integrate these views into a new self-definition” (Wade, 1998). Transformation is accompanied by feelings of excitement, satisfaction, freedom, creativity and increased ability to handle stress (Wade, 1998).

The Theory of Health as Expanding Consciousness and its underlying principle of personal transformation stand in sharp contrast to the discrete concepts of the predictive models of health behavior change and to the task-oriented stage theories. HEC also challenges the current prevailing health care paradigm that is based on fixing problems, giving advice and dichotomizing health and illness.

#### **Hernandez’s theory of integration.**

The theory of integration emerged from a grounded theory study of individuals with type 1 diabetes. There are three phases to integration: (1) Having Diabetes, (2) Turning Point, (3) Science of One. Phase 1, Having Diabetes, begins at diagnosis and can last for many years. This phase is characterized by lack of knowledge, disinterest, and denial (Hernandez, Antone & Cornelius, 1999). Phase 2, Turning Point, begins when some significant event occurs to force reassessment by the individual living with diabetes. It is characterized by a focus on learning about diabetes and the treatment regimen (Hernandez, et al., 1999). The last phase, The Science of One, is “a personalized science of living with diabetes is a gradual progression out of the second

phase. In this phase, there is “an ongoing, incremental process of building a unique, personalized, and exact science of living with diabetes” (Hernandez, et al., 1999, p.221). In the third phase, there is integration of the “personal” and “diabetic” selves (Hernandez, et al., 1999, p.221). While many individuals did not follow their health care providers’ directions, they did accomplish good metabolic control. Good metabolic control was achieved through tuning into their bodies and achieving an integration of diabetes into their lives (Hernandez, et al., 1999).

In follow up work with the native people of Canada with type 2 diabetes, Hernandez, et al. (1999) found the three phases as described above described the participants experience with just a couple of exceptions. One exception was the description of the turning point. Participants with type 1 diabetes were likely to have a single critical event whereas the participants with type 2 diabetes described multi-factorial turning points. Examples of turning points for participants with type 2 diabetes included developing complications, marital problems, or beginning to attend church (Hernandez, et al., 1999). Another exception was the importance of spirituality in phase 3. Similar to the Theory of Health as Expanding Consciousness, the Theory of Integration sets the stage for a more wholistic view of living with diabetes and maintaining the recommended and prescribed health behavior changes.

## **Conclusion**

The preliminary and post-analysis literature reviews provide context for the theory of *progressive self-curing* which will be described in detail in chapter 4. Commonly used health behavior models focus on initiation of health behavior. This emphasis is consistent with the settings in which they were developed. However,

maintenance of health behavior change is underdeveloped or absent from these models. Proposed models of health behavior maintenance are beginning to appear in the literature. The three health behavior maintenance models described in the post-analysis literature review rely heavily on the traditional health behavior change literature and/or traditional psychological concepts. The exception to this is the Health Behavior Internalization Model that presents a transformational aspect to health behavior maintenance. The transformational aspect of living with diabetes was further reinforced by Hernandez's Theory of Integration. The Theory of Health as Expanding Consciousness (Newman, 2000) and the Theory of Integration (Hernandez, 2007) provide a new lens through which to consider health behavior maintenance in chronic illness.

### Chapter 3: Methods

Classic grounded theory was used for this study because it provided an appropriate way to examine how older adults with type 2 diabetes mastered maintenance of a regular exercise program.

This chapter will provide a general description of grounded theory design and establish the rationale for its use in the current study. Following this, the six stages of grounded theory as described by Simmons (2009) will be used to structure the chapter and will be described in more detail. Grounded theory method as carried out in the current study will be elaborated in each stage. The chapter will conclude by addressing quality issues.

#### Study Design and Rationale

Grounded theory is an inductive methodology and stands in contrast to deductive methods that focus on confirming or refuting *a priori* hypotheses. Grounded theory also differs from other qualitative methods. Many qualitative methods such as ethnography, phenomenology, and case studies do not generate theory but focus on rich description of phenomenon (Glaser, 2001; Johnston, 2006).

Grounded theory was first described by Glaser and Strauss (1965, 1967) and subsequently has been more fully elaborated by Glaser (1978, 1992, 1996, 1998, 2001, 2005). The method is used to generate substantive theory from systematic data collection. The grounded theory method originated by Glaser and Strauss is now referred to as classic (Glaserian) grounded theory (Simmons, 2009).

Grounded theory is focused on identifying main concerns (problems) and how subjects work to resolve the problems. Rigorous research procedures lead to emergence

of conceptual categories. These conceptual categories are related to one another as a theoretical explanation for action that is taken by the participants. The actions taken by the participants are aimed at resolving their main concern (Glaser, 1978). The grounded theory consists of a description of the properties of a main category with its subordinate categories and their relationships to one another. The main category is also called the core variable (with subordinate variables) (Glaser, 1998).

Grounded theories may reveal missing, understated or overstated variables in the literature that have not been grounded in data (Bell & Bromnick, 2003; Bigus, 1996; Glaser & Strauss, 1967; Wilson, 1996). Glaser (1978) goes on to describe that variables not grounded in data come from “great man” or “think it up” theories (p. 11). Glaser (1978) contrasts the source of variables: Variables can come from reading learned people; variables are deducted from preconceived logic and applied to data. Conversely, variables can be inducted from data. Glaser’s argument (1978) is that the “great man” variables may miss, under- or overstate reality. Further, within a focused area, grounded theory assists in making sense of complex situations (Colmant, et al., 2004; Partridge, 1996; Yuen-Sang, 2001) and provides a method to identify new variables of interest (Cranton & Carusetta, 2004). Subsequently, the variables assist in organizing complex ideas into a useable theoretical map (Stern, 1996).

Grounded theory was a logical choice for the current study. Commonly used health behavior models do not adequately explain health behavior maintenance. Little is known about the problems faced by individuals with type 2 diabetes as they work to maintain an exercise program.

## **Grounded Theory Terminology**

Grounded theory has its own terminology that can be challenging to grasp at first. Several words are used interchangeably to mean the same thing. For example, variable, category, construct and concept all mean major findings of the study (Andrews & Nathaniel, 2009). And, variables, properties and subcategories are all used to designate lesser concepts that describe major findings. The “core category” is the main concept to which all other concepts are related (Andrews & Nathaniel, 2009). “Substantive” refers to a specific subject area (Duchscher & Morgan, 2004). For clarity, the present study will use the following terms: Core category will be used for the main concept. The subordinate categories will be referred to stages of the theory. In addition to the stages of the theory, construct will be used to reference three lesser concepts. The substantive area of study is exercise maintenance behavior in older adults with type 2 diabetes.

## **Coding**

Coding is a common thread in qualitative research designs (Thompson, McCaughan, Cullum, Sheldon & Raynor, 2004). Coding is the process through which raw data are interpreted and converted into theoretical categories (Thompson, et al., 2004). As a central process, coding helps the researcher sort data, attach labels of meaning to segments of data and make comparisons with other segments of data (Charmaz, 2006; Morse, 1998). Each code has a distinct name. For example, “pushing” was a code attached to participant data that described parental behavior in placing middle school children in advanced mathematics courses (Johnston, 2006).

### **Coding in grounded theory.**

In grounded theory coding is the “pivotal link between collecting data and developing a theory to explain the data” (Charmaz, 2006, p. 46). Coding strategies differ in classical grounded theory and in methods described by Strauss (Duchscher & Morgan, 2004). Classical grounded theory (Glaserian method) places the researcher in the position of patient listener and waiting for the theory to emerge (Duchscher & Morgan, 2004). During the coding process, Glaser (1978) suggests asking three questions of the data: (1) what are the data a study of, (2) what category does this line or group of lines indicate and (3) what is actually happening in the data? An important distinction here is that it is only these three questions that Glaserian method endorses. Furthermore, these questions are of the data, not the participants (Glaser, 1992).

Strauss and Corbin (1990) suggest multiple questions and strategies that are in sharp contrast to the Glaserian method. These strategies include developing sensitizing, theoretical, practical, structural and guiding questions (Duchscher & Morgan, 2004). These questions are used to guide subsequent data collection. Glaser’s indictment against Strauss is that Strauss’s questions are “highly structured, reductionistic, intrusively deconstructive and force a full conceptual description of data rather than articulate emergent theory” (Duchscher & Morgan, 2004, p.608).

### ***Substantive coding.***

In classical grounded theory, there are two types of codes: substantive and theoretical. Substantive coding has two steps: open and selective coding. Substantive codes conceptualize the empirical data (Glaser, 1978). Open coding generates a multitude of codes that will later be collapsed, reorganized and reordered into a more

representative whole (Duchscher & Morgan, 2004). During open coding, the analyst is comparing data to ideas (Simmons, 2009). Open coding is begun by “line by line” analysis of written memos or other empirical data. It is coding the data in every way possible; coding for anything and everything. Open coding quickly generates many potential categories (Simmons, 2009; Glaser, 1978). As open coding progresses, these categories are verified, corrected and saturated by going over and over the data. As verification, correction and saturation proceed, initial codes may no longer be relevant, fit or work. During the open coding process, the analyst should keep in mind three questions: “What is this data a study of?”, “What category does this incident indicate?”, “What is actually happening in this data?” (Glaser, 1978, p. 57). These questions keep the analyst sensitive to emerging theory and force the analyst to look at patterns among the data. The coding process progresses from the “microanalysis” of open coding to selective coding (Duchscher & Morgan, 2004).

Selective coding focuses the data analysis onto one core variable to delimit the theory. Categories become delimited as the analyst sees commonalities among original categories and moves toward a smaller set of higher level concepts. Further research has as its only objective the development of conditions and consequences related to this core variable (Duchscher & Morgan, 2004; Glaser, 2008). The other codes are not lost but take on a “role subservient” to the core variable (code) (Glaser, 1978, p. 61). For example, in *Awareness of Dying*, Glaser and Strauss (1965) delimited the theory of awareness of dying to the categories of social loss and dying trajectory. However, in subsequent work, these categories became the core variables of focus (Glaser, 1978).

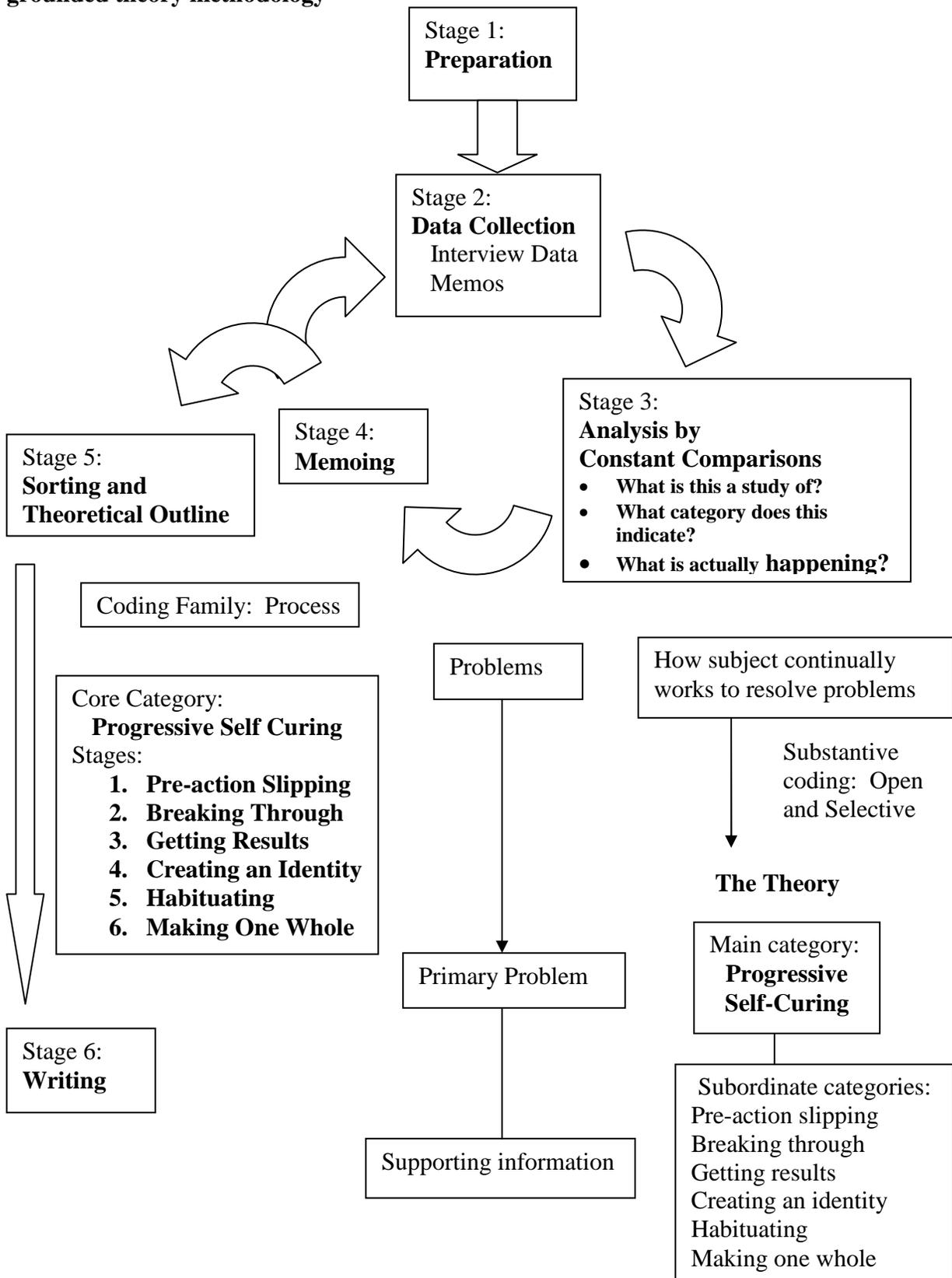
***Theoretical coding.***

Selective coding is followed by theoretical coding (Glaser, 1978). In contrast to substantive codes that focus on the empirical data, theoretical codes conceptualize how the substantive codes relate to one another to create tentative hypotheses. These tentative hypotheses, in turn, comprise the overarching theory (Glaser, 1978; Nathaniel & Andrews, 2007). Ways in which codes relate to one another are referred to as coding families. Glaser (1978) describes 18 such coding families that are meant to sensitize the researcher to integrative possibilities. For example, the interactive family captures how two or more variables interact when it is not possible to determine which comes first (vicious cycle or “chicken or the egg” argument) (Glaser, 1978).

**Coding nomenclature.**

There are two sources of concepts used for categories and their properties (Glaser, 1992). One source is the sociological literature. Examples of codes from this source are self-efficacy, social support, and status. More commonly used in grounded theory is language from the data itself (Glaser, 1992). Concept nomenclature will emerge as the analyst studies, codes and analyzes the data (Glaser, 1992). Most grounded theories explain a dynamic process. This dynamic process is captured by using gerund verbs such as “becoming”, “cultivating”, “making credible” (Andrews and Nathaniel, 2009, p.190). Participant data were used as the source for the categories and constructs in the current study. Furthermore, gerund verbs will be used to reflect the active processes discovered in the study.

**Figure 1. Model for building the Theory of Progressive Self Curing using grounded theory methodology**



## **Grounded Theory Process**

Simmons (2009) outlines the classical grounded theory process in six stages: 1) preparation, 2) data collection, 3) analysis—constant comparative analysis, 4) memoing, 5) sorting and theoretical outline, and 6) writing. Stages generally follow one another and will be described sequentially, however, once the research started, stages 2, 3, and 4 occurred simultaneously. The grounded theory process is illustrated in Figure 2.

### **Preparation.**

Key aspects of the preparation stage are to minimize preconceptions by not performing a preliminary literature review, and to select a general research topic without a predetermined research problem (Simmons, 2009). Addressing issues of human subjects protection is also a part of the preparatory phase.

### ***Minimize preconceptions—bracketing.***

Although it is not possible to eliminate preconceptions, their effect can be minimized through bracketing and maintaining an attitude of discovery (Gearing, 2004). Bracketing has its roots in phenomenology, but is applicable to other qualitative frameworks such as ethnography, hermeneutics, existentialism and generalist qualitative method (Gearing, 2004). Gearing (2004) maintains that bracketing has evolved into six forms since its first description in the early 1900's. The six types of bracketing are ideal, descriptive, existential, analytical, reflexive and pragmatic. The typology is based on phases and elements of the bracket process and reflects a distinct central structure (Gearing, 2004). Of the six forms, the bracketing form most useful to grounded theory is analytical bracketing (Gearing, 2004). In this form of bracketing the researcher

acknowledges the improbability of suspending personal knowledge, assumptions, beliefs, values and viewpoints, yet attempts this suspension. Furthermore, the researcher approaches data collection with the supposition that there exist many possible interpretations of a phenomenon and thus seeks participants' particular perspectives to help clarify the meaning. Suppositions are recognized as part of reality and can become integrated into subsequent iterations of data analysis and sorting (Gearing, 2004; Glaser, 1978). In the preparation phase, the researcher should write out "fully, everything she or he has ever experienced or thought about the particular topic to date" (Brink & Wood, 1998). This writing is then set aside and later used to discuss how personal biases may have affected the interpretative process. Thus, in the preparatory phase of the current study bracketing activities included acknowledging completed literature reviews. Since the researcher in the current study has many years' experience working with people with type 2 diabetes as a nurse practitioner, bracketing of personal biases and reporting the findings of previous literature reviews was used to minimize distortion of study findings.

A summary of bracketed thoughts is presented in Table 3. The researcher is not confident that "everything ever experienced or thought about" exercise behavior maintenance is included; however, major expectations were addressed. Furthermore, the researcher believes in her ability to conduct an open interview and carries a keen interest in and respect for individual perspectives. The bracketed ideas will not be incorporated into the data analysis as suggested as a solution by Glaser (1978) and Gearing (2004) but rather will be revisited in the discussion section of Chapter 5.

In addition to bracketing activities in preparation to the current study, preconceptions and personal biases were bracketed through the memoing process prior to and throughout data collection and analysis. Memos can be a sentence, a paragraph or a few pages. Memos achieve one of the following intents: “exhausts the analyst’s ideation; raises the data to a conceptual level; develops the properties of each category; presents hypotheses about connections between categories and begin to locate the emerging theory” (Glaser, 1978, p.83). Memoing is an integral stage of grounded theory and will be described later in this chapter.

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**Table 3. Preparation: Bracketing**

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In nearly 30 years of nursing experience, the last 10 have been working with adults with type 2 diabetes. Have seen a wide variety of struggles with diabetes self-care. It is often difficult to motivate patients to exercise.

There is a large literature on adherence and compliance issues because in general health care providers are very prescriptive, lack attention to what the patient is really willing to do and then get frustrated because the patient is not doing what they were told; what health care providers believe to be important (Hanko, et al., 2007; Kavanaugh, Gooley & Wilson, 1993; Lindahl, et al., 2009; Maddigan, Majumdar & Johnson, 2005; Martinus, Corban, Wackerhage, Atkins & Singh, 2006; Park, Hong, Lee, Ha & Sung, 2004; Shinji, Shigeru, Ryusei, Mitsuru & Shigehiro, 2007; Shultz, Sprague, Branen & Lambeth, 2001).

There is no apparent unifying theory that helps predicts exercise behavior in people with type 2 diabetes. Constructs that may be worth further study include self-efficacy, perceived barriers, socio-cultural context and psychological health, specifically depression, regulatory focus and satisfaction.

As a pretty regular exerciser for the past 30 years, I personally have little insight into what helps me stay on track and what has happened when I lapse from my routine. It seems like it mostly has to do with time and priorities.

From the literature review, it seems like I should find evidence of self-efficacy and satisfaction.

I will have a minor from the Center for Spirituality and Healing at the University of Minnesota in the health coaching track. Some of what I learned had to do with transformational development. I am not confident about finding evidence of this but it would be very exciting.

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*Preliminary literature review.*

Preliminary literature review in grounded theory has been addressed and reported in Chapter 2. Full disclosure of preliminary literature review can decrease its influence on the researcher. An additional advantage to full disclosure of the literature review allows for evaluation of the bias introduced by the researcher (Gearing, 2004)

*General research topic.*

Grounded theory is distinguished from quantitative methods that set out to test *a priori* hypotheses (Johnston, 2006). Therefore, in the preparatory stage of the study, no predetermined research problem was formulated. The aim of the study was to increase understanding about exercise behavior maintenance in older adults with type 2 diabetes.

*Human subjects protection.*

The research proposal was approved by the Institutional Review Boards (IRB) of the University of Minnesota, Minneapolis, Minnesota and the Mayo Clinic, Rochester, Minnesota, prior to any participant contact. Since primary participant recruitment was to occur at Mayo Clinic, the University of Minnesota deferred to Mayo Clinic as the primary board. The study was deemed exempt by the Mayo Clinic Institutional Review Board. Due to the exempt status, no written consent was required. The researcher elicited verbal consent for participation and separately for audiotaping in all instances. No annual review is required for exempt studies. IRB materials are presented in the appendix.

*Benefits to study participants.*

The participants of the current study were not expected to personally benefit in any way through their participation.

*Risks to study participants.*

Some questions or topics areas included in the interviews may have caused the participants to feel uncomfortable. Participants were reminded that they did not need to answer any questions that made them feel uncomfortable. Audiotaping may have increased the discomfort for some participants. During the verbal consent process, participants were reminded that audiotaping was not required and/or the tape could be stopped at any time during the interview. Participants could stop the interview at any time. The risks of the research study were minimal, meaning that the risks would not be any different than what a participant would experience in a routine clinic visit or during daily life.

**Data collection.**

The second stage of classical grounded theory is data collection. The following section will briefly describe basic data collection principles. This description will be followed by the specific data collection strategies of the current study including setting, sample and interview technique.

*General principles.*

Data collection in grounded theory follows the principle of theoretical sampling. Theoretical sampling is “the process of data collection for generating theory whereby the analyst jointly collects, codes and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges” (Glaser & Strauss, 1967, p. 45) Initial decisions for theoretical sampling are based only on a general problem area. Further data collection is directed by continuous coding and

analyzing of the incoming data. The ongoing analysis directs what further data need to be collected and from where (Glaser, 1978).

For theoretical sampling to be effective in developing a substantive theory, the researcher must remain open in coding until reaching saturation and relevancy.

Saturation means “bringing new participants continually into the study until the data set is complete, as indicated by data replication or redundancy” (Bowen, 2008, p. 140).

Saturation results from theoretical sampling (Bowen, 2008). Theoretical sampling aids saturation by directing the researcher toward relevant data.

In addition to remaining open to emerging categories, the researcher should keep in mind the categories that have already emerged from the data. This is the iterative process of grounded theory. These two tasks require a balance between focus and avoidance of premature attachment to appealing concepts. The researcher must analyze exceptions (Glaser, 1978). When developing substantive theory (as opposed to formal theory), it is recommended to stay within the substantive area. While formal theory development is accomplished by comparing a wide range of substantive areas to increase the generalizability of the theory, substantive theory development is focused on a narrower area of concern (Glaser, 1978).

This study’s aim was to develop a substantive theory in the area of exercise behavior maintenance in older adults with type 2 diabetes. To meet the aim of developing substantive theory, data were collected only from exercising older adults (over the age of 50) with type 2 diabetes. Older adults were chosen for the study because type 2 diabetes is primarily a disease of aging and older adults are even less

likely than younger adults to exercise regularly and at the recommended intensity, yet they can reap many benefits.

*Setting.*

The primary setting for this study was the Mayo Clinic, a large United States Midwest multi-specialty clinic. In 2008 just over ½ million patients were seen; patients come from the local area as well as from the United States and worldwide. Participants were recruited within the Division of Endocrinology at the Mayo Clinic.

The clinic is staffed with endocrinology fellows, physician faculty, nurse practitioners and physician assistants. In addition, it is situated within a multi-disciplinary practice with dietitians and diabetes nurse educators readily available.

Recruitment at the primary site was slower than anticipated. Due to this slow recruitment and for the opportunity to increase the diversity of the sample, a secondary site was approached for participant recruitment. The secondary setting was a community health clinic in the same city. This community health clinic serves primarily Hispanic individuals and their families working in agriculture-related occupations. The clinic is staffed by a physician assistant, bilingual health aides and registered nurses. Participants recruited at the Mayo Clinic and community health clinic were interviewed in private rooms at their respective clinics. Two additional participants were recruited through colleague informants and they were interviewed in their homes. These latter two participants were also recruited as a result of slow recruitment from the primary site but also because colleagues identified them as particularly suitable due to their prolonged persistence in exercise programs. These recruitment strategies are compatible with the grounded theory method of theoretical

sampling. Exceptions to the original sampling strategies were reported to the University of Minnesota and Mayo Clinic Institutional Review Boards.

*Sampling strategy.*

Both male and female patients who had a diagnosis of type 2 diabetes were sought out as volunteers for this study. Initial inclusion criteria included: age greater than 50 years; either gender; an address within 60 miles of the clinic; a duration of type 2 diabetes for at least one year; sedentary lifestyle prior to diagnosis of diabetes; and since diagnosis report exercise at any intensity for a period of six months or longer at any time. They did not currently need to be exercising. Initial exclusion criteria included: a diagnosis of type 1 diabetes or age less than or equal to 50.

Although it would have been impossible for the researcher to conduct interviews without the aid of an interpreter in any non-English language, language was not specified in the initial inclusion and exclusion criteria. Three participants whose primary language was Spanish were interviewed along with an interpreter. Additionally, two of the three Spanish-speaking participants were aged less than 50 years. This exception to the initial inclusion/exclusion criteria was felt to be warranted as their contribution to the emerging theory outweighed the degree of deviation from the initial criteria. Although not purposefully excluded, no other non-English speaking volunteers were recruited.

While the incidence of type 2 diabetes is beginning to occur in individuals of all ages, it is still most prevalent in older adults (CDC, 2005). In addition, older adults are more likely to exercise less than younger adults (Krug et al., 1991) yet have the potential to yield many metabolic, functional and psychological benefits from exercise

(Buse, et al., 2008). Thus, understanding the exercise behavior maintenance processes of this older group of individuals with type 2 diabetes may lead to very important and needed interventions. Therefore, pediatric patients with type 2 diabetes were excluded from the current study. Choosing persons who live within 60 miles of the clinic allowed for ease in scheduling of interviews. Individuals who have always exercised do not require intervention and those who have never exercised would fit into current explanatory models on initiation of exercise behavior and were therefore excluded as well.

The initial recruitment plan at the primary site was that all patients reporting to the 19<sup>th</sup> floor corridor of the Division of Endocrinology would be screened for eligibility. At the beginning of study recruitment in December of 2008, this corridor was staffed by four physicians and three nurse practitioners. Although clinical assistant staff rotates to different corridors within the Division, the primary assignment for six clinical assistants is assisting patients on the 19<sup>th</sup> floor corridor. The providers in this section are scheduled to see a total of approximately 60 patients per day. Of these 60 patients approximately 20 would have type 2 diabetes. Due to several practical considerations (for example, planned medical leaves, primary job responsibilities, familiarity of the clinical assistant with the diabetes database system) only three of the clinical assistants were trained to identify and recruit study participants. Additionally, two of the nurse practitioners left the practice. This resulted in rather slow identification and recruitment of participants so that by April of 2008 when data collection ended eight participants had been identified and recruited from the Mayo Clinic.

Upon arriving for their scheduled diabetes care appointments, the eight participants at the primary setting were checked in by a clinical assistant who obtained their weight, vital signs and completed a brief history review. During the screening, the clinical assistant obtained information regarding the patient's current exercise pattern. In addition, the clinical assistant completed a brief recruitment checklist (Appendix A1). If inclusion and exclusion criteria were met, the clinical assistant informed the patient of the research study and obtained their permission for the researcher to contact them. The researcher was contacted via email by the clinical assistant with the patient's contact information including preferred telephone number and clinic chart number. Once individuals were identified for participation, the researcher contacted the participant to ascertain if the potential volunteer had any questions, if they were still willing to participate and if so, to set up a time for the interview. Interviews were conducted at the Mayo Clinic in a private office space.

The secondary site is a community clinic with approximately 130 patients with type 2 diabetes. A diabetes registry list is maintained and these patients are known to the clinic staff. A bilingual health aide identified patients from the registry who met the inclusion criteria for exercise. She contacted the potential participants, explained the study using the script in Appendix A with the exception that she arranged for the participant to come to the Migrant Health Clinic for the interview at a time convenient to the volunteer. Three volunteers were recruited with this method. Two of the volunteers were younger (47 and 48 years) than the age criterion of 50. Their ineligible ages were not discovered until the time of the interview. After careful deliberation, their potential contribution to the study (i.e., uncovering important cultural differences,

ability to explore the generalizability of the emerging concepts to a more diverse population) was felt to outweigh the disadvantage of how their relative youth would negatively influence the project, and their data were retained (all information was communicated to the Institutional Review Boards).

Two additional participants were recruited through colleague informants, contacted by the researcher and interviewed in their homes.

***Demographic information.***

Demographic information was gathered to provide a description of the sample. This information included: age, gender, ethnicity/race, education level, employment status, marital status, socioeconomic status and description of current activity patterns.

A total of 13 individuals who had been diagnosed with type 2 diabetes for at least one year and self-identified themselves as having maintained an exercise program for a minimum of six months were interviewed (as described above). Table 4 provides a detailed description of the sample. The majority of the sample was aged 51-70; male; Caucasian; high school graduate or higher; unemployed, retired or disabled; and married. Household income, length of time since diabetes diagnosis and exercise intensity were fairly evenly distributed among the categories. The non-Caucasians in the study strongly self-identified themselves as “Mexican” and are thus indicated as such. The majority of the sample (11 individuals) met at least the minimum requirement of 150 minutes or more of exercise weekly as recommended by the American Diabetes Association (2009).

**Table 4. Demographic Description of Participants**

Total	n = 13 (100%)
<b>Age</b>	
45-50	2 (15%)
51-60	5 (38%)
61-70	4 (31%)
71-80	1 (8%)
80+	1 (8%)
<b>Gender</b>	
Male	8 (62%)
Female	5 (38%)
<b>Ethnicity/Race</b>	
Caucasian	10 (77%)
Mexican (self-identified)	3 (23%)
<b>Highest level of Education</b>	
Less than high school	3 (23%)
High school graduate	3 (23%)
Some post secondary	1 (8%)
College graduate	4 (31%)
Master or higher	2 (15%)
<b>Employment Status</b>	
Full time	4 (31%)
Part time	2 (15%)
Unemployed, retired, disabled	7 (54%)
<b>Marital Status</b>	
Married	10 (77%)
Single	2 (15%)
Widowed	1 (8%)
<b>Annual Household Income</b>	
<\$20,000	2 (15%)
\$20,000-\$30,000	1 (8%)
\$30,000-\$40,000	4 (31%)
\$40,000-\$60,000	1 (8%)
\$60,000-\$80,000	1 (8%)
\$80,000-\$100,000	0
\$100,000 or more	4 (31%)
<b>Length of time since diabetes diagnosis</b>	
<5 years	3 (23%)
5-10 years	3 (23%)
10-20 years	4 (31%)
>20 years	3 (23%)
<b>Moderate Exercise (Minutes per week)</b>	
<150 minutes	2 (15%)
150-300 minutes	6 (46%)
>300	5 (38%)

### *Interviews.*

All interviews were recorded using Sony digital voice recorders. Recorders were used in duplicate as insurance against equipment failure. At the completion of each interview, the recording was transferred to a password-protected folder and identified only with an interview number. Only the researcher has access to the password and thus access to the electronic files.

Recording the interviews was a deviation from Glaser's recommended methodology (Glaser, 1978). The rationale that drives this recommendation is that audiotaping and particularly use of transcripts of audiotapes bogs down the analyst in detail. Grounded theory analysis should be at a conceptual level where details are used for illustration and not for description (Glaser, 1978). Furthermore, the researcher should not worry about missing an important concept; if the concept is important, it will recur in subsequent interviews.

"Theoretical sensitivity" allows the researcher to identify and relate categories, to construct theory and to work with "amazing variability" (Glaser, 1978, p.2). As the researcher gains experience, "theoretical sensitivity" develops. Audiotaping the interview sessions is one way which assisted in the development of theoretical sensitivity by allowing review of content of a more experienced grounded theorist. However, as a novice theorist, the researcher was also careful not to get bogged down in detail.

All interviews were conducted by the researcher using a standard format. Each interview started with an overview of the study and verbal assent for participation and for recording. Following this introduction, each participant was asked an open-ended

question about what it was that they thought kept them exercising. Although it was possible that participants who had only previously been exercising to be recruited, all study participants were current exercisers. The interview followed an unscripted, open format. A prompt is often used in qualitative open-ended interviews to keep the conversation going. Typical prompts included: “When you think of people you know who do not exercise, what do you think is different about you?”, “When you are getting ready to exercise what are you thinking about?”, “What advice do you think would be helpful to give to people who do not exercise regularly?”

After the first interview and analysis of data had begun, additional questions were formulated to check the participant’s perspective on emerging themes. These questions were not asked until the interviewee was offering no new perspectives of his/her own. The recruitment and interview process was ended after 13 interviews were completed since little to no new information was obtained after the tenth interview. The researcher could have concluded the data collection after the tenth interview, however, the final three interviews were already scheduled and so they were completed. These interviews reinforced saturation of the categories.

#### **Analysis: Constant comparative analysis.**

The third stage of classical grounded theory method is analysis. The particular analysis approach in grounded theory is called constant comparative analysis. In constant comparative analysis, coding and analysis are carried out simultaneously. Additionally, constant comparative analysis is used in conjunction with theoretical sampling (stage 2). Constant comparative method along with theoretical sampling aid

the analyst in generating a theory that is “integrated, consistent, plausible and close to the data” (Glaser, 2008, p.2).

The major activity in the analysis stage of grounded theory is coding. For the current study, open coding began after the first interview. Multiple open codes were generated. Following each interview, memos were written. Initial line by line open coding of the memos was completed within 24 hours of the interview. Data were reviewed many times comparing incidents to one another. Incidents in grounded theory refer to words or phrases. These groups of words or phrases were then labeled with a code. As analysis progressed, the researcher repeatedly asked “what category (code) does this line or group of lines (incident) indicate?” (Glaser, 1978). Both memos and audiotapes were reviewed. Although most of the coding was done from the memos, listening again to the audiotapes assisted in gleaning quotes and additional detail. As selective coding commenced, the researcher used a four foot by five foot whiteboard to record categories and draw their relationships.

After the first three interviews, the researcher had identified thirteen potential variables. The core variable of progressive self-curing began to emerge after the third interview. The core variable accounts for most of what is going on in the data (Glaser, 1978). Progressive self-curing will be fully described in the results section (Chapter 4). By the fifth interview, the researcher was able to more selectively code for progressive self-curing and its component parts. Other variables that began to emerge include tracking, teaming, managing boredom, importing skills, creating an identity, prioritizing self.

Three of the 13 interviews were transcribed verbatim without identifying information for verification of open coding. This verification was accomplished at a grounded theory workshop hosted by Dr. Barney Glaser in Mill Valley, California in March of 2009. Participants at the grounded theory workshop included nine students and nine advanced practitioners of grounded theory plus Dr. Barney Glaser and his daughter, Jillian Rhine who is also a grounded theory expert. Each student gave an informal presentation summarizing their study. The presentation was followed by distribution of transcripts. All participants worked individually on coding of the transcripts. This was followed by group discussion of the codes and possible variables. All transcripts with notes from workshop participants (students and advanced practitioners) were returned to the student researcher. The open codes generated during the workshop were compared to coding previously completed by the researcher and incorporated into the constant comparative process as additional interviews were completed.

### **Memoing.**

Memos “are the theorizing write-up of ideas about codes and their relationships as they strike the analyst while coding” (Glaser, 1978). Memo writing is crucial in grounded theory method. Memo writing prompts analysis and increases the level of abstraction (Charmaz, 2006) and occurs simultaneously with data collection and analysis. Memos should be written anytime and anywhere “in a stream of consciousness fashion without regard to grammar or spelling” (Simmons, 2009).

Glaser (1978) elucidates four goals of memo writing: (1) ideas, (2) freedom, (3) memo fund, (4) sortability. These goals underscore the importance of memo writing in

carrying out grounded theory and their primary role in promoting conceptual thinking by the researcher. Each of the goals will be described in a bit more detail: (1) Ideas. Whether a sentence or a few pages, each memo should exhaust the analyst's ideas about the data at that moment. Ideational memo writing generates theory through raising data to a conceptual level, developing properties of each category and stimulating thoughts about possible connections between categories. (2) Freedom. The idea is the focus. The analyst is free to write without regard for style, grammar, sentence structure, etc. Memoing should be free writing unencumbered by concern for literary precision and intended to get conceptual and theoretical ideas on paper. There is nothing at stake in memo writing. (3) Memo fund. The memo fund is the source of all writings and lectures from the grounded theory study. (4) Highly sortable. Each memo should start with a title including the category about which the memo is written. This allows for easy sorting of memos.

Writing of memos is another area of disagreement between Glaserian and Straussian methodology. Straussian memo writing has guidelines for writing code notes, theoretical notes, operational notes and logical and integrative diagrams (Strauss & Corbin, 1998). The Straussian approach to memos appears to be reductionistic, fragmented and overwhelming by its complexity (Duchscher & Morgan, 2004).

Memo writing commenced from the beginning of the current study. Memos recorded ideas generated by data collection and coding. In addition, memos were generated as ideas were stimulated by conversations with family, friends and colleagues throughout the data collection, coding, sorting and writing stages. After all, "if the

analyst is not writing memos, the analyst is not doing grounded theory” (Glaser, 1978, p. 83).

### **Sorting and theoretical outline.**

The fifth stage of classical grounded theory is sorting and theoretical outlining. Sorting does not refer to data sorting, but rather to conceptual sorting of memos. Through the sorting of concepts, the outline of the theory emerges (Simmons, 2009). While the steps of coding and memoing tend to fracture the data into parts, sorting is the essential step that brings the data back together and forms the theory. Sorting forces the development of a “rich, multi-relation, multi-variate theory” (Glaser, 1978, p. 116). In the current study, the researcher completed memos at any time during the data collection and coding processes. Although the above methods section was described in discrete stages, the stages occurred simultaneously and cyclically. Memos were saved, coded and sorted multiple times until the final sort was achieved and writing began.

### **Writing.**

The sixth and final stage of the grounded theory method is writing. The final sort constitutes the first draft of the write-up (Simmons, 2009). This first draft of the write-up is a compilation of the memos that define and illustrate the variables and their relationships. It is subsequent iterations of this draft that become the “results” chapter (Chapter 4).

### **Quality**

#### **Historical perspectives.**

Over the last few decades there has been an active dialog on rigor and quality in qualitative research without resolution (Cohen & Crabtree, 2008). This dialog is

embedded within the larger methodological disputes in nursing research around quantitative versus qualitative research. A hierarchy is stated or assumed that quantitative data are preferable (Allen, Benner & Diekelmann, 1986). Historically there has been an emphasis on quantification of science (Guba & Lincoln, 1998). Dependability and scientific maturity are tied to the degree of quantification in any given field (Guba & Lincoln, 1998). Ascribing to the superiority of quantitative methods, nurse researchers have been led to view subjectivity (qualitative inquiry) as a “private and personal reading of reality, given to error” (Boyd, 2001, p.65).

Qualitative research has a rich tradition dating back to the late 1800’s when rapid social change stimulated qualitative inquiry (Boyd, 2001). Qualitative research waned in the 1930’s through the 1950’s as quantitative methods established their importance (Boyd, 2001). Quantitative methods became well established and the unquestioned conviction that only quantitative data were ultimately valid or of high quality developed (Patton, 1999; Guba & Lincoln, 1998). Methodological debate was rekindled in the 1960’s. Not until the 1980’s did the merits of qualitative research escalate (Boyd, 2001).

To ease acceptance that rigorous, high quality qualitative research was possible, early quality criteria closely paralleled quantitative criteria (Sandelowski, 1993; Guba & Lincoln, 1998). For example, the qualitative criterion of credibility addresses similar standards as does internal validity in quantitative research; auditability as does reliability and fittingness as does generalizability (Guba & Lincoln, 1998).

**Quality criteria for grounded theory.**

The focus on rigor and quality has evolved from one of general guidelines applicable to all qualitative research approaches to approach-specific criteria. Specific criteria have been developed to judge the quality and rigor of particular approaches such as ethnography, grounded theory, or hermeneutics (Chiovitti & Piran, 2003). Based on the three main standards of credibility, auditability, and fittingness proposed by Beck (1993), Chiovitti and Piran (2003) developed methods to assure these standards were met in grounded theory studies. The grounded theory approach used by Chiovitti and Piran to establish their criteria is Straussian (2003).

***Credibility.***

Credibility refers to the accuracy of the description of the phenomenon (Beck, 1993). Credibility parallels internal validity or the degree to which findings reflect reality (Guba & Lincoln, 1998). Four methods to enhance this standard are suggested by Chiovitti et al. (2003): (a) let participants guide the inquiry, (b) check the theoretical constructs generated against participants' meanings, (c) use the participant's actual words in the theory, and (d) articulate the researcher's personal views.

Expanding upon the credibility issue in qualitative research, Patton (1999) states that credibility depends on three elements: (1) rigorous techniques, (2) credibility of the researcher, (3) philosophical belief in the value of qualitative inquiry. Following rigorous techniques to gather high-quality data and conduct careful analysis (Patton, 1999) should increase the probability of an accurate description of the phenomenon (Beck, 1993). Credibility of the researcher depends on training, experience, track record, status and presentation of self (Patton, 1999). To increase credibility the

researcher must also have a “fundamental appreciation of naturalistic inquiry, qualitative methods, inductive analysis, purposeful sampling and holistic thinking” (Patton, 1999, p. 1190).

Morse (1998) and Sandelowski (1993) argue against the suggestion to check the theoretical constructs generated against participants’ meanings. Morse (1998) frames two main arguments against the suggestion. The first is good qualitative research is more than description. Good qualitative research is a synthesis, conceptualization and abstraction. These processes require an extensive knowledge of the topic and years of education to develop research skills. Generally, participants would not have the skills or knowledge. Furthermore, the research results are a synthesis of multiple participants’ perspectives and different than the descriptive accounts of each individual participant. The second argument is that participants often have a restricted view. Therefore, research may produce information that is not obvious to the participants. Sandelowski (1993) adds an additional difficulty: participant’s stories are always changing.

***Auditability.***

Auditability addresses the extent to which another researcher could follow the decision trail (Beck, 1993). In the quantitative paradigm, this measure of quality is referred to reliability and confirmability (Guba & Lincoln, 1998). In this case, Chiovitti et al. (2003) offer two methods: (a) specify the criteria built into the researcher’s thinking and (b) specify how and why participants were selected. The criteria are established through a standard list of questions asked of each transcript (Chiovitti et al., 2003). In writing the quality markers for grounded theory, Chiovitti et al. (2003) come

from the Straussian grounded theory method. Their strategies to address auditability are particularly applicable to the constructivist approach.

Rodgers and Cowles (1993) describe a more appropriate approach to the auditability for users of the Glaserian method. Their description of creating an “audit trail” of researcher-generated documentation is consistent with the memoing process. Accurate, comprehensive notes should be kept related to the contextual background of the data, impetus and rationale for methodological decisions, evolution of the findings and the researcher’s particular orientation to the data (Rodgers & Cowles, 1993).

***Fittingness.***

Fittingness refers to how well the investigator fits the findings into other contexts (Beck, 1993). Fittingness parallels external validity (generalizability) (Guba & Lincoln, 1998). There are two additional methods for assuring rigor around fittingness: (a) delineate the scope of the research in terms of sample, setting and level of the theory generated and (b) describe how the literature relates to each category in the theory (Chiovitti et al., 2003). Methods described here by Chiovitti and Piran (2003) would be applied most easily to the grounded theory method described by Strauss & Corbin (1990). Along with a preliminary literature review, use of their matrix approach to data analysis integrates the literature into the theory. In quantitative research, random sampling is the “gold standard” to assure generalizability to the largest number (Isaac & Michael, 1995).

Groger, Mayberry & Straker (1999) highlight sampling issues in qualitative research which create a source of bias. Gatekeeper bias, refusals to participate, sampling frame, pragmatic constraints and institutional barriers were identified as major

sources of bias (Groger, et al., 1999). Gatekeepers are individuals who have at least some control over access to participants; for example, nursing home administrators who allow (or disallow) access to residents. Individuals may refuse to participate for a variety of reasons. These reasons could introduce bias; for example, people who refuse to be interviewed may have a different perspective on their situation than those who do agree. Sampling frame refers to how your inclusion/exclusion criteria are presented to potential participants. Groger, et al. (1999) use the example of using “African American” in their recruitment letters and the risk of offending potential participants who would prefer to be called “colored” (p. 833). Examples of pragmatic constraints include delay in transcription, using multiple interviewers, multiple approaches to recruiting. Finally, institutional constraint addresses the “irreconcilable tension” between the requirements for successful proposal writing and the requirements of institutional review boards with the need for exploratory openness of qualitative research (Groger, et al., 1999).

Although generalizability has long been considered the prerogative of quantitative research, Applegate and Morse (1994) challenge this exclusive privilege. Studying privacy behavior in an all-male nursing home, Applegate and Morse (1994) discovered that the type of interpersonal relations (treating others like an object or as a person) predicted whether privacy was respected or not. Individuals who objectified others violated privacy norms more often (Applegate & Morse, 1994). These findings can be generalized to any situation where privacy violations are a concern (Applegate & Morse, 1994). It is the knowledge that is generalized; knowledge is not limited to demographic variables (Applegate & Morse, 1994).

**Current and future perspectives.**

Cohen and Crabtree (2008) in a recent article summarized the current controversies and recommendations for evaluation of qualitative research studies. In the article, they reviewed and synthesized published criteria for good qualitative research and develop a set of criteria with usefulness to researchers, reviewers, editors and funding agencies (Cohen & Crabtree, 2008). Database searches identified 29 journal articles and 16 books or book chapters (1980 to 2006). Seven evaluative criteria were identified: “(1) carrying out ethical research; (2) importance of research; (3) clarity and coherence of the research report; (4) use of appropriate and rigorous methods; (5) attending to researcher bias; (6) importance of establishing validity or credibility; and (7) importance of verification or reliability” (Cohen & Crabtree, 2008, p.333). There was general agreement on the first four criteria; however, the last three prompted wide debate (Cohen & Crabtree, 2008). Ethical research conduct is “respectful, humane, honest and embodied empathy, collaboration and service” (Cohen & Crabtree, 2008). If the research advanced the current knowledge base and was useful theoretically or pragmatically, it was considered important (Cohen & Crabtree, 2008). Clarity and coherence referred to the report of the research. The report should provide a clear and adequate description of the research question, background, context, study design and rationale (Cohen & Crabtree, 2008). Data descriptions should be honest. The researcher needs to demonstrate a relationship between the data and the interpretation that is understandable (Cohen & Crabtree, 2008).

Cohen & Crabtree (2008) also discovered three perspectives on the value of having unified criteria for assessing qualitative research. The first perspective is that

criteria for validity and reliability are crucial. Without these criteria, qualitative research risks being seen as nonscientific and lacking rigor (Cohen & Crabtree, 2008).

The second approach is to view validity and reliability as inappropriate for qualitative research. This is the view articulated by Guba and Lincoln (1998). Creditability, auditability and fittingness with their parallelism to quality measures in quantitative research represent an early effort to resolve the quality issue for qualitative studies (Guba & Lincoln, 1998). Guba and Lincoln (1998) argue that the quality criteria for qualitative studies are not well resolved. Resolution on quality criteria can be valuable but should not be based on premises from quantitative research (Cohen & Crabtree, 2008; Guba & Lincoln, 1998). Appropriate criteria offered as alternatives include: “historical situatedness of the inquiry (i.e., that it takes account of the social, political, cultural, economic, ethnic and gender antecedents of the studied situation), the extent to which the inquiry acts to erode ignorance and misapprehensions, the extent to which it provides a stimulus to action, that is to the transformation of the existing structure, the extent to which it enlarges personal constructions and the extent to which it leads to improved understanding of the constructions of others” (Guba & Lincoln, 1998, p. 213).

Finally, the third approach suggests that one set of evaluative criteria for qualitative research is misguided (Cohen & Crabtree, 2008). This position is articulated more fully by Sandelowski (1993) who recommends that we reconceptualize validity. Her argument is that “rigor” in quality assessment “threatens to take us too far from the artfulness, versatility and sensitivity to meaning and context that mark qualitative works of distinction” (Sandelowski, 1993, p. 1). Sandelowski (1993)

encourages researcher and reader to rely on contextual linguistic and interpretative practices to evaluate the validity of the study instead of relying on rules assumed to be sufficiently abstract and universal. A good qualitative data analysis grabs the “essence” of a phenomenon and not a “flood” of detail (Sandelowski, 1993, p.3). Qualitative research bridges art and science. In this way, no two researchers will produce the same result (Sandelowski, 1993). Sandelowski (1993) concludes her argument “We can preserve or kill the spirit of qualitative work; we can soften our notion of rigor to include the playfulness, soulfulness, imagination and technique we associate with more artistic endeavors, or we can further harden it by uncritical application of rules. The choice is ours: rigor or rigor mortis” (p.8). Although there is an abundance of opinions and legitimate arguments on quality evaluation in qualitative research, no consensus has been reached.

#### **Quality approach for current study.**

The current study will be evaluated using the criteria of auditability, credibility and fittingness. Criteria linked to quantitative studies may not be appropriate; however, the dominant research paradigm continues to be quantitative. At least for now these criteria help establish the credibility of qualitative research. In addition the four criteria that demonstrated consensus in the literature review by Applegate & Cohen (2008) will be applied ([1] carrying out ethical research; [2] importance of research; [3] clarity and coherence of the research report; [4] use of appropriate and rigorous methods). Finally, the four criteria used to judge grounded theory will be used (Glaser, 1998). These criteria will be described next.

**Classical grounded theory criteria.**

Original criteria described by Glaser & Strauss in 1967 state that a theory must have fit, workability and relevance. In 1978, Glaser added a fourth criterion, modifiability. Fit is “another word for validity. Does the concept adequately express the pattern in the data which it purports to conceptualize? Fit is “continually sharpened by constant comparisons” (Glaser, 1998, p. 18). Workability refers to whether the concepts and the descriptions of how they are related account for the participants’ behavior in the area of research? (Glaser, 1998). Relevance makes the research important by dealing with the participants’ main concern. “To study something that interests no one really or just a few academics or funders is probably to focus on non-relevance or even trivia for the participants. Relevance, like good concepts, evokes instant grab” (Glaser, 1998). The fourth criterion, modifiability, refers to the ability of the theory to be modified as new information becomes available for comparison. In 1978, Glaser noted: “We soon learned that generation is an ever modifying process and nothing is sacred” (p. 5).

Glaser (1998) maintains that by doing grounded theory, the criteria for judging quality automatically are met. For example, the categories of the grounded theory are derived directly from the data through coding, memoing and sorting. In this way, fit becomes automatic. By workability, Glaser means that the theory “should be able to explain what happened, predict what will happen and interpret what is happening in an area of substantive inquiry” (Glaser, 1978, p.4). Grounded theory method leads to relevance by allowing the categories to emerge without any forcing into preconceived notions.

From early on grounded theory method, by its nature, met the criteria of a good theory—fit, relevance and workability. Since grounded theory uses experiences of real people, it can be modified as situations, problems and people change (Andrews & Nathaniel, 2009).

### **Conclusion**

Chapter 3 provided a general overview of grounded theory methods and of specifically how the method applies to the current study. Suggestions for improving the quality of grounded theory studies were presented along with Dr. Glaser's perspective that the very nature of grounded theory method results in robust theory. Results of the analysis will be presented next in Chapter 4. Also, in chapter 5, the assessment of quality and personal perspectives on use of the method will be addressed.

## Chapter 4: Results

### Introduction

The purpose of this study was to advance the understanding of exercise behavior maintenance in older adults with type 2 diabetes. Using grounded theory, the aims of the study were to: (1) Identify common processes used by study participants in maintaining an exercise program, and (2) Develop a substantive theory of exercise behavior maintenance in older adults with type 2 diabetes.

The substantive theory, *progressive self-curing*, emerged through the grounded theory methodology which included a series of 13 interviews with older adults with type 2 diabetes who self-identified as having been exercising regularly for a minimum of six months. The theory of *progressive self-curing* has six subordinate categories (stages): (1) Pre-action slipping, (2) Breaking through, (3) Getting results, (4) Creating an identity (5) Habituating, and (6) Making one whole.

### Maintenance versus initiation.

Before the description of the theory of *progressive self-curing*, the chapter will proceed with the researcher clarifying some potentially confusing aspects of the theory. In the first two chapters of the current study, the researcher presented the background and arguments for the importance of studying exercise behavior maintenance in older adults with type 2 diabetes. One of the arguments highlighted the differentiation of initiation of health behavior versus maintenance of behavior. One aspect of that argument was that behavior initiation is quite well understood but there is a gap in our understanding of health behavior maintenance. Therefore, the aim of the current study was to study exercise behavior *maintenance*. However, in telling their stories, the

participants began with events that occurred prior to their initiation into exercise programs. One approach to this situation would have been to ignore that portion of their stories and focus only on exercise maintenance. However, the stories of their early responses to having diabetes and pre-exercise were important and consistent. Moreover, accommodating the whole story is consistent with grounded theory methodology. In the grounded theory method, a researcher cannot be confident about what will be important to participants until data collection has begun (Glaser, 1978). So, although the research aims were to focus on exercise behavior maintenance, early stages of the theory of *progressive self-curing* address “pre-maintenance” behavior.

#### **Maintenance versus progression.**

Maintenance and progression do not at first consideration appear to be compatible. After all, maintenance is defined as keeping something in a steady state (Agnes, 2003). This is in contrast to progression which is defined as forward movement (Agnes, 2003). Exercise maintenance has not been defined in the literature. However, it seems that the definition will evolve to include evidence that an individual meets some standard of intensity, frequency and duration of exercise over some prolonged period of time. In addition to the outward evidence of exercise behavior, the definition may include some level of cognitive activity. For example, Rothman, et al. (2004) distinguish different stages of exercise behavior change by the amount of effort the individual invests in repeated evaluations of the value, outcome expectation and satisfaction. Looking simply at the task of exercise, progression could be evidenced by increasing intensity, frequency or duration and obtaining greater physical health benefits. However, in using the term “progressive” to describe the process of exercise

maintenance in the current study, the researcher had the progression of psychological processes in mind. Thus, progression and maintenance are not mutually exclusive terms and “progressive” will be used to describe “maintenance” behavior in the current study.

**The constructs of monitoring, social support/networks, and boredom within the theory of *Progressive Self-Curing*.**

The recommended approach in grounded theory is to begin with open coding and to begin selective coding as a core variable emerges. In selective coding, the recommended approach is for the researcher to begin to set aside data that do not apply directly to the emerging variables. Only the data that helps define the properties of the core and subordinate variables is retained for further memoing and sorting. These retained variables explain most of what is going on in the area of interest (Glaser, 1978).

In the current study, the researcher made an exception to this practice. The exception was to continue to code and sort data on the constructs of monitoring, social support/networks and boredom. Although these constructs do not describe properties or subordinate categories of *Progressive Self-Curing* per se, they nonetheless describe important supporting information. Monitoring, social support/networks and boredom vary in importance at different stages of the theory. In some stages of *Progressive Self-Curing* little of note appeared to be happening pertinent to these constructs. In contrast, in Stage 3, “Getting Results,” monitoring is integral to the theory. These concepts were introduced in the post-analysis literature review in chapter 2. The approach to these constructs in this chapter will be to include a section within the major stage descriptions to depict how each construct was or was not part of each stage.

### **Older Adults.**

Older adults were targeted for the study because the prevalence of type 2 diabetes escalates as age advances and the practice of routine exercise declines with advancing age. Older adults are among the individuals who could benefit the most from exercise yet are the least likely to be doing it. Age within the older adult population did not emerge as an important variable. This is consistent with Glaser's perspective that "face sheet variables" (demographic variables) should not be assumed to be important (1978). However, on reviewing memos, the oldest adults in the current study did report more strategies to overcome pain (see Table 5). This is consistent with the literature that suggests that pain, particularly arthritic pain is a common barrier to older adults exercising.

**Table 5. Oldest Adults Quotes on Handling Pain**

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"Just get over it, we all have pain."

"If I let this pain stop me, I would never move again."

"Oh, I have a prescription for some Vicodin; I have had it for a year and there is still some left in that bottle so I don't need to use it too often."

"I am stubborn; I don't give in to anything; I can't let the pain stop me."

"I get out of bed with a backache as it is but instead of griping, I start with some gentle exercise even before I get out of bed."

"You cannot let things (knee pain) take over."

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### **Progressive Self-Curing**

The core variable that emerged during the coding and constant comparative analysis was *Progressive Self-Curing*. *Progressive Self-Curing* was the prominent process being used by the participants to maintain their exercise program. The six subordinate categories, Pre-action slipping, Breaking through, Getting results, Creating an identity, Habituating and Making one whole, describe stages of the progressive self-curing process. The theory of *Progressive Self-Curing* describes most of how older adults with type 2 diabetes maintain their exercise program to improve their health.

#### **Progressive.**

Webster's New World Dictionary defines progressive (an adjective) as "1. moving forward, 2. continuing by progressive steps, 3. of or favoring progress, reform, etc." (Agnes, 2003, p.477). All three definitions of the term "progressive" have applicability. Definitive stages of progress toward "self-curing" and transformation were described by the participants. "Steps" may conjure up the notion of measured distance, however, steps can be "any of a series of acts, processes" or taking steps "to do the things needed" (Agnes, 2003, p.586). It is these latter definitions of "steps" that elicit the processes undertaken to maintain an exercise program. That is, they "take the steps to do what is needed" to maintain their health.

#### **Self-Curing.**

The "self" became evident as a force for participants in a multitude of ways. Primarily, there was alienation from health care providers. Alienation stemmed from having received threats, having received challenges to their abilities and failing to have received individualized care (see Table 6). Participants reported having to rely on

themselves and others with diabetes to find out about current and alternative treatment. There was a lack of trust that their health care provider was up-to-date and fear of even further alienation if alternative treatment was disclosed. Participants became reliant on their own resources.

**Table 6. Empirical Data Illustrating Progressive Self-Curing**

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**A. Participant quotes illustrating “self”**

“I was going to prove my doctor wrong.” (after receiving threats)

“I take better care of myself in spite of my physician.”

“Some of what I do rubs doctors the wrong way; I have to do it myself; I don’t want to argue.”

“I am not sure he [physician] finds out about new stuff.”

“I can’t count on my physician to pay attention to my symptoms; they [symptoms] are often discounted.”

“It seems like it everybody without diabetes that tells me about those miracle cures.”

“It seemed like it was information that might be useful if you were a doctor but there was nothing in the education about living with diabetes” (Underline signifies participant emphasis)

“Mother is always bringing those cakes and pies—I just have to say ‘Ma, I just don’t eat that kind of thing anymore.’”

“I reject the box that everyone wants to put me in.”

“Individuals are unique; I’m unique.” (Underline signifies participant emphasis)

“I need to do it my way.” (Underline signifies participant emphasis)

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“It is up to me.”

“Need to make a commitment.”

“The disease does not control you.”

“You can respond to the challenge.”

“Get over it, everyone has a hard story.”

**B. Participant quotes illustrating alienation from providers:**

“If you don’t exercise, you will have to take insulin”

“If you don’t take insulin, you are going to die.”

“If you lose weight, which I don’t think you will be able to do, you might be able to get off

insulin”

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Primary care providers were not the only contacts within the health care system that failed the participant’s expectations for partnership and support; diabetes educators were singled out as well. Diabetes educators were also perceived as lacking the patient perspective on what it is like to live with diabetes. Outside of the health care system, many participants also encountered situations in which they needed to rely on themselves and their own judgment. These situations included instances of misguided assistance from others. Although family and friends were trying to help, their assistance was not always interpreted as helpful by the participants. One example of this was receiving advice about how best to live with diabetes from people who do not have diabetes. Another situation in which participants needed to rely on their own resolve occurred when families, particularly mothers, continued to offer special treats

including cakes and pies. These treats were often items that the participants had decided not to eat due to their deleterious effects. As will be described later and in contrast to these instances, the participants did receive helpful support from family and friends. In fact, most of the social support they received had very many positive aspects.

In addition to, or perhaps because of the separation from others, the participants had developed a strong sense of self. This strong sense of self helped them design not only exercise programs but other approaches to healthy living that worked for them. The participants had a strong sense of individualism and pride in their unique response to having and living with diabetes. Most of the participants also talked about a strong sense of self-responsibility.

Self-curing may appear as an odd choice of wording. Cure implies healing or a remedy. Cure is commonly interpreted to mean that a disease-free state has been reached. Yet, the participants in the study have type 2 diabetes, a chronic illness. Perhaps more obvious choices would have been self-caring or self-managing. After all, the chronic disease management literature is replete with articles featuring “self-care” and “self-management” (Li, et al., 2004; Lorig, Ritter, Villa & Piette, 2008; Samuel-Hodge, et al., 2009; Scollan-Koliopoulos & Walker, 2009; Skinner, et al., 2008; Sousa, Hartman, Miller & Carroll, 2009; Weiler, 2009). These two concepts are closely related and in fact, self-management is associated with the need for patients to assume a greater role in caring for their own chronic disease (Witwer, 2008).

The researcher rejected this tradition of diabetes self-caring and self-management for “self-curing” with the following rationale. Self-management is

conceived as a cluster of tasks, and self-caring the ability to carry those tasks out (Sousa, et al., 2009). As the theory developed, aside from some attention to monitoring, there was little evidence for emphasis on specific tasks. In contrast, what emerged in the model was a process that is more applicable to a way of living than to specific tasks.

Specific to diabetes, diabetes self-management has been defined as “adherence to a self-treatment regimen that includes eating healthily, being active, monitoring blood glucose and taking medication” and self-care is the capability for diabetes self-management (Sousa, et al., 2009). Yet another argument for use of self-caring or self-managing as part of the core variable would have been that the heart of diabetes education is based on the principles of self-management (Franz, 2001).

The dictionary definition of curing is “1. to restore to health, 2. to get rid of (an ailment, evil, etc.)” (Agnes, 2003). In turn, health is defined by the World Health Organization as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). This definition of health reflects the old paradigm that emphasized disease.

There are new paradigms that emphasize health, functioning and well-being (Larson, 1999). One of these new paradigms is the wellness model of health which says that health is more than the absence of illness; it also has positive dimensions such as well-being and energy (Larson, 1999). In the wellness model, bad health can exist in the absence of disease as well as one can experience disease and be healthy (Williams, 1993). Health becomes wholeness, balance, and an integration of the body, mind and spirit that allows meeting the demands of living without becoming overwhelmed (Larson, 1999; Weil, 1997). Nursing has a rich tradition of promoting a broader

definition of health by assisting individuals to “make healthy choices in wellness and healing choices in illness” (Johnson, 2007).

While the participants were not “cured” of their diabetes and they did not experience restoration of “complete physical” health, there was movement toward health as described in the wellness model. This chain of reasoning led the researcher to choose “curing” (restoring health [wellness]).

In summary, the core variable that emerged in the grounded theory summary of exercise behavior maintenance in older adults with type 2 diabetes demonstrated stages over time and an importance of self and curing. Thus the core variable was labeled *progressive self curing*.

### **Stages of Progressive Self-Curing**

The core variable *Progressive Self-Curing* defined the prominent process of the substantive theory. Six subordinate categories, Pre-action slipping, Breaking through, Getting results, Creating an identity, Habituating and Making one whole emerged through sorting of data and establishing theoretical relationships between the variables. The theoretical relationship within any one theory fits into one of many coding families. In this instance, the subordinate categories fit the “process” theoretical coding family. A process must have at least two stages and refer “to getting something done which takes time or something happening over time” (Glaser, 1978, p. 74). The very notion that this is a study of exercise behavior over time led the researcher to begin to conceptualize a staged process. Although the focus of the interviews was on the maintenance phase of health behavior change, the study participants talked about their own (and others) exercise behavior over time. Thus the Pre-action Slipping stage

describes behavior before exercise began and the Breaking Through stage describes the initiation phase of exercise for these participants. The maintenance phase of exercise behavior really begins in earnest in the Getting Results stage and is sustained through the Creating an Identity, Habituating and Making One Whole stages.

### **Stage 1: Pre-action Slipping.**

Although the present study did not emphasize pre-exercise behavior, participants' descriptions of their pre-exercise days could not be ignored. This stage also sets the context for the beginning of the process and the notable progress participants made over time. The primary descriptions of pre-action slipping as reported by the study participants are feelings of guilt, shame and denial (see Table 7). There is a sense of victimization and being trapped by symptoms. This phase may have preceded the actual diagnosis of diabetes and there is an element of misreading cues—attributing sluggishness, shortness of breath, and declining health to advancing age or obesity, not diabetes. Also operating in this phase are rationalization and embarrassment. A lag between diagnosis and the initiation of exercise was also noted by another participant.

### **Table 7. Participant Quotes Illustrating Stage 1: Pre-Action Slipping**

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“I was trapped by symptoms.”

“I was slowly caught into a sedentary pit.”

“I didn't plow right into it” (It=exercise or other diabetes-related care)

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### ***Monitoring.***

Participants did not describe monitoring at this stage.

***Social support/network.***

Participants did not describe social support at this stage.

***Boredom.***

Participants did not describe boredom at this stage.

**Stage 2: Breaking Through**

Breaking Through marked the initiation of exercise for these participants. The participants described primarily breaking through denial (see Table 8). During the pre-action stage the participants denied the diagnosis and used denial of disease to attribute symptoms to normal aging. One participant had been particularly traumatized by receiving the diagnosis of diabetes. All of her images around diabetes were of her father who had died from its complications and the health care provider did not give any signals that he was sensitive to this situation. Her response to the situation was to deny that the diagnosis was possible.

**Table 8: Participant Quotes Illustrating Stage 2: Breaking Through**


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“I couldn’t ignore my situation any longer” (after being diagnosed with diabetes complication)

“My daughter has had two kidney transplants and is nearly blind; my brother has a foot ulceration right now--that is not going to be me.”

“I’ve been told that if I exercise, it is like I don’t even have diabetes as far as getting complications.”

“Talking about it [diabetes] with others [with diabetes] breaks through the denial.

---

Breaking Through was linked to realization of harm. Some of the participants began to develop complications. The desire to arrest these complications in the early stages moved them toward an exercise program. On the other hand, some of the participants remained free of complications but were aware of the harm of diabetic complications from having witnessed family members with diabetes suffer greatly from complications. They related stories of relatives who have had kidney transplants, amputations and diminished eyesight. Participants realized that by exercising and keeping blood sugar under good control, they could minimize or perhaps even eliminate their own risk of developing diabetes complications.

***Monitoring.***

Participants did not describe monitoring at this stage.

***Social support/network.***

Another impetus for the Breaking Through stage was teaming with others. Of particular importance was getting support from others with diabetes. Several of the participants attended a clinic-sponsored group education class and support group for individuals with type 2 diabetes. One participant expressed the importance of receiving support from others with diabetes at her worksite. She has at different times tried to establish a work-site-based support group but has been unsuccessful. She attributed some of the difficulty in establishing a formalized group to resistance from some co-workers to openly acknowledge their having diabetes. Because worksite support is so crucial to the participant, she was baffled by the others' reluctance.

While support from others will thread through this stage and all subsequent stages, it began here. Most often a spouse was named as primary support but children, co-workers, neighbors and pets also help keep the participants exercising.

***Boredom.***

Participants did not describe boredom at this stage.

**Stage 3: Getting Results.**

Stage 3 marked the beginning of exercise behavior maintenance. More accurately, it is a bridging step. Most participants experienced remarkable improvements once they started exercising. This stage, however, is a bridge to maintenance as the participants continued to use “Getting Results” to prevent back sliding. Also, as will be described in later stages, “Getting Results” (linked with monitoring) progresses in its sophistication. During this stage, the participants began to connect improvements in how they felt and in physiological measures such as blood sugar with doing exercise. Keeping track of symptoms or blood sugar was motivating (see Table 9). Participants varied in the different parameters they tracked including blood sugar, insulin doses, breathing, pain, and step counts on pedometers. Getting positive results spurred the participants to intensify their activity to get even better results. Monitoring in *progressive self-curing* had sophistication above simply taking a blood sugar reading. The participants used a variety of parameters to judge not only their diabetes control but how they were doing more generally. Also, the participants linked monitoring results with exercise benefits. Connecting symptoms and physiological measures to exercise helped participants not only keep going but also intensify their exercise programs.

**Table 9. Participant Quotes Illustrating Stage 3: Getting Results**

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“You just don’t want to slide back into that hole again.”

“Even just a couple of days without exercise I can tell my breathing gets a little harder.”

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Although getting results seemed particularly important early on in establishing their exercise program, it remained a theme throughout their progress. The majority of participants experienced marked improvement in whatever symptom or physiological measurement they were monitoring and connected those changes to their exercise program. Dropping blood sugar and insulin doses spurred one participant to add a weight belt to his walking attire. Most of the participants connected their exercise to both immediate and long-term improvements. For example, they used positive results in tracking parameters to decrease their worry of personally developing complications of diabetes.

***Monitoring.***

Monitoring, interpreting and using the information were integral to this step.

***Social support/network.***

Social support in this stage is similar to that described in the previous stage. It continued to be important to get support from others with diabetes and from family, friends and co-workers.

***Boredom.***

Participants did not describe boredom at this stage.

#### **Stage 4: Creating an Identity.**

During the Breaking Through stage, participants began to admit their diagnosis, thus, creating an identity where they began to more fully embrace their situation of having diabetes. Creating an identity occurred in two major ways: either creating an identity as a person with diabetes or recovering an older identity as an athlete or at least a previously active person (Table 10). Creating an identity intensified some of the processes of the Breaking Through stage. For example, identifying oneself as a person with diabetes lessened the likelihood that symptoms previously attributed to getting older would continue to be misinterpreted. Creating an identity assisted exercise maintenance by re-enforcing self-care and establishing rules. Creating an identity set the stage for progression to subsequent stages as more aspects of living with diabetes become integrated.

**Table 10. Participant Quotes Illustrating Stage 4: Creating an Identity**

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“I am diabetic, now that is something I can do something about.”

“I am not sure what happened; I was always active as a younger person but I guess I kind of lost that but now I am recovering that part of myself.”

“I joined it [diabetes].”

“I am diabetic and that piece of cake is not a part of my life anymore.”

“I am very dedicated.”

“Diabetes is part of my life.”

“I can’t regress because everyone knows.”

“Identity engenders pride.”

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***Monitoring.***

No specific advancements in monitoring occurred at this stage.

***Social support/network.***

No specific advancements in social support occurred at this stage.

***Boredom.***

Boredom has not developed as a particular problem at this stage.

**Stage 5: Habituating.**

The fifth stage, Habituating, was characterized by its simplicity of description (see Table 11). Participants in this phase just do it as a habit and exercise behavior was very routine. The routine involved doing the same exercise for the same amount of time at the same time of day over and over. This stage was quite stable although was interrupted, but at least for these participants quite easily resumed. Interruptions in the routine involved competing demands of ill and hospitalized family members. Despite efforts by the researcher to get at underlying processes during the interviews with this group of participants, participants were unable to add anything new; they just said they do the exercise and do not think about it anymore.

**Table 11. Participant Quotes Illustrating Stage 5: Habituating**

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“I don’t think about it anymore.”

“Well, I didn’t exercise for a few months there when I loaned my bicycle to my granddaughter who hurt her knee playing basketball and needed to bicycle as part of her treatment.”

“I get up every morning at 5:30 and ride the bicycle for 30 minutes. I did have a family

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member in the hospital for a few months so my routine got a little mixed up then but now I am back at it.”

“Just do it.”

“My wife, she exercises all the time. She asks me every morning if I have done my exercise and if I haven’t—well, I better get at it”

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### ***Monitoring.***

During the Habituating stage, the participants in this study were less likely to be continuing any monitoring behavior initiated in stage 3. They were less likely to continue to connect symptoms or results of physiologic measures to their exercise.

### ***Social support/network.***

To highlight this stage a bit more, the participants in the Habituating stage were more likely to describe their support system as someone who would nag them or make them feel guilty if they did not exercise than participants in other stages. In contrast, participants in other stages of *progressive self-curing* were more likely to describe support from others as stimulating and loving without judgment. The support received from others was described more harshly in the Habituating stage, nonetheless, the support continued to assist in sustaining their exercise program.

### ***Boredom.***

By the Habituating stage, boredom became an issue of importance. In fact, boredom was so salient that during early coding it looked like it might emerge as the core variable. Without exception, the participants recognized that exercise for exercise sake is boring. A participant quotes “Boredom, now that is a really big thing.”

Participants in the Habituating stage handled boredom by “tolerating monotony”. A few of the participants described growing up having to do chores such as milking cows by hand and baling and stacking hay. They described this work as very hard and very boring, not unlike exercise. Through these activities as youth, they were “disciplined to tolerate monotony.” Their ability to tolerate monotony was a skill they employed to tolerate their boring, monotonous exercise routines.

### **Stage 6: Making One Whole.**

Making One Whole is the sixth and final stage of the theory of *progressive self-curing*. In this stage there is integration of body, mind and spirit. Participants spoke of positive attitudes and love and sacredness as underlying processes to improve their physical health (see Table 12). These processes helped sustain their exercise program. As they became more confident in their exercise programs, the participants described improvements in family relationships, eating healthier diets, and supporting others with diabetes. Participants at this stage of integrating exercise into their life also told stories of *living* with diabetes. Many participants relayed stories of complex lives and major stresses such as ill family members and job changes that did not derail them and in some instances, major stressors were seen as opportunities for growth. Participants in the Making One Whole stage demonstrated an integration of self that transcended the “tasks” of living with diabetes.

**Table 12. Participant Quotes Illustrating Stage 6: Making One Whole**


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“People can do tremendous things.”

“I live a blessed life.”

“I’ve said to a co-worker, why would you call something that helps you lead a healthy life a curse?”

“God is great.”

“Love myself; love my family; love others.”

“You have to hang in despite obstacles.”

“If you want it, you can find a way.”

“I grew up poor yet with an attitude of plenty.”

“I am not perfect, I can forgive myself if I slip and start over the next day.”

“Life is sacred.”

“I cannot let knee pain take over.”

“You may find this strange but I used some self hypnosis to try to help my body control the diabetes. Basically what I did was relaxation techniques and administer positive messages and images of my body producing insulin and healing itself.”

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***Monitoring.***

Tracking continued for participants in the Making One Whole stage. Symptoms or declination in physiological measures were noticed if even a few days of exercise were missed. Tracking of symptoms motivated resumption of exercise and prevented

backsliding. In this stage, plateaus in measurements are recognized and overcome through patience, understanding or intensification of the exercise routine.

The participants took in additional information and used it to improve their self-care. For example, one participant had a stable aerobic exercise program where her blood sugars were well controlled. Then she received results of a bone density test which indicated that she had early stages of osteoporosis. This additional information led her to add resistance training to her aerobic routine. While in earlier stages tracking was connected to remarkable results evidenced by lower blood sugars, lower blood pressures, decreasing weight, as examples, and immediate satisfaction, tracking in Making One Whole has become more complex and mature. Results of the participants' monitoring activities are interpreted more holistically by them.

***Social support/network.***

In the Making One Whole stage, the support of others took on a different tone. A very important distinction for several of the participants was that while they highly valued the support they got from others, they learned that perhaps the best cure was to help others. Some of the participants recognized that they are an inspiration to others because of their healthy lifestyles.

Receiving attention for helping others was seen as a reward. Others looked to the participant for information about diabetes and diabetes treatment options including alternative treatments. Some of the participants described a very supportive group of people with diabetes who gathered together to provide input on innovations in diabetes care to health care providers and administrators at Mayo Clinic. This group was not a support group per se but a consumer advisory group. Benefits of a group such as this

were delineated by participants as continuing to break through the denial, exploring alternatives, ongoing awareness, stimulating environment, caring about each other. One participant reported exercising with a group. She is the informal leader and described her involvement as follows: “I never miss; if I didn’t go, they wouldn’t do it. And if I had to do this alone in my apartment, I probably wouldn’t do it either.” Both giving support to and getting support from others are important aspects of exercise maintenance to individuals in the Making One Whole stage. The benefits of giving support to others are of particular note.

***Boredom.***

Boredom in the Making One Whole stage was overcome by one of two ways—adding variety or recognizing that “boredom is in the eye of the beholder” (see Table 13). One group of participants overcame the boredom of exercise by creating variety. These participants changed their routine by altering the activity or the place or the people with whom they exercised. Although the other group of participants recognized unequivocally that exercise is boring, they personally were not bored. They described active, creative minds that are continually mindful of their environment. Furthermore, the participants that were never bored described a feeling of timelessness to their activity. With a variety of approaches, then, individuals who are successful in maintaining an exercise program have overcome the boredom of routine activity.

**Table 13. Making One Whole Participant Quotes on Boredom**


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“Just weights would be awful.”

“Some days I walk at the mall, other days on the bike path; some days I bike, others I swim”

“I like to create opportunities to exercise—walk to do an errand.”

“I take the dog for a walk—we follow several different paths.”

“Boredom is in the eye of the beholder.”

“I’m not bored; every morning I walk along the lake; today there were four boats out there in a group; I was wondering if they knew one another, whether they were catching fish, I create this whole story in my head.”

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### **Summary**

*Progressive Self-Curing* emerged as the core variable for the substantive theory of exercise behavior maintenance in older adults with type 2 diabetes. Six subordinate variables were identified that related to one another as progressive stages. These stages were Pre-action Slipping, Breaking Through, Getting Results, Creating an Identity, Habituating and Making One Whole. The participants described movement out of a pre-active stage through a series of processes to Making One Whole. These have been described and illustrated with the participants’ words. There was evidence of progression from a state of denial and rationalization to a state of personal transformation. This transformation of self was accomplished for the most part outside of the current health care system. Instead, participants described a process based in

self-reliance and support from family, friends and co-workers but particularly from others with diabetes. Each stage had its own major task as well as components of support and monitoring and in the last two stages, overcoming boredom. Support progressed from a situation of primarily receiving support to recognizing the importance of providing support to others. Monitoring matured from blood glucose monitoring to more complex interpretation of not only blood glucose results but of other signs and symptoms. The theory of *progressive self-curing* describes the transformation of diabetes self-care from a series of tasks to a way of living and being.

## Chapter 5: Conclusions and Discussion

### Introduction

Chapter 5 will commence with a summary of the findings. The summary will be followed by, a comparison of the theory of *Progressive Self-Curing* to related models and theories and distinguished as a separate concept. Strengths and limitations of the current study will be addressed using the quality criteria described in Chapter 3. Next implications for nursing practice and directions for future research will be presented. Finally, the chapter will close with concluding remarks.

### Summary of Findings

Type 2 diabetes is an important emerging health problem. Exercise is a cornerstone of therapy for type 2 diabetes. And for reasons outlined in the background and literature review was the chosen as the focus of this study. Yet, many individuals with type 2 diabetes do not meet recommended intensity, frequency and duration of exercise. Furthermore, our current health behavior change models do not adequately describe health behavior maintenance. Therefore, using grounded theory methodology this study set out with aims (1) to identify the common sociological and psychological processes used by older adults with type 2 diabetes to maintain an exercise program and (2) to develop a substantive theory of exercise behavior maintenance in older adults with type 2 diabetes.

Literature reviews of predictors of exercise in older adults with type 2 diabetes revealed inconsistent findings. Demographic variables were found not to be predictive of physical activity. Additionally, few studies used health behavior models as their conceptual framework. Of the few studies that studied health behavior models, none

found support for the models as a whole. Constructs including self-efficacy, social support and perceived barriers and perceived benefit were associated with physical activity; however, studies included in the review were observational and cross-sectional in design limiting their interpretation of cause and effect. Researchers (Rothman, 2000) have demonstrated differences in regulatory focus, self-efficacy and satisfaction between those initiating and those maintaining smoking cessation and weight loss. The preliminary literature review identified gaps in our understanding of health behavior maintenance. Yet, the escalating prevalence of chronic disease creates urgency to understanding how individuals sustain healthy lifestyles.

Following methods outlined by Glaser (1967, 1978) grounded theory methodology was used in the present study to investigate exercise behavior maintenance in older adults with type 2 diabetes. The theory of *Progressive Self-Curing* emerged from the data. Consistent with grounded theory components, the *Progressive Self-Curing* theory has six stages: (1) Pre-action Slipping, (2) Breaking Through, (3) Getting Results, (4) Creating an Identity, (5) Habituating, (6) Making One Whole.

The newly developed theory describes how, over time, older adults in the rural Midwest with type 2 diabetes maintain an exercise program. The first two stages, Pre-action Slipping and Breaking Through, describe pre-exercise stages characterized by denial, rationalization, mis-reading of cues and guilt. The hallmark of Stage 3, Getting Results, describes high levels of satisfaction with results attributed to exercise—lower blood sugar, lower insulin doses, and less shortness of breath. In Stage 4, Creating an Identity participants describe either recovering a previously forgotten identity as an

previously active person or taking on the identity of a “person with diabetes”.

Regardless of the identity, these identities create a vision, create “rules”, and create an image that helps maintain their activity program. “Just do it” could have been the variable name for Stage 5, Habituating. Individuals in Stage 5 are successful at exercise maintenance by maintaining an unwavering routine.

And finally, Stage 6, Making One Whole encompasses progress toward transformation. Transformation in this instance includes joy, spirituality, focus on self as well as others, and “living” with diabetes. Three constructs of importance to the theory of *Progressive Self-Curing* include self-monitoring, overcoming boredom and teaming (social support). The theory of *Progressive Self-Curing* describes exercise behavior maintenance in older, rural Midwestern adults with type 2 diabetes.

Chapter 5 will continue with a discussion of the theory of *Progressive Self-Curing*'s place in the literature (through comparison of models/theories), strengths and limitations of the current study using the quality measures introduced in chapter 3, the researcher's general comments and critique, implications for nursing practice, and directions for future research.

### **Comparison of Models/Theories**

For purposes of placing the theory of *Progressive Self-Curing* in the current literature, it will be compared to the Transtheoretical Model, the Four Phase Behavior Change Process, the Health Behavior Internalization model, the Physical Activity Maintenance theory. The Transtheoretical Model was chosen from among the common health behavior models for comparison to the theory of *Progressive Self-Curing* because it does have the most developed maintenance phase. The other models (Four

Phase Behavior Change Process, Health Behavior Internalization Model, Physical Activity Maintenance Theory) are proposed as health behavior maintenance models. The comparison of models will start with stage models: Transtheoretical Model; Four Phase Behavior Change Process; and Progressive Self-Curing. Following that discussion, constructs in the non-stage model(s) and “continuum” models will be contrasted and compared. See Tables 1 and 2 in Chapter 2.

### **Comparison of stage theories**

#### *Similarities.*

Transtheoretical Model (TTM) and *Progressive Self-Curing* have stage(s) that precede overt behavior change. The first three stages of TTM all describe processes that occur before taking action. The processes described by the participants of the current study in stage 1, Pre-action Slipping were particularly consistent with the pre-contemplation stage of TTM. For example, denial is the hallmark of the precontemplation stage of the Transtheoretical Model (Prochaska, et al., 1994). It is also a stage of in which people use justification—“creating good reasons for bad actions” (Prochaska, et al., 1994, p. 74). Yet other defenses described by Prochaska et al. (1994) which are consistent with descriptions of the study participants are rationalization (offering plausible explanations for behavior) and projection and displacement (redirecting personal responsibility others—*they made me eat cake*). In addition to turning outward as in projection and displacement, feelings in the pre-contemplation stage can be turned inward resulting in self-blame, self-accusation, and low esteem (Prochaska, 1994). These descriptions are reminiscent of “slipping into the pit” as described in the theory of *Progressive Self-Curing*.

All of the stage theory/model(s) have comparable processes as overt behavior change begins. Corresponding stages are: (a) TTM: stage 4, Action; (b) Four Phase Behavior Change Process: initial response and continued response and (c) Progressive Self-Curing: Breaking Through. What all of these stages have in common is that it is the first time that the desired behavior is performed reliably. Previously operating negative processes such as denial, rationalization, self-blame, etc. have been overcome at least enough to allow behavior change. Although not described completely by the participants in the current study, descriptions of both the TTM and Four-Phase Behavior Change Process address that this stage takes a lot of commitment, energy and continued cognitive processing.

The three stage theory/model(s) all have a “maintenance” stage. This stage will be discussed in the next section on dissimilarities as there are important distinctions between the models at this stage. Termination, Stage 6, of the TTM and the habit phase of the Four Phase Behavior Change Process both describe behavior change being carried out with complete confidence no matter of the external circumstances and without further consideration for its value. Prior behavior begins to be the primary determinant of continuing the behavior. These stages are comparable to Habituating in the theory of *Progressive Self-Curing*.

### ***Dissimilarities***

Although all of the stage models have a “maintenance” phase, the extent to which this stage is developed and described distinguishes the three theories from one another. First in contrasting TTM and the Four Phase Behavior Change Process, TTM describes maintenance as having performed a new health behavior consistently for at

least six months. Two factors are needed for successful maintenance: sustained, long-term commitment and a revised lifestyle (Prochaska, et al., 1994). Somewhat in contrast, the four-phase process model emphasizes satisfaction with the new behavior as the key ingredient and the behavior is consistently performed with confidence and with lessened consideration for the value of the behavior (Rothman, et al., 2004). These descriptions imply that maintenance in the TTM model continues to take at least some thought and energy while on the other hand the behavior is becoming a bit more automatic in the Four Phase Model during maintenance.

In contrast to the other stage models, the *Progressive Self-Curing* theory has a more developed maintenance phase consisting of four stages. This should be expected as the focus of the current study was to develop a theory of exercise behavior maintenance. The maintenance phase of the *Progressive Self-Curing* theory has continuing development of skills and social support as well as, strategies to manage boredom. Participants continued to use monitoring of blood glucose and/or symptoms to stay on track specific to this phase.

The final stage of *Progressive Self-Curing* stands in sharp contrast to the final phases of TTM and Four Phase Behavior Change Process. In TTM and Four-Phase process, the final stages are Termination and Habit, respectively. These phases are described as “automatic”—the value of the behavior is no longer considered. This is in contrast to the final stage of *Progressive Self-Curing*, Making One Whole, in which the participants did not stop thinking but they were thinking in a different, holistic fashion.

### *Summary of stage theory comparisons*

In summary, the stage theories on the whole are not dissimilar to one another or to *Progressive Self-Curing*. Although health behavior maintenance was the focus of this study, a particular similarity of importance is that both the TTM and *Progressive Self-Curing* theories acknowledge stages in which individuals are not changing. One of the arguments for the value of stage theories is that they guide intervention. However, the majority of interventions are aimed at individuals in action phases (Prochaska, et al, 1994). This is unfortunate. Prochaska, et al. (1994) estimate that only 20% of patients are in the action phase at any given time. Newman's Theory of Health as Expanding Consciousness (2000) challenges these conceptualizations of inactive phases. After all, individuals are always engaged in some pattern of activity.

The *Progressive Self-Curing* theory does stand in sharp contrast to health behavior change/maintenance models in the final stage. In both TTM and the Four Phase Behavior Change Process, individuals in maintenance progress toward termination (TTM) or habit (Four-Phase). These latter stages of health behavior change are manifest by the behavior becoming automatic. This contrasts with the final stage of *Progressive Self-Curing*. The final stage of *Progressive Self-Curing* arguably implies not less thought but more mindfulness to a holistic way of being in the world. In that way, the maintenance phase of progressive self-curing is more like the health behavior internalization model which will be discussed in the non-stage theory section which follows

### **Comparison of non-stage health behavior maintenance theories.**

The Health Behavior Internalization Model (Bellg, 2003) and the Physical Activity Maintenance Theory (Nigg, et al., 2008) are non-stage health behavior change models. Both models describe constructs in health behavior maintenance phases. The physical activity maintenance theory is specific to exercise maintenance. The health behavior internalization model is not specific to any behavior. The approach to discussing how the *Progressive Self-Curing* theory fits in the literature around these two theories will be to compare theoretical constructs.

#### ***Health Behavior Internalization Model vs. Progressive Self-Curing Theory.***

The Health Behavior Internalization is described as a health behavior maintenance model (Bellg, 2003). Three distinct prototypes of behavioral regulation and internalization are defined on a continuum from external regulation to integrated self-regulation. External regulation consists of the perceived imposition from others or from the environment to adopt new behavior. In the middle of the continuum, introjected regulation refers to low levels of self-regulation but this internal regulation is motivated by guilt and shame. On the other end of the continuum from external regulation is integrated self-regulation. Individuals at this end of the continuum are internally motivated and experience high levels of satisfaction, autonomy, competence, security and support (Bellg, 2003). In describing the continuum of internalization Bellg (2003) is not explicit in stating whether individuals progress from external to integration self-regulation or whether an individual may have a tendency toward one level or another. All levels of internalization are compatible with health behavior maintenance although integrated self-regulation has the greatest potential for sustainable change

(Bellg, 2003). There is no comparable construct to external regulation in the theory of *Progressive Self-Curing*. In fact, the participants verbalized high levels of autonomy. Habituating (Stage 5) of *Progressive Self-Curing* has similarities to introjected regulation. Similarities include a tendency for participants in this stage to describe their social support as nagging. Participants at this stage also lacked the high levels of acceptance, satisfaction, and problem solving that were very evident in participants in stage 6. Participants in Stage 6, Making One Whole, fit very well into the description of integrated self-regulation as described by Bellg (2003). They demonstrated high levels of acceptance, autonomy, security, perceived support, satisfaction, competence and coping.

***Physical Activity Maintenance Theory (PAM) vs. Progressive Self-Curing.***

The Physical Activity Maintenance Theory is a multi-level theory. The theory contains both intrapersonal (goal-setting, motivation, self-efficacy) and interpersonal (life stress, environment) mediators. These mediators explain the link between interventions and physical activity maintenance. Because the theory was built from existing physical activity literature, there is evidence that components of the theory are important to exercise, but not necessarily maintenance. Also, because the theory is based on the literature, many of the constructs are familiar. At least the constructs are familiar as they have been conceptualized in the non-maintenance-oriented physical activity literature. However, how these constructs apply to behavior maintenance is unclear. Nigg, et al. (2003) recognize this limitation in their description of the theory and encourage research on definitions and measurement of these constructs as they might apply to maintenance.

Attempting to compare the constructs of PAM to *Progressive Self-Curing* is difficult at best. The constructs are “under-defined” for their application to behavior maintenance. Also, the terminology of grounded theory does not fit easily into traditional constructs. The multi-level nature of the PAM theory is appealing and does make it compatible with the more holistic approach to exercise behavior maintenance preferred by participants in the current study.

### **Summary of health behavior model comparisons.**

In summary, in analyzing the data for the current study, the participants described a process—something was happening over time. This was particularly true for the participants that included a description of their pre-exercise phase. In grounded theory methodology, coding families are used to describe the relationship between the categories/variables identified in the data. One of those coding families is “process”. The process coding family had initial appeal for sorting of the data into stages. Furthermore, stage theories in health behavior maintenance, particularly the transtheoretical model, have empirical evidence to support a staged conceptualization of behavior change. The *Progressive Self-Curing* theory, the Transtheoretical Model and the Four Phase Behavior Change Process share similarities in their early stages. The final stage of *Progressive Self-Curing*, however, adds a dimension of personal growth not captured by the termination and habit phases of the Transtheoretical (Prochaska, et al., 1994) and Four Phase Models (Rothman, et al., 2004), respectively. The final two stages of the *Progressive Self-Curing* theory are consistent with the descriptions of introjected and integrated self-regulation as described in the Health Behavior Internalization Model (Bellg, 2003). The strength of the physical activity maintenance

theory is its multilevel structure. In comparing the health behavior change models to one another, both their constructs and structure, the theory of *Progressive Self-Curing* was put in context of the current literature on health behavior maintenance theories.

### **Comparison of *Progressive Self-Curing* with other theories.**

The focus of the theory of *Progressive Self-Curing* broadened from a theory of health behavior change to one of personal transformation for the participants. A literature search focused on transformation uncovered the Theory of Health as Expanding Consciousness (Newman, 2000) and the Theory of Integration (Hernandez, 2007). These theories will be compared to the theory of *Progressive Self-Curing*.

### ***Progressive Self-Curing and Health as Expanding Consciousness (HEC).***

Health as Expanding Consciousness is a nursing theory that guides nursing interventions with patients whether or not disease is present. Expanding consciousness is a “process of becoming more of oneself, of finding greater meaning in life, and of reaching new dimensions of connectedness with other people and the world” (Newman, 2009). Aspects of the theory of *Progressive Self-Curing* that are consistent with HEC (personal transformation) include turning from a pattern of denial in Stage 2 (Breaking Through) to creating a new pattern of living with diabetes. This new pattern included creating a new identity and continued monitoring of physiological patterns. Making One Whole epitomizes transformation to feelings of excitement, satisfaction, freedom, creativity, spiritual freedom, and increased ability to handle stress. The timelessness of expanding consciousness is captured in the statements of not being bored and noticing the beauty.

***Progressive Self-Curing vs. Hernandez's Theory of Integration (TOI).***

Aspects of the *Progressive Self-Curing* theory are also compatible with Hernandez's Theory of Integration (1999). Theory of Integration is a three-phase grounded theory that describes how individuals with diabetes solve self-care problems (Hernandez, 1999). Phase 1 of TOI is comparable to stage 1, Pre-action slipping of the theory of progressive self-curing. Both are characterized by denial and disinterest. Likewise, phase 2 of TOI and Stage 2 of Progressive Self-Curing are similar. Both mark an end to denial and progress toward action and making a life with diabetes. Phase 3, Science of One, is similar to the maintenance stages of Progressive Self-Curing. Both theories describe creating an identity, monitoring physiological cues and spirituality. The core category of *Progressive Self-Curing* also captures the overall theme of TOI. Hernandez captures it this way:

When the theory of integration emerged in my initial study, my life seemed shattered because the results shook my view of diabetes and toppled the tower of my preconceptions. I had always believed that the health profession goal in diabetes was to promote diabetes control by motivating our clients to adhere to a diabetes regimen prescribed by us. However, these participants had achieved this glycemic control by not adhering to the regimen, but by deriving their own regimen through tuning in to their own bodies (Hernandez, 2007, pp.108-109).

There are enough similarities among the models that a bit of confidence may be warranted about the ability to formulate a theory of exercise maintenance. However, the researcher was left with a level of dissatisfaction. It seems more relevant to change

the focus to “living” and “being” with diabetes than “doing”. This conclusion is particularly supported by the Theory of Health as Expanding Consciousness (Newman, 2007) and Hernandez’s Theory of Integration (1999).

## **Quality**

### **Credibility.**

In grounded theory credibility is enhanced by: (a) letting participants guide the inquiry, (b) checking the theoretical constructs generated against participants’ meanings, (c) using the participant’s actual words in the theory, and (d) articulating the researcher’s personal views (Chiovitti et al., 2003). Strategies (a), (c) and (d) were followed in the present study. All interviews were conducted by the researcher with an open and unstructured approach. The interviews began with a “grand tour” question (Simmons, 1994) such as “Tell me how you think you are able to stick with an exercise program”. Although the focus of this study was exercise maintenance, participants shared, in some instances, multiple other concerns and stresses. This provides evidence that participants were given the opportunity to guide the content of the interview at least to some extent. Description of the theory is illustrated with participant quotes. Actual participant words are used in some of the stage names: pre-action “slipping”, “creating an identity”, “habituating”. Researcher personal views were bracketed in the preparation phase as well as in memos throughout the research study.

As far as strategy (b) is concerned where the theoretical constructs are checked with the participants, Glaser (1978) recommends against this practice. Grounded theory allows for the same data to be interpreted differently and so going back to check the researcher’s interpretation is not warranted (Glaser, 1978). However, through the

processes of constant comparative analysis and theoretical sampling, concepts from previous interviews were checked with subsequent participants. This did result in some early interpretations being left out of the theory. For example, in the early interviews “importing skills,” meaning skills such as decision making or managing time, seemed like it might be important. However, this made very little sense to many of the later participants and so was dropped.

In addition to the credibility tactics outlined by Chiovitti, et al. (2003), Patton (1999) states that credibility in grounded theory depends on three elements: (1) rigorous techniques, (2) credibility of the researcher, (3) philosophical belief in the value of qualitative inquiry. As far as following rigorous techniques, the current study made exceptions to classical grounded theory method. Exceptions included approach to the literature review and to the reporting of results. These exceptions have been clearly explained and rationale provided. Important steps in grounded theory including data collection methods, constant comparison analysis and memoing were carried out with guidance from Dr. Glaser (mentored workshops, 2008 and 2009).

The researcher is a novice. Her naiveté in grounded theory research methodology has been ameliorated by attendance at workshops led by Dr. Barney Glaser, mentorship from academic advisors and completion of academic coursework. The researcher has a fundamental appreciation of the complexities of qualitative research, however, the fact remains that the credibility of the researcher is negatively affected by lack of experience and status as a student.

**Auditability.**

Auditability addresses the extent to which another researcher could follow the decision trail in the development of the substantive theory (Beck, 1993). In the present study, memos were dated and given a title at the time of their recording to ease in auditability. As the data were examined in more detail, memos were divided into multiple bits of data. However, a copy of the original memo was maintained in its entirety. Although grounded theory allows for different interpretations of the same data, memos written for the current study demonstrate the researcher's logic. By remaining in a single area of interest, the sampling of participants did not waver from that described in the protocol. This is in contrast to other grounded theory studies that may have a more complex theoretical sampling scheme.

**Fittingness.**

Fittingness is qualitative terminology for generalizability. Generalizability considers the representativeness of the participants and the setting. Generalizability is enhanced by decreasing bias in the sampling strategy. Bias in the current study was introduced by the researcher needing to rely on identification and recruitment of study participants by clinical staff. Although the clinical assistants generally tried to approach all eligible participants, when the clinic was busy and/or short-staffed recruitment was abandoned.

The clinical assistants had a script and were instructed to read it to potential participants. Most participants were recruited at the Mayo Clinic on the 19<sup>th</sup> floor corridor of the Division of Endocrinology. The health care providers who work on that particular corridor see many patients with type 2 diabetes for ongoing care. Patients

who see an endocrinologist for primary diabetes care may be different in important ways than patients who are followed by a primary care physician. It is possible, for instance, that they believe their diabetes to be more important.

Theoretical sampling should be used in grounded theory (Glaser, 1978).

Theoretical sampling is the process of data collection in which the researcher simultaneously collects, codes and analyzes the data. This process then guides what data will be collected and from where (Glaser, 1978). An alternative to theoretical sampling is selective sampling. In selective sampling, “the subjects are mainly chosen before the data collection and the data are collected within a certain time” (Backman & Kyngas, 1999). The current study used a “hybrid” of theoretical and selective sampling. For the most part the sample was chosen before data collection. The rationale for this approach was based on the aim to develop a substantive theory. In substantive theory, the researcher may focus their sampling to the area of interest (Glaser, 1978). Aspects of theoretical sampling included modifying the structure of the interview based on constant comparative analysis. This aspect of theoretical sampling was employed in the current study. It is possible that by using selective sampling the researcher missed exploring and finding exceptions to the experiences of the participants interviewed for the current study. After all, selective sampling is generally more restrictive in scope than true theoretical sampling. Using selective sampling eases working within the structure of Institutional Review Boards.

#### **Classical grounded theory criteria.**

Criteria described by Glaser (1978) are that a theory must have fit, workability, relevance and modifiability. Glaser (1998) maintains that by doing grounded theory,

the criteria for judging quality automatically are met. For example, the categories of the grounded theory are derived directly from the data through coding, memoing and sorting. In this way, fit becomes automatic. By workability, Glaser notes that the theory “should be able to explain what happened, predict what will happen and interpret what is happening in an area of substantive inquiry” (Glaser, 1978, p.4). Grounded theory method leads to relevance by allowing the categories to emerge without any forcing into preconceived notions.

To the researcher, quality in grounded theory seems a bit more complicated than described by Glaser (1978). For example, as a novice theorist, my developing sensitivity to emerging concepts and analytical and abstraction skills do not make it feel “automatically good”. Furthermore, relevance and modifiability have yet to be proven. Only in time will it be known if the theory of progressive self-curing is of interest to others and if it is workable. The researcher does believe it is modifiable.

#### **Consensus criteria.**

Cohen and Crabtree (2008) through a literature review identified four consensus criteria: (1) carrying out ethical research; (2) importance of research; (3) clarity and coherence of the research report; (4) use of appropriate and rigorous methods.

Conducting ethically sound research involves carrying out research in a way that is “respectful, humane, and honest and embodies the values of empathy, collaboration, and service” (Cohen and Crabtree, 2008). The researcher believes that the study was carried out in that way. There are larger ethical issues in qualitative research such as vulnerability of participants, anonymity, confidentiality (Holloway & Wheeler, 1995). Ethical underpinnings particular to qualitative research include: “Human beings are as

they are; actions of individuals are in some sense free; there is a reverence for the human experience; the researcher does not predetermine the reality through his/her own assumptions and language” (Munhall, 1989, p.23). The current study was approved by Institutional Review Boards at Mayo Clinic and the University of Minnesota. The study was determined to be exempt. Verbal consent was obtained for participation and separately for audiotaping. The researcher believes she was sensitive to the participant. The quotes used for illustration are not specific enough to identify any participants.

The current study has advanced our understanding of exercise maintenance behavior in older adults with type 2 diabetes. It could be argued that the findings advance our knowledge of not just exercise behavior but how older adults with type 2 diabetes manage “living”. The notion that older adults with type 2 diabetes are “out there on their own” transforming their lives is important. Clarity and coherence of the research report is not applicable to the dissertation format; it applies to the journal article format. The fourth criterion, appropriate and rigorous method has been addressed above.

#### **Quality summary.**

Generally, criteria for credibility, auditability and fittingness were met in the present study. The major exception to the criteria is the fact that the researcher is a novice in grounded theory methodology which could affect credibility as well as theoretical sensitivity. Another concern is sampling bias because this study included only older adults with type 2 diabetes who had been successful at maintaining an exercise program for a minimum of six months. Furthermore, they were for the most part, recruited from the Mayo Clinic Division of Endocrinology. Limiting

generalizability to demographic variables remarkably restricts the present study.

However, the concepts of *Progressive Self-Curing* have broad generalizability. Because of the theory's similarity to Health as Expanding Consciousness, it could be argued it is applicable to anyone interested in transformational growth. Although there are some real limitations to the study, the researcher followed a rigorous method, was true to the data and the participants and discovered an important, interesting process.

The majority of the small sample was recruited from a large Midwestern specialty clinic. Although their demographic information indicated a range of education, income, and employment status, it could be argued that the sample would be representative of a very specific subset of the population.

A weakness of exploratory design is its lack of replicability (Brink & Wood, 1998). A different researcher may interpret the data differently. No two people "see" the same phenomenon identically (Brink and Wood, 1998, p. 318). This situation is inherent in grounded theory studies.

To complete the discussion on quality of the current research study, a few comments will be made about saturation. Saturation is an important principle in qualitative research. Saturation means "bringing new participants continually into the study until the data set is complete, as indicated by data replication or redundancy" (Bowen, 2008, p. 140). Saturation assures that no important data have been ignored (Glaser, 1978). In classical grounded theory, the processes of constant comparative analysis and theoretical sampling are particularly helpful in saturating theoretical categories. On the other hand, selective coding, wherein you begin to set aside data that

does not support your main category, must be done carefully so that important data are not set aside and ignored.

In the current study, constant comparative analysis allowed for checking codes that emerged early in the process with subsequent participants. This resulted in eliminating some codes that initially appeared important but did not resonate with subsequent participants. For example, “prioritizing self” was connected to data on calendar management and dedication to caring for oneself. Only one of the early participants talked about calendar management. The context of the comment on dedication to caring for oneself was re-evaluated and re-coded into the Making One Whole category. A couple of other examples of early codes that did not end up having supporting data from subsequent participants include “importing skills” and “making trade offs”. Thus, constant comparative analysis allowed checking for and setting aside the exceptions.

In a modification to theoretical sampling, the current study used selective sampling. Selective sampling refers to setting out to sample participants meeting a specific set of inclusion and exclusion criteria (Glaser, 1978). In contrast, in theoretical sampling the researcher cannot know in advance precisely what to sample for or where the data will lead. The researcher can be more confident that categories have been saturated in theoretical sampling because comparison groups are sought (Glaser, 1978). Selective sampling allowed the researcher to reach “data replication and redundancy” (Bowen, 2008) but it is possible that additional description of the categories or perhaps even additional categories would emerge if theoretical sampling and therefore, comparison groups had been interviewed.

Selective coding requires diligence on the part of the researcher to avoid ignoring important data that does not fit the emerging core category. In classical grounded theory, once a core category has emerged, data not related to it can be set aside as the researcher transitions from open to selective coding. Being careful to remain open to the possibility of alternative interpretations of the data, the researcher was careful to continue to analyze each piece of data for its fit or exception. Unwilling to ignore data on monitoring, social support, social networking and boredom, these constructs were defined and retained within the theory of *Progressive Self-Curing*. This exception to selective coding enriched the overall theory of *Progressive Self-Curing*. However, the stages of the theory could be “unsaturated” due mainly to the sampling strategy as explained above.

Interestingly, there were very consistent stories across demographic variables. The first interview and the last interview stand as testament: the first interview was with a Caucasian male; the last interview with a Mexican female yet their stories of transformation were nearly identical. One exception to demographic variability was that the oldest participants were more likely to discuss musculoskeletal pain. In summary, saturation appeared to be reached as no new information was being obtained regarding the processes underlying exercise behavior maintenance. However, the final descriptions of the categories may be “unsaturated” due at least in part to the sampling strategy.

#### Researcher’s General Comments and Critique

The theory of *Progressive Self-Curing* has been presented as a staged model. This model was suggested by the participants’ description of events happening over

time and the progressive nature of personal transformation. However, after completing the post-analysis literature review and critique of theory structures, this linear, stage by stage progression faces challenges. While there is enough data to support a general progression, there is not enough data to support a linear, step-by-step progression. It is possible with closer longitudinal examination of individuals with type 2 diabetes working at establishing exercise maintenance, the route may be more circular; perhaps there is back-sliding; perhaps not all individuals progress through all of the stages. Indeed, the researcher suspects these alternative scenarios to be very possible.

Another observation that lends complexity to the discussion of the theory structure is that the majority of the participants in the current study (9 of 13 participants) were at stage 6, Making One Whole. Although the participants in the final stage of the theory described progression over time, their recollections of their progress was not detailed enough to describe a predictive progression. Those participants not in stage 6, Making One Whole, were in stage 5, Habituating. Characteristics of Habituating are similar to the terminal phase of the Four Phase Behavior Change model (Rothman, et al, 2004) and the description of external regulation (Bellg, 2003). Bellg (2003) does not describe explicitly whether his theory of behavior maintenance is progressive. One interpretation of his work is that each category (external regulation, introjected regulation, integrated self-regulation) describes a possible, stable adaptation or response but an integrated self-regulation response is most desirable. The theory of *Progressive Self-Curing* relies completely on historical recollection to build the path of personal transformation. Although this path has support from work by Bellg (2003), Newman, (2000), and Hernandez (1999, 2007) no one has conducted the kind of

research in this population that would rule out other baseline explanations for participants to reach high levels of exercise maintenance such as personality, intrinsic coping styles or other processes.

### **Implications for Nursing Practice**

The findings of the current research challenge our current paradigm of care delivery. Our current paradigm continues to focus on disease and health as absence of disease. Our current diabetes education focuses on teaching “self-management” skills. The participants of the present study describe a process of transformation that is not currently supported by these approaches to patient care. Based on the findings of this study, there should be a call for development of strategies that would not only enhance transformation of patients but transformation of nursing and nurses also. Again, quoting Newman (2000), “Nursing intervention is derived from a relational paradigm that directs the professional to enter into a *partnership* with the client, often at a time of chaos, with the mutual goal of participating in an authentic relationship, trusting that in the process of its unfolding, both will emerge at a higher level of consciousness” (p. 97). In contrast to creating partnerships with their health care providers, the participants of the current study described being out on their own. Using Newman’s approach, this situation could be remedied to the enrichment of both patients and nurses.

Teaching individuals with type 2 diabetes to monitor their blood glucose should also include broader perspectives on interpretation of results. Currently individuals are primarily taught to monitor their blood glucose and use the results to adjust their medication doses. Broadening the interpretation to include monitoring effects of other

activities of daily life including exercise and dietary intake could help motivate patients to change behavior.

The role of boredom as a deterrent to sustaining regular exercise is currently under-recognized. The participants in the current study unanimously recognized regular exercise as boring. Current advice to decrease the boredom of regular exercise programs is often to increase the variety. This may have limited applicability to individuals who tolerate monotony and who are never bored. Increased recognition of and amelioration of the negative effects of boredom including lethargy, frustration and depression create opportunities for innovation in nursing interventions to promote exercise maintenance.

Additionally, it is possible that older adults living with type 2 diabetes may benefit from non-traditional health care interventions. Some non-traditional therapies that assist in integration of mind, body and soul include yoga, tai chi, meditation, art, music, poetry, biofeedback and breathing techniques, among others (Dacher, 2006). Dacher (2006) addresses the current need for our health care system to become a healing system through the use of integral approaches. Furthermore, there is increasing acceptance of alternative therapy by Americans. In 2007, nearly 40% of United States adults used alternative therapy. The most common modalities included meditation, massage therapy and yoga (Barnes, Bloom & Nahin (2008). Therefore, offering alternative therapies that assist in personal transformation may assist patients with chronic illness to live well and are acceptable to them.

However, for integral approaches to be effective, the health care provider must first develop an integrated (mind, body and soul) approach to their own lives. “We

must change ourselves if we are to change the medicine we are practicing” (Dacher, 2006). The relationship between patient and provider is the foundation of healing and transformation for both healer and healee (Dacher, 2006; Newman, 2000).

### **Recommendations for Future Research**

The current study started out with the intent to fill at least part of the gap in the understanding of exercise behavior maintenance in older adults with type 2 diabetes. This focus now seems narrow and misdirected. The current study points toward a broader perspective that puts aside the providers’ agenda of specific tasks and behavior expectations. Furthermore, giving new definitions to old concepts of health behavior change to make them more applicable to behavior maintenance has little appeal. Instead the patient’s agenda of living with diabetes and creating patterns of transformation should move forward. However, given that it is unlikely that old paradigms will fall away quickly, recommendations for further research will include suggestions based in both the new and old approaches to living with diabetes.

One of the first steps in furthering the development of the theory of *Progressive Self-Curing* is to address and modify its structure. As discussed above, it is very possible that the structure is not linear and stepwise. Possible solutions worth exploring include integration of the theory of HEC into a non-staged process model, longitudinal studies of individuals over time, and additional data collection in comparison groups. These comparison groups could include other older adults with type 2 diabetes regardless of exercise status. Because the transformation process of the participants of the current study transcended the tasks of diabetes self-care, individuals with other chronic illnesses could also contribute to understanding the progressive self-curing

process. Also, it would be worthwhile revisiting in more detail the literature on other emerging theories (self-determination, self-regulation, self-schema, etc.) that could contribute to an integrated model of exercise behavior maintenance. Some of these emerging theories address particular stages of the theory of *Progressive Self-Curing*. For example, exercise self-schema describes creating an identity as an active person. Other emerging theories address personal transformation and self-responsibility (self-determination, self-regulation, activation theory). Both theories that address particular stages and those that address the larger process have potential contributions to maturing the current study. Although the theory of *Progressive Self-Curing* has contributed to the understanding of exercise in older adults with type 2 diabetes, it is an emerging theory and provides relevant opportunity for further development.

The definition of “exercise maintenance” has not been clearly identified. Thus far exercise maintenance has generally been defined as maintaining a regular exercise program for a minimum of six months. Whether this is a legitimate definition for this complex behavior has not been established. And, in fact, defining behavior maintenance primarily using time is suspect. This is particularly true in chronic disease when behavior must be maintained for years, not for a relatively short period of time. Definitions using psychological process such as those proposed in the Four Phase Behavior Change Process warrant attention.

Additional studies to understand the role of boredom, self-monitoring of blood glucose and other symptoms and social support/networking in health behavior maintenance are warranted. Our current understanding of boredom is limited and our general advice is to increase the variety of exercise. Expanding consciousness would

appear to be associated with a state of low boredom. Increasing our understanding of boredom, whether it is a state or a trait, could lead to important interventions.

Expansion of self-monitoring to continuous glucose monitoring and/or attention to other symptoms appears promising but requires additional study. Finally, the role of altruistic acts in overall well-being could be further examined.

Exploration of the experience of pain in older adults could lead to conquering a common barrier to exercise and to quality of life. The oldest participants in the current study were more likely to mention strategies to manage pain than the younger participants. The literature has also identified pain as a barrier to exercise in older adults. Designing and testing programs that allow older adults to exercise with minimal discomfort could decrease this barrier for the nearly 50% of older adults who have frequent pain.

One of the goals of grounded theory is “to generate a theory that explains patterns of behavior that are relevant and problematic for those involved” (Andrews & Nathaniel, 2009, p. 29). This goal could as well be written by Newman (2000) as she describes the basics of the theory of HEC as recognition of patterns. In turn, these goals are compatible with Newman’s “research as praxis” model (2000). Research as praxis is defined as “thoughtful reflection and action that occur in synchrony, in the direction of transforming the world” (Newman, 2000, p. 92). In the research as praxis model, research focuses on the reality of nursing practice. Newman (2000) maintains that “The process of nursing practice is the content of nursing research. What we need to understand is the process of transformation from one point to another” (p. 92-93).

There is a call for nursing to incorporate research into practice. Attention to developing

pragmatic models of nursing research that would simultaneously generate knowledge and build transformational relationships with patients is an exciting possibility.

The theory of *Progressive Self-Curing* indicates that individuals experience a transformational transition as they learn to live well with chronic disease. This type of transformation may be supported by a variety of different interventions. Possible interventions include coaching (Grodzki & Allen, 2005), motivational interviewing (Miller & Rollnick, 2002), and empowerment strategies such as creating critical consciousness (Freire, 1974). There are gaps in our understanding of how these interventions might be applied to chronic disease management.

The physical activity maintenance theory (Nigg, et al., 2008) was developed with the hope that it would stimulate research on physical activity maintenance. Although the theory is based on and built with concepts from the physical activity literature, the theory has not been studied in the health maintenance setting. Furthermore, the concepts have not been defined for the study of exercise maintenance. The concepts of the theory are described as mediators in an intervention model. After definitions and measurement tools for the concepts are developed, intervention studies aimed at increasing exercise behavior maintenance could be designed and the model tested.

## **Conclusions**

The prevalence of type 2 diabetes is becoming epidemic in proportion. Older adults will be particularly affected by the disease. Currently, individuals with type 2 diabetes and/or advancing age are less likely to exercise than their younger, healthier counterparts. However, exercise is the cornerstone of diabetes treatment (and

prevention). Commonly used health behavior change models emphasize adoption of health behavior change, not maintenance. To control type 2 diabetes, prevent complications and improve quality life, individuals with type 2 diabetes need to exercise on a regular basis over prolonged periods of time. There is a critical need to increase our understanding of exercise behavior maintenance in older adults with type 2 diabetes.

Although the theory of *Progressive Self-Curing* is in its infancy, it advances our understanding of exercise behavior maintenance. The theory points toward the importance of identity creation, social networking, physiological monitoring and personal transformation. These constructs stand in contrast to concepts and processes used in current commonly used health behavior change models. Further development of the current theory is, however, indicated.

Results of the current study point to a holistic response to living with diabetes that is currently not addressed by our health care system. Exercise is not necessarily the central concern but rather living well, in all ways, and transforming the self to greater consciousness. Greater consciousness is manifest as less boredom, social networking, regular exercise, spirituality, and love. The current study challenges us to change direction in our research, education and practice.

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Appendix A  
Identifying and Recruiting Subjects for Exercise Study

Age over 50	Yes	No
Type 2 diabetes for at least 1 year	Yes	No
Sedentary prior to diagnosis of diabetes	Yes	No
Exercised consistently for a period of at least 6 months since diagnosis (need not be currently exercising)	Yes	No
Live within 60 miles of clinic	Yes	No

If the answer to all of the above items is yes, ask the patient about participating in the study. Use the following script:

Would you be interested in participating in a study that is exploring how and why people with type 2 diabetes exercise? It would involve your meeting with a researcher to describe the study in more detail, answer questions and obtain your consent to participate. You will then be asked to complete an interview that will last approximately 1 hour. The interview will be conducted in a confidential, private place. The interview will be audiotaped. You will receive 20 dollars compensation for your time.

The researcher is a nurse practitioner who is now a doctoral student at the University of Minnesota. She has prior experience in caring for people with diabetes. You are entirely free to say yes or no to talking to the researcher and your care will not be affected in any way. If you say yes, we will contact her and she will then make arrangements directly with you to complete the consenting process and conduct the interview.

## Appendix B: Mayo Clinic Institutional Review Board Approval

## Principal Investigator Notification:

From:IRB  
To:Audrey Weymiller  
CC:Audrey Weymiller

Re:Application # 08-007531

08-007531

Please Note: Effective immediately, communications for IRB decisions will be in a new format. This change is a result of recent standardization measures occurring in the IRB. If you have questions, please contact the IRB Service Center at (77) 64000.

Title: Toward Understanding Exercise Behavior Maintenance in Older Adults with

Type 2 Diabetes: Proposal for a Grounded Theory Study

IRB#: 08-007531

Please note that all correspondence (modifications, continuing reviews, reportable events) related to this study/grant application must be submitted electronically in the IRBe system.

The following is an excerpt from the minutes of the Expedited Review B of the Mayo Clinic Institutional Review Boards meeting dated 11/18/2008:

The above referenced application was reviewed and approved by expedited procedures. The Reviewer noted that the human studies activities involve an interview with diabetic patients older than 50 years regarding exercise behavior, and determines it to be EXEMPT under 45 CFR 46.101 item 2.

The investigator is reminded that as the study has been determined to be exempt, the IRB will not issue a finalized consent form for the study. The Reviewer noted approval from the Nursing Research and Evaluation Committee, dated October 6, 2008. Continuing or annual IRB review of this study is not required as it is currently written. However, modification to the study design or procedures should be submitted to the IRB, to determine whether the study continues to be exempt.

Pearson, Randall K. M.D., Chair  
Ja-Neen Bird , Correspondent  
Mayo Clinic Institutional Review Boards  
Expedited Review B

## Appendix C: University of Minnesota Institutional Review Board Approval

Date: Mon, 24 Nov 2008 14:57:36 -0600 (CST)  
From: irb@umn.edu  
To: weym0001@umn.edu  
Subject: approval letter

11/24/2008

Audrey J Weymiller  
722 Seventh Street SW  
Rochester, MN 55902

RE: "Toward Understanding Exercise Behavior Maintenance in Older Adults with Type  
2 Diabetes: A Grounded theory Study"  
IRB Code Number: 0811P52601

Dear Ms. Weymiller

The referenced study was reviewed by expedited review procedures and approved on November 20, 2008. If you have applied for a grant, this date is required for certification purposes as well as the Assurance of Compliance number which is FWA00000312 (Fairview Health Systems Research FWA00000325, Gillette Children's Specialty Healthcare FWA 00004003). Approval for the study will expire one year from that date. A report form will be sent out two months before the expiration date.

IRB approval of this study includes the consent form and HIPAA Authorization received November 3, 2008

The IRB would like to stress that subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when calculating the number of subjects you request. This study is currently approved for 20 subjects. If you desire an increase in the number of approved subjects, you will need to make a formal request to the IRB.

The code number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.

As the Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Unanticipated problems and adverse events should be reported to the IRB as they

occur. Research projects are subject to continuing review and renewal. If you have any questions, call the IRB office at 612-626-5654.

On behalf of the IRB, I wish you success with your research.

Sincerely,

Felicia Mroczkowski, CIP  
Research Compliance Supervisor  
FM/egk  
CC: Jayne Fulkerson

## Appendix D: Nursing Research and Evaluation Committee Funding

**From:** Cornelius, Lori A., R.N.  
**Sent:** Monday, February 02, 2009 8:38 AM  
**To:** Arnold, Jacqueline J., R.N.; Haala, Pamela M., R.N.; Magtibay, Donna L., R.N.; Maxson, Pamela M., R.N., C.N.S.; McCabe, Pamela J., R.N., C.N.S.; Moessner, Anne M., R.N., C.N.S.; Moore, Wendy R., R.N.; Steely, Frances V. (Dusty), R.N.; Wentworth, Laura J., R.N., C.N.S.; Weymiller, Audrey J., R.N., C.N.P.  
**Cc:** Holland, Diane E., R.N., Ph.D.; Cornelius, Lori A., R.N.; Johnson, Sarah L. [RO NSG]  
**Subject:** NREC funding approved 1-26-09  
**Attachments:** NREC Funding 012609.doc  
Hello All,

The Nursing Research & Evaluation Committee has reviewed and approved your study for scientific merit, feasibility, and funding (please see attachment). The MCR Research Department will allocate NREC monies sometime in February. At that time, if you have submitted a minute item to NREC indicating you have IRB approval, you will be notified of the cost center for your study. Please note that a 10% indirect charge was implemented by the MCR Research Department for all studies funded after Sept. 1, 2008:

[As previously communicated effective September 1, 2008, the Research Finance Subcommittee approved the application of indirect costs to all new internal awards. As a result, 10% of awarded funding will be withdrawn from your account for indirect charges.](#)

Therefore if you have requested \$2,000 you will have \$1800 to spend for your study. Please note the following NREC funding requirements:

- The principal investigator is responsible for monitoring expenses charged to their account. Questions regarding the budget may be directed to Lori Cornelius at 5-0597 or [cornelius.lori@mayo.edu](mailto:cornelius.lori@mayo.edu).
- Beginning this year Investigators will be expected to meet quarterly with NREC Chair and Budget Representative regarding your funding and study progress. We look forward to assisting you with your work.
- Once funds have been awarded any large shift (greater than \$500) between line item expenditures requires pre-approval by the NREC.
- Items that have been purchased with funds from the NREC, such as tape recorders, remain Mayo property after the completion of the study. Please return these items to the Nursing Research and Evaluation Committee for the use of future investigators.



NREC Funding  
112609.doc (33 KB..)

**Lori A. Cornelius, RN**

Nursing Administrative Specialist  
Department of Nursing  
Eisenberg SL 41A  
Phone: (25)5-0597  
Pager: 127-00622  
cornelius.lori@mayo.edu

**Mayo Clinic**

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Rochester, MN 55905  
www.mayoclinic.org

<b>Investigator</b>	<b>Study</b>
Arnold, Jackie	Teaching and Evaluating Beginning Intensive Care RNs in Emergency Response: Comparison of Three Simulation Teaching Methodologies
Haala, Pam	Patient Story: Essential Elements
Magtibay, Donna	Correlational Study of Vascular Access Flow Measurement: Fresenius 2008K® and Transonics®
Maxson, Pam	The Incidence of Ejaculatory Urinary Incontinence after Radical Prostatectomy
Maxson, Pam	Short Term and Long Term Sexual and Urinary Dysfunction in Patients Undergoing Surgery for Colorectal Cancer: The Impact on Quality of Life
McCabe, Pam	Predictors of Symptoms and Psychological Distress in Patients with Recurrent Atrial Fibrillation
Moessner, Ann	Brain Injury Coping Skills Group: A Prospective and Preventative Intervention Aimed at Addressing the Emotional Well-Being of Patients with Brain Injury and their Caregivers
Moore, Wendy	Can a Nurse Education Video Improve Compliance with Positive Airway Pressure (PAP) and Enhance Patient Self-Efficacy in Management of Obstructive Sleep Apnea Syndrome?
Steely, Frances (Dusty)	Nursing Perceptions of MRSA and the Associated Isolation Guidelines
Wentworth, Laura	One Voice Collaborative Massage Pilot of Interventional Cardiology Patients
Weymiller, Audrey	Toward Understanding Exercise Behavior Maintenance in Older Adults with Type 2 Diabetes: A Grounded Theory Study