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The Effect of a Group Lifestyle Coaching Model on HbA1c and Psychosocial Constructs in Low-Income Patients with Type 2 Diabetes

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by

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ABSTRACT

The epidemic of diabetes and its complications is concerning, and new approaches need to be explored for fostering better patient outcomes in a cost effective way. This exploratory study examined the effectiveness of a group coaching model on glycemic control, diabetes knowledge, diabetes empowerment, and diabetes self-management compared to usual care or participation in a 90-minute diabetes education class. A convenience sample of 34 patients with type 2 diabetes mellitus was recruited at a clinic providing services to the uninsured. Participants self-selected into the coaching group (n = 12), class group (n = 10), or control group (n = 12). HbA1c and four psychosocial questionnaires were used in a repeated measures pre-test/post-test design. ANOVA, Kruskal-Wallis, paired-samples t test, Wilcoxon signed-rank test, ANCOVA, Pearson's product-moment correlation, and hierarchical multiple regression were used to examine relationships among the variables. Although results suggest that the coaching model did not improve glycemic control or the psychosocial indices measured, the coaching group had the least weight gain over the course of the study (.55 lbs ± 5.55). The contribution of the intervention group to the change in body weight remained significant even after adjusting for age, medication changes, and years with diabetes (R^2 = .416, $F(4,18) = 3.201$, $p < .0005$; adjusted R^2 = .286). A post-program evaluation completed by the coaching group revealed a positive group experience and several positive health behavior changes. Further research with a larger sample and longer time-frame would be beneficial to expand on this approach to diabetes care and diabetes self-management education.

Keywords: type 2 diabetes mellitus, health coaching, group coaching, diabetes self-management education, diabetes knowledge, diabetes empowerment, diabetes self-efficacy, diabetes self-management

STATEMENT BY THE AUTHOR

This scholarly project has been submitted in partial fulfillment of requirements for a doctor of nursing practice degree at Southern Adventist University and is deposited in the McKee Library to be made available to borrowers under rules of the Library. Brief quotations from this manuscript are allowable without special permission, provided that the work is properly cited, the use is educational and not for profit, and the work is not altered. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the Dean of the School of Nursing when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

DEDICATION

I dedicate this culmination of my doctoral journey to my very best friend and husband, Barry. We've laughed through the years because I so often use the adjective "wonderful" to describe his impact on my life. But without his unfailing love, encouragement, and support, I would not be who I am today. Though I am thankful this part of the journey is ending, I am glad that the one we are on together never will.

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I am grateful to my parents, my sister Julie, dear friends Tami, Tina and Starla, and other family, friends and colleagues who understood and tolerated my over-scheduled life during the past two years—and cheered me on despite my decreased available time to spend with them. I also want to thank my precious sons, Daniel and David, for their love, support, encouragement, and unwavering confidence in me.

Above all, I wish to praise my Savior and Master Restorer for making every part of this journey possible. He has repeatedly reminded me that this project is His, not mine, and that it has been accomplished through His "great power and outstretched arm" (Jeremiah 27:5, NKJV). In response to His continual presence in my life, "my only aim is to finish the race and complete the task the Lord Jesus has given me—the task of testifying to the good news of God's grace" (Acts 20:24, NIV).

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CHAPTER 1: STATEMENT OF THE PROBLEM

The doctoral project described in this paper is an exploratory study investigating the effect of a nurse practitioner-led diabetes lifestyle coaching model on glycemic control, diabetes knowledge, diabetes empowerment, and diabetes self-management in an uninsured population with type 2 diabetes. Chapter 1 describes the impact of the current diabetes epidemic in the United States, the challenges it brings to health care, and an overview of some of the recent trends in providing diabetes care and fostering effective diabetes self-management education (DSME). The purpose and aims of the project are delineated, including the PICO question and research hypotheses tested. The practice setting for the research project is introduced, along with a discussion of how this setting supported the development of the project. Also provided are definitions of important terms and concepts and a review of the theoretical framework utilized. The chapter concludes with a discussion of the significance of the project to nursing practice.

Background to the Research Problem

In the United States it is estimated that 8.3% of adults and children have diabetes. Another 35% of U.S. adults aged 20 years or older and 50% of those aged 65 years or older have prediabetes (Centers for Disease Control and Prevention [CDC], 2011b). The prevalence of diabetes in the United States has increased significantly from 1958 to 2010 (see Figure 1), and a recent CDC study projects that as many as one in three U.S. adults could have diabetes by 2050 if the current trends continue (Boyle, Thompson, Gregg, Barker, & Williamson, 2010). To put this in practical terms, nearly 1 out of every 10 patients seen in a primary care practice today will present with diabetes, and perhaps as many as 1 in 3 patients in 2050. As a result, nurse practitioners need to be proficient in screening for and treating diabetes and its complications.

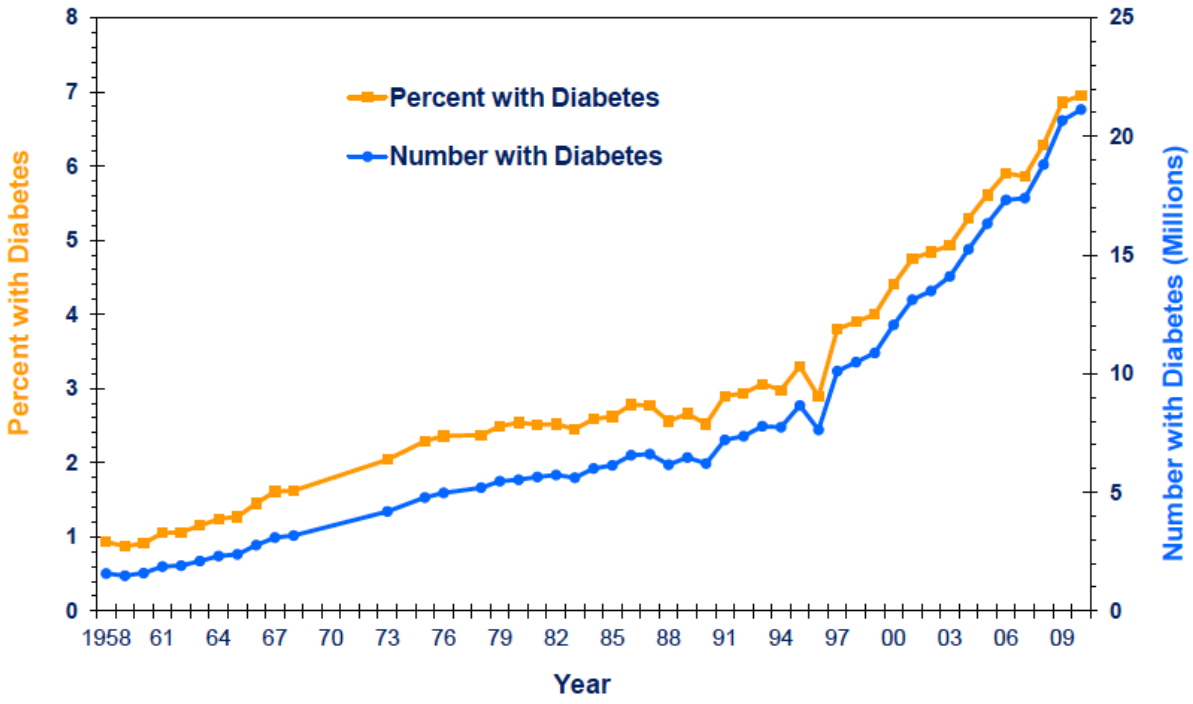


Figure 1. Number and percentage of U.S. population with diagnosed diabetes, 1958-2010. From CDC's Division of Translation National Diabetes Surveillance System available at http://www.cdc.gov/diabetes/statistics.

The primary Healthy People 2020 goal for diabetes is to reduce the disease and economic burden of diabetes and improve the quality of life for all persons who have, or are at risk for, diabetes (U.S. Department of Health and Human Services [HHS], Healthy People 2020, 2011). Chronically elevated blood sugars damage blood vessels, nerves and organs—resulting in heart disease, stroke, hypertension, blindness, kidney disease, amputations, and other serious complications (CDC, 2011b). Unfortunately, nearly half of patients with type 2 diabetes do not achieve evidence-based targets for blood glucose control (Ross, 2013).

These problems are compounded in primary care settings that target the underserved (Soto, Bazyler, O'Toole, Brownson, & Pezzullo, 2007). Often these patients ignore chronic

conditions due to a lack of resources, miss appointments due to transportation issues or fear of losing a job, and have a higher incidence of complications. These barriers often lead to poorer diabetes outcomes for disadvantaged patients and subsequently drive healthcare costs even higher.

Challenges of Diabetes Care

The significant and growing prevalence of diabetes and poorly controlled diabetes presents several major challenges for providing diabetes care. The most significant issue faced by health care providers is that of time constraints. Although evidence-based practice guidelines have been developed to facilitate management of patients with diabetes (American Diabetes Association [ADA], 2014), a typical fifteen-minute primary care visit provides little time for the clinician to address the many recommendations.

Fostering better diabetes self-management is a big challenge in diabetes care. Research attests to the importance of lifestyle change for prevention, management, and even reversal of diabetes, but Van der Ven (2003) points out that it requires additional time and support to help patients navigate the change process. Extending the visit length to allow time for behavioral counseling is just not cost effective for most practices. Furthermore, many clinicians lack the confidence and skill needed to provide such behavioral change counseling (Yarnall, Pollak, Ostbye, Krause, & Michener, 2003; Jallinoja et al., 2007).

Another identified barrier is patient refusal to comply with recommendations. This may be due to a phenomena identified by Ingadottir and Halldorsdottir (2008) as the discrepancy between the "evidence based best" or recommended treatment, and the "lived best" for each patient at any given time. Patients may accept what healthcare providers prescribe, but ultimately make their own decisions based on their unique situations. This barrier is alluded to in the final

strategy for improving diabetes care in the ADA Standards of Medical Care in Diabetes: "A patient-centered communication style should be employed that incorporates patient preferences, assesses literacy and numeracy, and addresses cultural barriers to care" (ADA, 2013, p. S10).

As health care moves towards more patient-centered care, effective methods are needed that meet recommendations for diabetes care, support patient responsibility and participation in their health, are sensitive to the distinctive needs of the disadvantaged, and are financially sustainable in primary care practice.

Trends in Fostering Effective Diabetes Care

Several different models of diabetes care and diabetes self-management education (DSME) have emerged to respond to the diabetes epidemic and the challenges it presents to primary care. Two approaches, in particular, have shown promising results for helping patients take a more active role in their diabetes management and prevent complications of the disease: (a) group diabetes visits, and (b) health coaching.

Group diabetes visits. The use of group visits, also called *shared medical appointments*, *cluster visits*, and *problem-solving DIGMA* (drop-in group medical appointments), can be used in place of or in addition to traditional primary care appointments. Led by a physician or advanced practice nurse (APN), group diabetes visits typically include group education, shared problem-solving, focused private or semiprivate medical evaluations that allow individualized medication adjustment, and ordering of preventive services and referrals (Davis, Sawyer, & Vinci, 2008).

Clancy, Cope, Magruder, Huang, and Wolfman (2003) and Clancy, Huang, Okonofua, Yeager, and Magruder (2007) compared group visits with usual care for type 2 diabetes patients and found significant improvement in the intervention groups for adherence to ten ADA guidelines (ADA, 2013). At a free clinic, group visits resulted in significant improvement in total

cholesterol, LDL cholesterol, and body weight. In addition, HDL cholesterol, triglycerides, HbA1c, and diastolic blood pressure changes, although not statistically significant, were in a clinically favorable direction (Soto et al., 2007). Burke and O'Grady (2012) reviewed literature on group visits for patients with diabetes and found: (a) fewer urgent care or emergency room visits and hospitalizations; (b) improved glycemic control; (c) fewer specialty care visits; (d) improved diabetes knowledge and health behavior; (e) increased patient and provider satisfaction; (f) improved provider productivity; and (g) reductions in HbA1c and blood pressure.

Health coaching. Health coaching has been defined as "a practice of health education and health promotion within a coaching context, to enhance the well-being of individuals, and to facilitate the achievement of their health-related goals" (Palmer, Tubbs, & Whybrow, 2003). Coaching comes from the perspective that the patient is creative, resourceful, and the expert in his or her own life. With that focus, the APN using a coaching approach does not direct the care. Rather, a nondirective approach is taken in which patients are offered choices and are included in the decision-making process. Together, the APN and patient co-create a plan for change that includes individualized health-related goals and action steps to achieve them. This leads to the patient "owning" the plans that are developed.

Wolever et al. (2010) investigated the effectiveness of individual health coaching in patients with type 2 diabetes and found that coaching participants had significant improvements in the following areas:

- perceived barriers to medication adherence;
- medication adherence;
- knowledge, skills, and confidence for self-management;
- negative feelings associated with having diabetes;

- availability of social resources;
- perceived stress;
- exercise; and
- HbA1c levels.

Whittemore et al. (2004) randomized participants to standard diabetes care plus nurse-coaching or to a control condition of standard diabetes care. Those who experienced coaching had significantly different results at three months and six months, including: (a) better diet and exercise self-management; (b) improved BMI; (c) less psychosocial distress; and (d) greater treatment satisfaction.

At the time of this literature review, the published research on health coaching has been limited to the study of coaching individuals. There were no published data on the effectiveness of group coaching for diabetes care or health outcomes. Neither were there any data on the effectiveness of group coaching in a primary care practice setting. Therefore, relatively little is known about the processes, outcomes, feasibility, or sustainability of group lifestyle coaching for diabetes care in primary practice, particularly in an underserved population.

Scholarly Project Purpose

The purpose of this project was to explore the differential effects of an APN-led lifestyle coaching group on glycemic control in low-income patients with diabetes. The main objective of this research study was to improve diabetes self-management (and subsequently, glycemic control) among diabetic patients at the Volunteers in Medicine clinic.

Research Question

This scholarly project sought to answer the following research question: (P) In a sample of patients with uncontrolled diabetes at the Volunteers in Medicine clinic in Chattanooga,

Tennessee, (I) what effect would a group lifestyle coaching model, (C) compared to participation in a single 90-minute diabetes education class or usual care, (O) have on glycemic control and three psychosocial constructs: knowledge of diabetes, diabetes empowerment (or self-efficacy), and diabetes self-management?

Research Hypotheses

Two hypotheses were tested in this study. First, it was hypothesized that an APN-led lifestyle coaching group will improve HbA1c. Second, it was hypothesized that an APN-led lifestyle coaching group will improve diabetes knowledge, diabetes empowerment, and diabetes self-management.

Practice Setting for the Project

Volunteers in Medicine (VIM) is a primary care medical clinic in Chattanooga, Tennessee that provides medical services to financially eligible individuals and families of Hamilton County who otherwise have no access to health care. In order to be eligible for services, patients must show that their income is not over 150% of the federal poverty level. The clinic is totally supported by community contributions from area churches, foundations, businesses, and individual donors. It is primarily staffed with volunteers for both medical and nonmedical positions. Laboratory and x-ray services are donated by local hospitals, and the clinic operates a dispensary with medications provided through indigent pharmacy programs offered by pharmaceutical companies. Since opening in May of 2005 through April 2014, VIM delivered over $66 million in health care services (emergency room rates) and logged over 48,000 patient visits without any government or tax support (www.vim-chatt.org).

One of the challenges faced at VIM is that of providing effective diabetes care and DSME for its patients, many of whom have poorly controlled diabetes complicated by poor diets,

obesity, comorbidities, longtime lack of access to health care services, and inability to navigate the health care delivery system. Since part-time volunteer health care providers staff the clinic, the problem is compounded by a lack of consistency in care when patients are not scheduled with the same provider for follow-up visits. Inability to take time off work and a lack of transportation and childcare contribute to higher than average no-show rates. When patients do receive care, it tends to be sporadic, uncoordinated, and often centered around emergency department visits.

In addition to the diabetic patients themselves, key stakeholders for this research project include:

- the Clinic Director, who arranged for quarterly diabetes education classes after observing the needs of the diabetic patients;
- the Medical Director, who offered insights into patient needs based on his experience at the clinic;
- the volunteer dietitian, who is scheduled six months ahead and has voiced concerns because of spending nutrition counseling time addressing patient questions about diabetes medications (S. Stewart, personal communication, August 9, 2013);
- the nurse practitioners, one of whom recently completed a research project at VIM focusing on effectiveness of meeting ADA guidelines for diabetes care (Freeland, 2012); and
- the physicians who volunteer their time in order to make a difference in the lives of the medically underserved.

Researcher background leading to this project includes a working relationship with VIM as one of the part-time nurse practitioners on staff. Although employed at the clinic for less than a year, the researcher has had several conversations with patients in which they acknowledged a

desire to make lifestyle change to improve their health, but lacked confidence in their ability to do so. In addition, an extensive background in health coaching has provided a perspective that has shaped the design of the research study.

Findings from this project will provide VIM with valuable information to make decisions about future diabetes care and DSME. It will also contribute to practice-based knowledge related to health coaching, lifestyle medicine, and the role of the APN in fostering diabetes self-management.

Concepts and Definitions of Terms

The following definitions clarify key terms used in this study.

Diabetes empowerment. In its most simplistic form, empowerment means taking charge of one's life. It is the process of discovering and developing one's inherent capacity to be responsible for one's own life, make choices, and transform those choices into actions that lead to a desired result (Funnell et al., 1991). Empowerment in diabetes care is the perceived ability to self-manage diabetes, and is synonymous with diabetes self-efficacy (Anderson, Funnell, Fitzgerald, & Marrero, 2000).

Diabetes knowledge. Sousa and Zauszniewski (2005) defined diabetes knowledge as "the individual's knowledge of the disease and knowledge about diabetes diet, exercise, blood glucose monitoring, and medication/insulin administration" (p. 63). This knowledge about diabetes is a resource that is not only received through diabetes education, but also by personal experiences.

Diabetes self-efficacy. Bandura defined perceived self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). A growing body of research reveals that there is a positive, significant relationship between an individual's confidence in his or her ability to carry out a particular

behavior and the resulting level of success in making healthy lifestyle change. People with low self-efficacy toward a health behavior change are more likely to avoid it, while those with high self-efficacy are not only more likely to attempt the change, but they also will work harder and persist longer in the face of difficulties.

Diabetes self-management. Sousa and Zauszniewski (2005) define diabetes self-management as the actual performance of diabetes self-care activities. Diabetes self-management focuses on health behaviors such as healthy eating, being active, monitoring blood sugar, taking medication, problem solving, and reducing risks. It is a key component of glycemic control.

Diabetes self-management education (DSME). The National Standards for DSME defines DSME as "the ongoing process of facilitating the knowledge, skill, and ability necessary for prediabetes and diabetes self-care. This process incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based standards" (Haas et al., 2014, p. S145). More than providing information, DSME fosters better decision-making, problem-solving, and active partnership with the health care team for improving diabetes care and preventing diabetes complications.

Group coaching. Cockerman (2011) defines group coaching as "a facilitated group process led by a skilled professional coach and created with the intention of maximizing the combined energy, experience, and wisdom of individuals who choose to join in order to achieve organizational objectives or individual goals" (p. 1). In this research study, the focus of group coaching was on individual goals for diabetes self-management.

Health coaching. Gallwey defines coaching as "the art of creating an environment, through conversation and a way of being, that facilitates the process by which a person can move

toward desired goals in a fulfilling manner" (as cited in Moore & Tschannen-Moran, 2010). Health coaching uses this nondirective, patient-centered conversation as an important tool for encouraging patients to choose their own goals and action steps. Simply put, health coaching is the practice of health education and health promotion within a coaching relationship, to enhance the wellbeing of individuals and to facilitate the achievement of their health-related goals (Palmer, Tubbs, & Whybrow, 2003).

Lifestyle medicine. Although there is not a standard definition for lifestyle medicine, the available definitions include the therapeutic use of lifestyle interventions within conventional medicine for lowering the risk of developing chronic disease and for adjunctively treating and managing existing disease. The American College of Lifestyle Medicine (n.d.) defines the practice as the use of lifestyle interventions in the treatment and management of disease, such as diet (nutrition), exercise, stress management, smoking cessation, dependence on God, and a variety of other nondrug modalities. This approach requires the patient to become more involved in his or her care, change high-risk health behaviors, and adopt healthier behaviors. Success depends on patient motivation and self-efficacy—hence the need for a coaching approach to empower the patient.

Theoretical Framework

Many theories and strategies have emerged for understanding and supporting lifestyle change. The theoretical framework used in this research study is the diabetes lifestyle coaching model. This model was developed based on the information-motivation-strategy model by Martin, Haskard-Zolnierek, and DiMatteo (2010). In their model, three factors are necessary for health behavior change and patient adherence to treatment management: (a) information, (b) motivation, and (c) strategy.

In addition to using the key constructs in the information-motivation-strategy model, several other theories and strategies guided the development and direction of the diabetes lifestyle coaching model, including:

- diabetes knowledge via *The Journey for Control Diabetes Conversation Map*;
- diabetes empowerment (or self-efficacy) via the health coaching and GROUP coaching models; and
- diabetes self-management, via the CREATION Health model for lifestyle modification.

These individual concepts will be discussed further in Chapter 2.

The diabetes lifestyle coaching model is a comprehensive framework blending several evidence-based strategies to address glycemic control in diabetic patients at risk for complications of type 2 diabetes. The potential impact of this intervention can be appreciated in the example of the Community Outreach and Cardiovascular Health (COACH) Study (Allen et al., 2011). The COACH Study involved a comprehensive lifestyle program delivered by a nurse practitioner to a medically underserved population. The intervention in this randomized controlled trial included pharmacologic management, tailored educational and behavioral counseling for lifestyle modification, problem-solving to address barriers to adherence and control, phone follow-ups between visits, and pre-appointment reminders. As compared to the usual care group, patients in the intervention group had significantly greater 12-month improvement in total cholesterol, LDL cholesterol, triglycerides, systolic blood pressure, diastolic blood pressure, HbA1c, and perceptions of the quality of their chronic illness care.

Significance to Nursing Practice

Health promotion and disease prevention are distinctive components of the advanced practice nursing role. These competencies are especially critical for providing effective care to patients with type 2 diabetes. In addition to the health care challenges previously discussed, other barriers to the implementation and success of diabetes care include an emphasis on productivity, episodic problem-focused visits, increased documentation requirements, inadequate insurance reimbursement, unrealistic patient expectations, patient refusal to discuss or comply with recommendations, and lack of clinician confidence and skill in providing behavioral change counseling (Yarnall, Pollak, Ostbye, Krause, & Michener, 2003).

Not only does this research study provide useful information for the stakeholders of the project, but it may also inspire advanced practice nurses to incorporate group lifestyle coaching into their practice and to consider developing other innovative practice models that support wholistic, lifestyle-focused, patient-centered diabetes care. In addition, it offers a theoretical model for diabetes care that links group coaching to DSME strategies and diabetes outcomes.

Summary

Diabetes and its complications are a growing challenge for health care providers, and new approaches need to be explored for fostering better patient outcomes in a cost-effective way. Utilizing a group lifestyle coaching approach for patients with diabetes may be an effective way to meet the challenge and improve glycemic control in diabetic patients. This research project sought to determine the effectiveness of the diabetes lifestyle coaching model on glycemic control, diabetes knowledge, diabetes empowerment, and diabetes self-management in an uninsured population with type 2 diabetes. The next chapter provides a more extensive review of the literature for the issues introduced in Chapter 1.

CHAPTER 2: LITERATURE REVIEW

This chapter briefly reviews the background and demographics of the diabetes problem in the United States and discusses the concerns related to providing care for the diabetic patient. Research studies that address DSME, health coaching, group interventions for diabetes care, and lifestyle medicine are reviewed, particularly as they are relevant to diabetes care. Concepts and strategies that make up the components of the diabetes lifestyle coaching model are discussed. Finally, literature relevant to the study methods and the project implications for underserved populations are reviewed.

Background: The Diabedemic

The prevalence of diagnosed diabetes in the United States has increased from around 1% in 1958 to 8.3% in 2010. This increasing prevalence of type 2 diabetes has been referred to as the epidemic of the 21st century, or a "diabedemic" (Youngberg, 2013). Because of the progressive nature of the disease, there is concern that as prevalence increases, so will the complications of diabetes, health care costs, and mortality rates. In a 2011 report, the CDC cited diabetes as the leading cause of new cases of blindness, kidney failure, and limb amputations in adults. In addition, health care costs for a diabetic averaged more than twice as much as the expenses of a person without diabetes. In 2007, diabetes was the seventh leading cause of death listed on U.S. death certificates (CDC, 2011).

Health care providers spend large amounts of their time screening, treating, and educating patients about diabetes. And rightly so—research indicates that diabetics who reduce their HbA1c by just one percentage point can reduce the risk of eye, kidney, and nerve diseases by 40% (CDC, 2011). Nevertheless, between 1988 and 2010, barely half (52%) of diabetic patients reached recommended HbA1c goals (Casagrande, Fradkin, Saydah, Rust, & Cowie, 2013).

The irony is that, unlike epidemics of infectious disease, diabetes prevention and management is most often associated with lifestyle factors within one's control, such as food choices, amount of physical activity, and body weight. Accordingly, self-management of diabetes is critical to prevent serious diabetes complications, control costs, and extend lives. The downside for the health care provider, however, is the amount of time it takes to provide the counseling needed to motivate and support patients in the lifestyle change necessary to prevent and/or manage diabetes—especially when many other objectives compete for limited office visit time. In a 2007 study on time allocation in primary care office visits, the median visit length was only 15.7 minutes and covered a median of six topics (Tai-Seale, McGuire, & Zhang, 2007).

Consequently, health care providers face a dilemma. On the one hand, there are alarming statistics and concerns surrounding the current diabedemic and the challenges it presents for health care. On the other hand, there are obstacles to providing effective diabetes care and DSME, such as time constraints and the amount of education necessary to support patient self-management of their disease. Meanwhile, an estimated 12.9% of U.S. adults with diabetes exhibit poor glycemic control (HbA1c > 9.0%), with rates of poor glycemic control as high as 28.5% in the uninsured (Ali, Bullard, Imperatore, Barker, & Gregg, 2012). As a result, the Healthy People 2020 objectives include a 10% reduction in the proportion of the diabetes population that has poor glycemic control as a target (HHS, Healthy People 2020, 2011). Clearly, more effective and sustainable methods are needed to meet the goals of the patient, health care provider, and nation.

Project Objectives

The epidemic of diabetes and its complications is a significant concern for health care providers, and new approaches need to be explored for fostering better patient outcomes in a cost

effective way. The purpose of this project was to explore the differential effects of an APN-led lifestyle coaching group on glycemic control in patients with diabetes at a free clinic in Chattanooga, Tennessee, compared with usual care or participation in a single 90-minute diabetes education class. In addition, the effects of the coaching on three psychosocial constructs related to diabetes (knowledge, empowerment, and self-management) were investigated.

Literature Search Strategy

The literature was searched using the keywords of type 2 diabetes mellitus, health coaching, group coaching, group health coaching, diabetes self-management education, conversation maps, diabetes knowledge, diabetes empowerment, diabetes self-efficacy, and diabetes self-management. CINAHL, Pubmed, ProQuest, Google Scholar, and other database were queried for peer-reviewed articles and studies that addressed the relationship between these concepts. No limitations were set on year of publication or type of literature searched. The articles were considered by reviewing the title and abstract.

Synthesis of Relevant Literature

Diabetes Self-Management Education

Self-management in diabetes is critical for managing a chronic disease like diabetes and preventing its complications. The ADA states that diabetes self-management leads to better glycemic control, higher quality of life, and lower cost of therapy in people with diabetes (ADA, 2013). Recognizing the role that self-management plays in managing diabetes, the ADA recommends that all patients with diabetes receive diabetes self-management education (DSME) (ADA, 2013; Haas et al., 2014).

DSME differs from traditional, didactic patient education in that the communication is two-way, patient-centered, and focused on behavior change, rather than one-way, provider-

centered, and focused on knowledge (Grey, 2007). In recent years, the emphasis of DSME has shifted to an individualized approach with the goal of educating and empowering the patient in order to increase self-efficacy for self-management behaviors (Pearson, Mattke, Shaw, Ridgely, & Wiseman, 2007).

Fan and Sidani (2009) conducted a meta-analysis of 50 randomized controlled trials between 1990 and 2006 evaluating DSME interventions and found an overall weighted mean effect size of 1.29 for knowledge, 0.51 for metabolic control and 0.36 for self-management behaviours. Another meta-analysis of 21 studies by Steinsbekk, Rygg, Lisulo, Rise, and Fretheim (2012) also supported the use of self-management education programs for individuals with diabetes. They found that self-management programs have been associated with improvements in self-management skills and self-efficacy at 6 months, improvements in body weight at 12 months, and improvements in HbA1c and diabetes knowledge at 2 years.

DSME interventions have also been found to be effective in low-income populations. In a large, multisite federally qualified health center, patients with type 2 diabetes participating in a DSME program set and attained goals in healthy eating, being active, self-monitoring, reducing risks, taking medication, healthy coping, and problem-solving (Anderson, Christison-Lagay, & Procter-Gray, 2010). The mean rate of change in HbA1c was –0.90 ± 0.18 SE.

Health Coaching

Another relatively new model for DSME is health coaching. Pearson et al. (2007) maintain that a key underlying consideration in programs that seek to change patient behavior is the need to "include both supportive coaching interventions and educational interventions as part of the program content" (p. 2). Health coaching employs diverse evidence-based theories including self-determination theory, transtheoretical model of change, motivational interviewing,

appreciative inquiry, goal-setting theory, social cognitive theory, adult development, cognitive behavioral therapy, positive psychology, and others. Frates, Moore, Lopez and McMahon (2011) pull them all together in their coach model consisting of a five-step cycle for coaching behavior change (see Figure 2).

Figure 2. Five-step cycle in the coaching model. Reprinted from "Coaching for Behavior Change in Physiatry," by Frates, E. P., Moore, M. A., Lopez, C. N. & McMahon, G. T. (2011). *American Journal of Physical Medicine and Rehabilitation 22,* 620-624.

In the first step of the model, “Be Empathetic,” the provider spends time understanding the patient’s current situation. Once empathy is in place, the second step is “Align Motivation,” in which the provider seeks to help the patient identify a personal reason why change may be important to him or her. The next step is “Build Confidence.” Self-confidence is the basic belief that one can successfully carry out activities and attain goals. The fourth step in the coach model is “Set SMART Goals.” Individualized, engaging goals that are specific, measurable, attainable, relevant and time-sensitive create a target for the patient to shoot for. The last step, “Set Accountability Plan,” creates the structure and monitoring needed for the patient to realize their

goal. After accountability comes deeper understanding and compassion, as the provider reviews progress, celebrates success, and in a nonjudgmental way guides the patient to view "failures" as opportunities for self-discovery. At this point, the cycle begins again, leading to more motivation, more confidence, more goals, more accountability, more celebration, and finally, more empathy.

The published research on health coaching to date has been limited to the study of coaching individuals. Individual health coaching has been shown to have positive effects on outcomes for:

- cardiovascular risks (Edelman et al., 2006; Vale et al., 2003),
- asthma (Fisher et al., 2009),
- adult attention deficit hyperactivity disorder (Kubik, 2010),
- cancer survivors (Galantino et al., 2009),
- pain management (Oliver, Kravitz, Kaplan, & Meyers, 2001),
- weight loss (Appel et al., 2011; Schwartz, 2013; Tucker, Cook, Nokes, & Adams, 2008), and
- medical costs and resource utilization (Wennberg, Marr, Lang, O'Malley, & Bennett, 2010).

In a review of 15 studies published between 1999 and 2008, Olsen and Nesbitt (2010) identified significant improvements in one or more of the behaviors of nutrition, physical activity, weight management, or medication adherence in six of the studies. Common features of effective programs were goal setting (73%), motivational interviewing (27%), and collaboration with health care providers (20%).

Several researchers have studied the effect of health coaching on diabetes. In a six-month nurse-coaching intervention provided after diabetes education, 53 women with type 2 diabetes were randomized to nurse-coaching or standard care **(**Whittemore, Melkus, Sullivan, & Grey, 2004). Individual coaching sessions were initially held every two weeks for three sessions, then every month for two sessions, and then a final session after three months. Sessions included education as well as behavioral and affective strategies. The coaches helped the participants to identify personal barriers and facilitators to change, set realistic goals, brainstorm strategies, and engage social support. Women in the coaching group demonstrated significantly better self-management ($p = .02$), less diabetes related disease ($p < .01$), less psychosocial distress ($p < .01$), and greater satisfaction with care ($p < .01$).

Engel and Lindner (2006) allocated elderly adults with diabetes to either a pedometer and coaching (intervention) group or a coaching-only group. Coaching involved education, goal-setting, and supportive and motivational strategies to increase time spent walking. Both groups significantly increased their physical activity. However, in the absence of a control group, it is not possible to infer a causal relationship for the coaching. In a randomized control trial at six public health clinics, Thom et al. (2013) recruited 299 diabetic patients with HbA1c levels of 8.0% or higher and randomized them to receive peer health coaching ($n = 148$) or usual care ($n = 151$). At six months, HbA1c levels had decreased by 1.07% in the coaching group and 0.3% in the usual care group ($p = .01$, adjusted). In another study of 1117 participants, those who engaged in a coaching program were 40% less likely to experience poor control of their HbA1c, 50% more likely to meet the ADA HbA1c goal of < 7%, 11% more likely to meet the blood pressure goal of <130/80 mmHg, and 7% more likely to meet the LDL cholesterol goal of <100 mg/dL, compared with those not engaged in coaching (Bray, Turpin, Jungkind, & Heuser, 2008).

Health care providers need to see themselves as lifestyle coaches. Merely providing information about lifestyle changes won't solve the diabetes problem. Kessels (2003) notes that 40-80% of the medical information given to patients is forgotten immediately. Furthermore, 50% of patients leave their provider visits without understanding their treatment plan (Bodenheimer, 2008). There is a need to go beyond imploring and prescribing, to helping patients through the often messy work of lifestyle change. Newman, Varnam, and McDowell (2013) encourage a "mindset shift" in clinicians in which they view patients as capable of change and holding the solution to managing their own condition. This health coaching approach is compatible with the professional role of the APN and provides a framework for engaging the patient in taking responsibility for their health (Hayes & Kalmakis, 2007; Hayes, McCahon, Panahi, Hamre, & Pohlman, 2008).

Group Interventions for Diabetes Care

Mensing and Norris (2003) define a group as "a gathering or an assembly of persons with a common interest, such as diabetes self-management" (p. 96). Many aspects of diabetes self-management education (e.g., diabetes knowledge, skill-building, goal-setting, problem-solving) can be applied in group settings. In fact, Van der Ven (2003) notes several advantages of group interventions for diabetes care over individual counseling, including time savings, cost-effectiveness, shared emotional support from people with similar experiences, and shared learning from the experiences of others. In her review, she found that interventions with a short, structured format seem to have more beneficial effects than groups relying on disclosure and sharing of experiences only. "To achieve behavioral change, people need strategies and practice to translate new information into actual behavior and to implement new behaviors in real life" (p. 94).

Rickheim, Weaver, Flader, and Kendall (2002) demonstrated that group diabetes education was equally or slightly more effective at providing improvements in HbA1c, compared with individual education. Participants receiving individual education had a 1.7 ± 1.9% reduction in HbA1c ($p < 0.01$), compared with a 2.5 ± 1.8% reduction in HbA1c ($p < 0.01$) for those receiving group education. In their review, Steinsbekk et al. (2012) found evidence that group-based diabetes self-management education led to improvements in HbA1c, diabetes knowledge, self-management skills, and self-efficacy, compared to routine treatment for diabetic patients. In an earlier review, Tang et al. (2006) found that group DSME resulted in greater cost effectiveness, treatment satisfaction, and support for lifestyle change.

Shared medical appointment. One model for group DSME is the shared medical appointment (SMA), in which multiple patients with a common characteristic (e.g. type 2 diabetes) are seen together as a group by a provider or interdisciplinary team. Although there is considerable variability in design (fixed or open groups) and provider teams (constant or varied), SMA sessions typically last from 60 to 120 minutes with a format that includes social integration, interactive education, and medication management. Edelman et al. (2012) reviewed 19 studies (16 in patients with diabetes) and found that SMAs were associated with lower HbA1c than usual care at 4 to 48 months' follow-up (mean difference = -0.55; 95% CI, -0.99 to -0.11). However, variability in populations, characteristics of the intervention, and outcomes measured make comparisons across studies difficult. Although none of the studies were conducted in "real world" (non-academic) settings, the findings were consistent with a small study by Guirguis et al. (2013) in which the mean HbA1c of clinic patients attending four shared medical appointments over one year decreased from 9.47% to 8.97% at the second visit, to 8.78% at the third visit, and 8.21% ($p = .05$) at the fourth visit.

On the other hand, a retrospective study testing the effectiveness of diabetes group medical visits versus usual care in a sample of low-income patients at a free clinic found no significant differences in biophysical outcomes of care noted between those who participated in the group visits and the usual care group at one year (Mallow, Theeke, Whetsel, & Barnes, 2013). Other systematic reviews and meta-analyses document similar evidence for the lack of consistent impact of SMAs on HbA1c and other outcomes (Brennan, Hwang, & Phelps, 2010; Burke & O'Grady, 2012; Riley & Marshall, 2010).

Ridge (2012) noted several gaps in the literature with regards to SMAs, including a lack of studies examining the difference between group and individual sessions with the same number of visits, the same providers, and a standard education curriculum provided to both groups. Ridge also observed several logistical challenges to implementing SMAs in a clinical practice. These include (a) availability of space to accommodate a group of patients; (b) the necessity of pre-session review of patient records to determine need for routine screening, immunizations, referrals, etc.; (c) planning educational activities and use of ancillary staff. Another consideration is the coordination of vital signs for each patient prior to the session. In addition, a process should be identified for conducting private individual medical management as needed for specific concerns related to diabetes care.

Group health coaching. Additionally, group coaching interventions may be an efficient and cost effective way for healthcare providers to foster improvements in diabetes knowledge, empowerment, self-management, and ultimately, glycemic control. However, there is a need for further research in this area. In their review of seven group coaching interventions offered by academic and private sector institutions, Armstrong et al. (2013) noted a great deal of variability in the number of coaching hours provided, format (in-person vs. telephone), health issues

targeted (general health, stress, chronic medical conditions, chronic pain, etc.), and coach characteristics (trained peer vs. professional). The group coaching approach offers a number of strengths, including: (a) a sense of "community;" (b) a greater sense of responsibility to follow through; (c) feeling less alone; (d) learning from others' experiences; and (e) streamlined education. The authors also identified potential challenges with group coaching, such as logistics (e.g., recruitment, scheduling) and managing group dynamics. They concluded by listing several areas of research needed to determine the effectiveness of group coaching, including that of "randomized control trials comparing participants in group coaching to those in four different conditions: waiting controls, those receiving individual coaching, those in group education, and those in support groups" (p. 77).

Lifestyle Medicine

An important, but often overlooked, aspect of healthcare is that of educating people about healthy behaviors and lifestyle modification in order to postpone, avoid, effectively manage, or even reverse chronic disease. Vinson, Rich, Sperry, Shah, and McNamara (1990) identified the factors contributing to preventable hospital readmissions in elderly patients with congestive heart failure, and found that the list included:

- noncompliance with medications (15%);
- noncompliance with diet (18%);
- inadequate discharge planning (15%)
- inadequate follow-up (20%);
- failed social support system (21%); and
- failure to seek medical attention promptly when symptoms recurred (20%).

Thus, early rehospitalization for elderly patients with congestive heart failure may be preventable in up to 50% of cases through healthy behaviors and lifestyle modification.

A growing body of scientific evidence has demonstrated that lifestyle intervention is an essential component in the prevention and treatment of many chronic diseases, including type 2 diabetes. Healthy lifestyle behaviors are included in the ADA practice guidelines for preventing and treating type 2 diabetes (ADA, 2013). These interventions can be as effective as medication for improving glycemic control, slowing progression of diabetes, and minimizing the risk of developing complications—but without the risks and unwanted side effects.

The landmark Diabetes Prevention Program (DPP), funded by the National Institutes of Health and the Centers for Disease Control and Prevention, showed that by eating healthier foods, increasing physical activity, and losing a small amount of weight, a person with pre-diabetes can prevent or delay the onset of type 2 diabetes by 58% (Diabetes Prevention Program Research Group, 2002). The Look AHEAD (Action for Health in Diabetes) trial involved an intensive group and individual lifestyle counseling intervention to assist diabetic participants to achieve weight loss through decreased caloric intake and increased physical activity. The outcomes at one year included an 8.6% weight loss, 21% improvement in fitness, and 0.7% reduction in HbA1c (from a baseline of 7.3%), as well as improvements in blood pressure, triglycerides, and HDL cholesterol (The Look AHEAD Research Group, 2007). A three-week residential lifestyle intervention at the Pritikin Longevity Center showed that a high-fiber (> 40 gm), low-fat diet with daily aerobic exercise led to significant improvements in total cholesterol (- 40 mg/dL), LDL cholesterol (- 27 mg/dL), fasting glucose (- 31 mg/dL), fasting insulin (- 10 mcU/ml), and several inflammatory markers in men with type 2 diabetes and the metabolic syndrome (Roberts, Won, Pruthi, Lin, & Barnard, 2006).

According to Greenstone (2007), the challenge is no longer proving that lifestyle interventions work, but rather for clinicians to learn how to implement the interventions in practice. He states that "we have the evidence to prove modifiable risk reduction saves lives; we must now have the conviction to relentlessly pursue strategies that maximally reduce our patients' CHD risk through pharmacologic and nonpharmacologic (lifestyle) means" (p. 23).

Framework for the Project

The theoretical framework used in this research study is the diabetes lifestyle coaching model, a comprehensive model that blends several evidence-based concepts to address glycemic control in diabetic patients at risk for complications of type 2 diabetes. This model was developed based on the information-motivation-strategy model by Martin, Haskard-Zolnierek, and DiMatteo (2010).

Information-Motivation-Strategy Model

The information-motivation-strategy model was developed to promote health behavior change and patient adherence to treatment management. Martin, Haskard-Zolnierek, and DiMatteo (2010) maintain that three factors are necessary for patient adherence and health behavior change: information, motivation, and strategy (see Figure 3). Their model encourages providers to move beyond advising and educating patients to change, to helping them understand *what* health behavior changes are necessary, *why* they would want to change (motivation) and *how* to go about it (strategy).

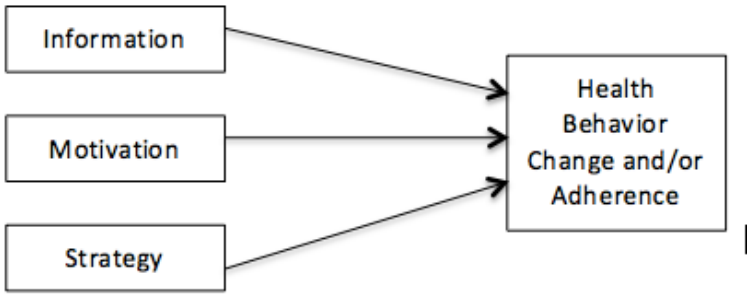


Figure 3. Information-motivation-strategy model. *Health Behavior Change and Treatment Adherence* (p. 19), by L. R. Martin, K. B. Haskard-Zolnierek, & M. R. DiMatteo, 2010, New York, NY: Oxford University Press, Inc.

In the diabetes lifestyle coaching model (see Figure 4), the components of the information-motivation-strategy model are placed on the outside arrows, framed as three key questions that patients need to ask and answer as they take responsibility for their diabetes care.

1. *What?* What do I need to know about diabetes? What changes are necessary to keep my blood sugar controlled and prevent diabetes complications?
2. *Why?* Why is this change relevant to me personally? Why now? Why do my choices matter?
3. *How?* How do I go about making these changes?

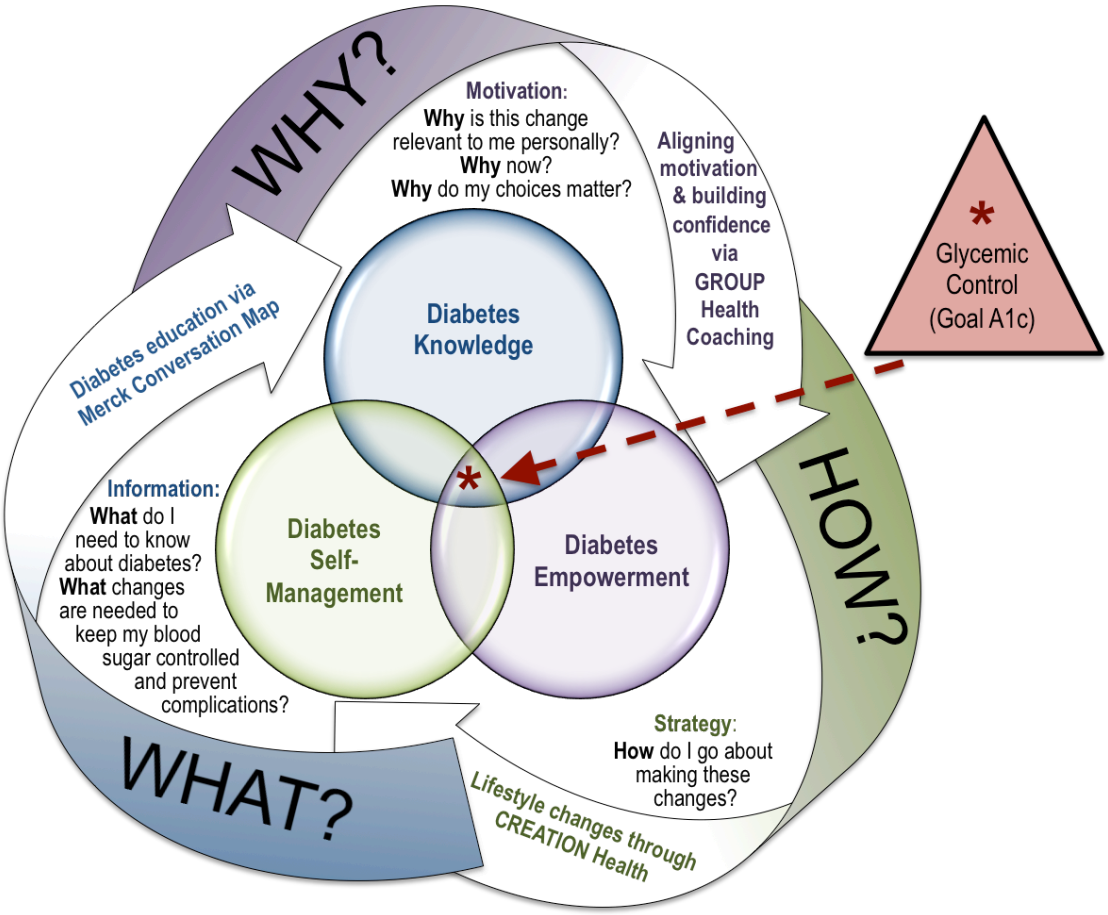


Figure 4. The Diabetes Lifestyle Coaching Model

Additional Theories and Strategies

In addition to using the key constructs in the information-motivation-strategy model, several other theories and strategies guided the development and direction of the diabetes lifestyle coaching model. On the insides of the arrows are the strategies used to foster information, motivation, and strategy.

Information. As noted in the information-motivation-strategy model, education is a key factor in health behavior change and treatment adherence. Instruction in diabetes self-management is recommended in the ADA Standards of Medical Care to help patients develop and maintain behaviors that can prevent or delay the onset of diabetes (ADA, 2013). In fact,

national standards for diabetes self-management education and support are published annually (Haas et al., 2014). In the diabetes lifestyle coaching model, information about diabetes is disseminated through use of the *Journey for Control Diabetes Conversation Map* created by Healthy Interactions in collaboration with the ADA and sponsored by the Merck pharmaceutical company (Reaney, Eichorst, & Gorman, 2012).

The four-session *Diabetes Conversation Map* program is designed to empower participants to better manage their diabetes. Theoretical underpinnings for the program include self-efficacy theory, the health belief model, social learning theory, and the transtheoretical model, among others. It consists of six components, including a map visual for each session, conversation questions, discussion cards, group interaction, facilitation, and an action plan (Fernandes et al., 2010). Each 3-by-5-foot map is placed on a table with facilitator and participants seated around it. The facilitator then uses the map as a springboard for group discussion about diabetes-related topics.

Sperl-Hillen et al. (2011) found in their multi-site randomized IDEA Study that the effectiveness of individual diabetes education resulted in better glucose control outcomes than the use of the *Diabetes Conversation Maps* ($p = .01$). Nevertheless, the *Diabetes Conversation Maps* were chosen for this intervention because many of the theories that underpin its development are also congruent with health coaching. In addition, it is a group-based, interactive diabetes learning approach that fit well with the group coaching model. One of the major themes highlighted by educators at the IDEA study sites was that "the Conversation Map successfully facilitated interactive dialogue among study subjects through rapport building and the sharing of personal stories and experiences" (Fernandes et al., 2010, p. 195).

Motivation. In the diabetes lifestyle coaching model, motivation and confidence are nurtured through group health coaching. Brown and Grant (2010) present a practical model of coaching for use with groups, integrating an individual coaching framework with a process for group dialogue. Their model consists of five phases: Goal, Reality, Options, Understanding Others, and Perform (see Table 1). Brown and Grant identified numerous benefits of group coaching in the emerging group coaching literature, including knowledge transfer, increased emotional intelligence, greater accountability and commitment, and more long-lasting changes in behavior. A key difference from group facilitation is the more goal directed process of group coaching.

The role of the coach in the group coaching process is to ensure that the coaching conversations stay goal focused and to encourage open exchange of ideas and collaborative learning. Each coaching session finishes with each individual clearly defining personal action steps to be completed before the next coaching session. Subsequent coaching sessions utilize the RE-GROUP model, which begins with two additional phases: (a) Reviewing, and (b) Evaluating the between-session action steps, before moving on to set a goal(s) for the session. Although the GROUP model offers a practical template for the group coaching process, it is important to use it in a flexible and patient-centered manner.

Table 1. *The GROUP Model, Adapted for Diabetes Lifestyle Coaching*

Acronym	Description	Example Questions
Goal	The group is asked to clarify what they want to achieve from the session. Determines the focus of coaching.	What do you want to achieve this session? How would you like to feel afterwards? What would be the best use of this time?
Reality	Raise awareness of present realities. Examine how current situation is impacting individual and group goals for diabetes management.	How have things gone in the past week? How have you handled any problems? What worked? What didn't work? What did you learn about diabetes self-management? About yourself?
Options	Identify and assess available options. Encourage solution-focused thinking and brainstorming.	What possible options do you have? What has worked for you in the past? What haven't you tried yet that might work?
Understanding Others	Group observes deeply, notices their internal responses to what is being said and makes meaning both of what they hear and their internal response. The group connects to the emerging best future.	What is your view on the best options? What did you understand by her view? What was your internal dialogue when you were listening to that? Can you integrate the broader group perspective?
Perform	Assist the group to determine next steps. Prototype best options. Develop individual action plans. Build motivation and ensure accountability.	What is the most important thing to do next for the management of your diabetes? What can be learned from this prototype? What might get in the way? Who will be able to support you? How will you feel when this is done?

Note. Adapted from "From GROW to GROUP: Theoretical issues and a practical model for group coaching in organisations," by Brown, S. W., & Grant, A. M. (2010). *Coaching: An International Journal of Theory, Research and Practice 3*(1), 30-45.

Strategy. The question of *How?* in the diabetes lifestyle coaching model is addressed through promotion of lifestyle changes outlined in the CREATION Health model developed by Florida Hospital (*CREATION* Health, 2008). Although diabetes is the seventh leading cause of

death in the United States (CDC, 2011), it is considered a lifestyle disease. In other words, our lifestyle choices can either prevent or promote insulin resistance and resulting diabetes. Lifestyle medicine is becoming the preferred modality for the treatment of many chronic diseases attributable to lifestyle. CREATION Health is a whole-person wellness program and philosophy that is useful for empowering patients to visualize and move towards a healthier lifestyle. Based on a formula for healthy living found in the Genesis story of Creation, this model provides a framework for discussing and recommending an evidence-based lifestyle approach for improving health (see Figure 5).

Figure 5. CREATION Health model, © 2009 by Adventist Health System. Orlando, FL: Florida Hospital Mission Development. https://www.creationhealth.com

Each letter in the word CREATION describes a principle that can easily be applied to diabetes self-management:

Choice. A leading concept in relation to lifestyle modification is that of the power of choice to improve diabetes and overall health and happiness. In early stages of change, it is important to help patients to become aware that healthful food choices and active living can make a difference in controlling blood sugars. As patients explore their own personal reasons for making healthier choices and commit to lifestyle change, they will then need to learn goal-setting and decision-making skills. More collaborative then prescriptive, this approach keeps the patient in a proactive role for managing his or her diabetes.

Rest. Sleep duration and quality are associated with diabetes risk and severity. Findings from a 2013 study of 130,943 U.S. adults participating in the National Health Interview Survey from 2004 to 2011 revealed that suboptimal sleep duration (less than seven hours) was strongly associated with diabetes in both black and white participants, with a prevalence ratio of 1.49 [95% CI 1.40–1.58] and 1.21 [1.09–1.34], respectively (Jackson, Redline, Kawachi, & Hu, 2013). Moreover, Donga et al. (2010) found that a single night of partial sleep deprivation reduces insulin sensitivity of hepatic and peripheral glucose metabolism, as well as of peripheral lipolysis by 19-25%. Several studies note that poor quality of sleep is correlated with poor glycemic control in patients with type 2 diabetes (Ohkuma et al., 2013; Tsai et al., 2012). The CREATION Health model expands on the concept of rest to also include the importance of taking the time for mental and spiritual rest.

Environment. Both the immediate environment (light, sound, aroma, touch) and the larger environment (air, sunlight, water quality) can influence one's mood and health (CREATION Health, 2008). For example, there is some evidence for the health benefits of green

space in urban areas (Lee & Maheswaran, 2011). In addition, exposure to sunlight increases vitamin D synthesis in the skin. Deleskog et al. (2012) noted that progression from prediabetes to type 2 diabetes was reduced by about 25% per 10 nmol/l increase in serum 25-hydroxyvitamin D.

Activity. Thomas, Elliott, and Naughton (2006) reviewed 14 randomized controlled trials on the effects of exercise in type 2 diabetes mellitus and found that the exercise interventions significantly improved glycemic control, increased insulin response, and decreased plasma triglycerides. This was associated with a reduction in visceral and subcutaneous adipose tissue. A study by Aadland and Høstmark (2008) found that light intensity activity immediately following a meal blunted the rise in blood glucose and insulin. Applying this research clinically, Youngberg (2012) observed that his patients reduce their post-prandial blood sugar spikes by one to three points for every minute of light to moderate exercise after a meal.

Trust. A wholistic approach to diabetes care will also address the spiritual needs of the patient and encourage personal faith practices to support their behavior change efforts. In their literature review on the influence of spirituality on well-being among persons with diabetes and other chronic diseases, Harris, Wong, and Musick (2010) concluded that spirituality "often provides patients with a significant means of overcoming their health related fears, understanding their strengths and limitations, and putting their lives into a new contextual perspective" (p. 11).

Interpersonal relationships. An often over-looked health strategy is the importance of love and support. Relationships with others can either strengthen wellbeing or cause stress that contributes to disease. Heraclides, Chandola, Witte, and Brunner (2009) found that psychosocial stress in the work place was associated with a twofold higher risk of type 2 diabetes in age-

adjusted analysis in women (hazard ratio 1.94 [95% CI 1.17–3.21]), even after adjustment for socioeconomic factors, non-work stressors, health behaviors, obesity, and other diabetes risk factors. Social connections can also make a difference in diabetes self-management by fortifying or sabotaging resolve. In a 2012 study by Mayberry and Osborn, perceptions of family members' behaviors as nonsupportive (such as criticizing, miscarried helping, and arguing about diabetes self-care activities) was associated with reporting worse dose adherence to diabetes medications ($r = 0.44$, $p = 0.001$), which, in turn, was associated with higher HbA1c values ($r = 0.29$, $p = 0.03$). Thus, an important aspect of diabetes care is helping patients to identify and develop supportive relationships in family, friends, and support groups.

Outlook. One's attitude and thought patterns can influence diabetes management behaviors and outcomes. Schmitz et al. (2014) found that the risk of poor functioning and impaired health-related quality of life was nearly three times higher (relative risk = 2.86) for diabetics with four subthreshold depressive episodes compared with those who had no or minimal depression. There was a significant linear trend ($p < 0.001$) even after controlling for potentially confounding variables. Hence, another strategy for diabetes care is that of promoting a positive outlook. In their literature review, Celano et al. (2013) found that positive psychological characteristics are significantly associated with improved glycemic control, fewer complications, and reduced rates of mortality in diabetics. They asserted that the associations are likely mediated by both biological (e.g. inflammation, autonomic nervous system dysfunction) and behavioral (lifestyle change) mechanisms, and may be bidirectional. The bidirectional relationship between lifestyle and depressive symptoms is noted in the Look AHEAD Trial (The Look AHEAD Research Group, 2014), in which an intensive lifestyle intervention significantly

reduced the incidence of mild or greater depression symptoms compared with a diabetes support and education control intervention (HR = 0.85; 95% CI 0.75–0.97; $p = 0.0145$).

Nutrition. Choosing a balanced whole-food plant-based diet promotes optimal energy and long-term health. Nutrient-dense foods, such as vegetables, nuts, seeds, beans, and fresh fruit, can also prevent and even reverse diabetes. In a recent study on type 2 diabetics who followed this type of diet, researchers found that 90% of participants were able to come off all diabetic medications, and the mean HbA1c after one year was 5.8% (Dunaief, Fuhrman, Dunaief, & Ying, 2012). Many other studies support the efficacy, acceptability, and nutritional adequacy of a plant-based diet for people with type 2 diabetes (Barnard et al., 2006; Trapp, Barnard, & Katcher, 2010; Trapp & Levine, 2012).

The CREATION Health components offer a lens for the APN to assess, evaluate, and assist the diabetic patient to better manage their diabetes and move from disease toward wellness. Moreover, rather than simply managing diabetes, these approaches offer a wholistic approach for modifying the behavioral and lifestyle foundations of diabetes and its complications.

Diabetes Outcomes

The theories and strategies in the model point to three important outcomes for diabetes care: (a) diabetes knowledge, (b) diabetes empowerment, and (c) diabetes self-management. In a Venn diagram, the overlap area is significant. At the center of the model is the primary outcome, glycemic control. As levels of diabetes knowledge, empowerment, and self-management increase, it stands to reason that the patient will achieve better HbA1c levels and avoid the complications of type 2 diabetes.

Synergistic Approach

Pulling these concepts into a single model offers a wholistic and multifaceted framework for diabetes care that links key factors for health behavior change with evidence-based DSME strategies and diabetes outcomes. When coupled with pharmacologic management and ADA Standards of Medical Care (ADA, 2013), it provides a synergistic framework for diabetes care. A current trend in the literature is that of a synergistic approach. An APN-led diabetes support group included care management services such as monitoring and managing health problems; facilitating group exercises; providing self-management education; collaborating with multidisciplinary team members; establishing continuity of care and holistic care services; and, consulting with patients and healthcare providers. The intervention group experienced lower systolic blood pressures ($p < .05$), as well as higher self-care abilities ($p < .001$), quality of life ($p < .001$) and satisfaction with care ($p < .001$), compared to those in the comparison group (Partiprajak, Hanucharurnkul, Piaseu, Brooten, & Nityasuddhi, 2011).

In a nurse practitioner-led intervention that combined a lifestyle component (the Diabetes Prevention Program curriculum), motivational interviewing, and behavioral support (identifying lifestyle change strategies and problem-solving barriers to change), Whittemore et al. (2010) reported that the participants in the intervention group demonstrated a trend toward greater weight loss ($p = .08$) and improved exercise behavior ($p = .08$). Twenty-five percent of participants met weight loss goals, compared to 11% in standard care.

A systematic review of 41 controlled trials evaluating the effectiveness of interventions targeted at health care professionals and/or the structure of care for patients with diabetes found that multifaceted interventions and interventions that facilitate structured and regular review of patients were effective in improving the process of care. The addition of patient education to

these interventions and the enhancement of the role of nurses in diabetes care led to improvements in patient outcomes and the process of care. In addition, studies in which a nurse or pharmacist assumed part of the physician's role and provided diabetes care in combination with a patient-oriented intervention were associated with a small beneficial effect on glycemic control (Renders et al., 2001).

Literature Review Related to Method(s)

Since there is little in the published literature on group health coaching, a systematic review was not feasible for this project. A non-randomized exploratory study was chosen in order to test the proposed diabetes lifestyle coaching model for diabetes self-management education and to lay the groundwork for a larger randomized experiment and/or the addition of ongoing group coaching at VIM. With quasi-experimental designs such as this one, it is more difficult to show that any difference in outcome is the result of the intervention rather than differences between groups. Therefore, in order to decrease the risk of error or bias, the usual care group was added to the study design. This resulted in a higher level of evidence than would be obtained by a pretest posttest study without a control group.

Although the randomized control trial is widely considered the gold standard in research design, Evans (2003) maintains that the optimal research method will be determined by the type of question, and that a range of research methods can contribute valid evidence. He proposed a framework for ranking evidence evaluating healthcare interventions that focuses on three dimensions: effectiveness, appropriateness, and feasibility. This research study, focused on effectiveness, ranks as a "Fair" level of evidence in his hierarchy of evidence. Evans notes that although this level does not provide a strong evidence-base for clinical practice, it represents initial exploration of interventions and can assist in prioritizing the research agenda.

Congruence of VIM's Strategic Plan to the Project

The mission of the VIM Chattanooga Clinic is "to understand and serve the health and wellness needs of the medically underserved in our community by providing quality, compassionate, and personalized care in a faith-based caring environment" (http://www.vim-chatt.org/vim16/index.php/about-us). The vision statement, also found on their website, reads: "May we have eyes to see, with Christian love, those to whom we have been blind, arms to embrace those who have been excluded, hands to touch those needing compassion, wisdom and skill to alleviate suffering, with hearts bonded together." The existing strategic plan has been achieved, and the Board of Directors will soon be starting another strategic process. However, one of the strategies for the future is to strive to continue to provide high quality, professional health care services to the poor (N. Franks, personal communication, April 17, 2014).

This research project was consistent with the VIM strategy to provide quality health care services to the medically underserved. The researcher worked closely with the Medical Director and Clinic Director in order to identify needs of the diabetic patients that are seen at the clinic. Evidence-based methods were utilized, and the research design was tailored to fit the needs of the clinic schedule, building use, staffing, and processes. Class and coaching group materials were provided to participants at no charge.

Impact of Group Coaching on Cost and Quality of Health Care for the Underserved

The estimated direct medical cost for diabetes in the United States is $116 billion. After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes. Another $58 billion is a result of indirect costs, such as disability, work loss, and

premature mortality (CDC, 2011). The socioeconomically disadvantaged and ethnic minorities bear a disproportionate burden of these costs.

Group coaching has the potential to decrease complications, lower health care costs, and improve work productivity as patients are empowered to better self-manage their diabetes. Although primarily addressing group coaching in the work place, Britton (2010) cites five benefits of group coaching for affecting change:

- It offers more impact at a lower cost than one-on-one approaches.
- It helps to leverage the power of a group to effect change.
- It encourages members to take ongoing action and create public accountability about their commitments.
- It reinforces learning by allowing the member to "see the material, hear it, speak about it, and take action, or do it" (p. 45).
- It builds internal capacity and knowledge as members share common frameworks and have the opportunity to discuss key issues.

In addition, group coaching addresses many of the barriers faced by underserved populations. In a systematic review of interventions to improve diabetes care in disadvantaged populations, Glazier, Bajcar, Kennie, and Willson (2006) found that the interventions that had the most consistent positive effects included:

- culturally tailored interventions,
- face-to-face interventions,
- development of skills to promote behavior change,
- individualized approaches,
- providing feedback, and

- high-intensity intervention (more than ten contact times) delivered over a long duration (greater than six months).

Peek, Cargill, and Huang (2007) cited a similar list from their review of 43 studies of diabetes care for minorities, adding interpersonal skills and social networks as positive effects. Although not cited as an example, coaching methodology and group support would offer these features. Interestingly, interventions that focused primarily on diabetes knowledge did not have positive outcomes.

Summary and Conclusions

This chapter has provided a broad review of relevant research regarding the background and demographics of the problems related to diabetes care in the United States. Literature focusing on DSME, health coaching, group interventions, and lifestyle medicine as important aspects of diabetes care was also reviewed. In addition, literature support for the research project's theoretical framework, methodology, congruence to VIM's strategic plan, and impact for underserved populations was discussed.

Although all the studies that looked at the effect of coaching on health indicated a direct and significant relationship, the literature search resulted in very little current research that directly addresses the relationship between coaching and diabetes. Furthermore, research on group coaching in primary care settings or for diabetes is essentially nonexistent. This research project fills at least one practice gap revealed in the literature by examining the effectiveness of group lifestyle coaching on glycemic control, diabetes knowledge, diabetes empowerment, and diabetes self-management in an uninsured population with type 2 diabetes in a primary care setting. The next chapter highlights the details of the research design and methodology.

CHAPTER 3: PROJECT DESCRIPTION

This chapter describes the methodology for the study. The approach and rationale for selection of the design are presented within the context of the research problem and the theoretical framework. The setting for the research project, sample size and sampling method, ethical considerations, outcome measures, procedures for data collection, project timeline, personnel, interventions, budget, and data analysis are discussed.

Approach and Rationale

As stated previously, new approaches are needed for fostering better patient outcomes in diabetic patients. The purpose of the project was to determine the effectiveness of a diabetes lifestyle coaching model, during which the APN guides coaching group participants in exploration of information, motivation, and strategies for diabetes self-management. The primary aim was to improve the proportion of uninsured patients who achieve goal levels of HbA1c. Secondary objectives were to determine the effectiveness of the model on outcomes of diabetes knowledge, empowerment, and self-management. It was hypothesized that the APN-led lifestyle coaching group would improve HbA1c and increase levels of diabetes-related knowledge, empowerment, and self-management.

A pretest posttest research design allowed exploration of the effectiveness of the group-based diabetes lifestyle coaching model compared with that of usual care and a traditional diabetes education class. Usual care consisted of a typical follow-up visit with one of the health care providers at VIM during the study period. The class group involved usual care plus attending a single 90-minute classroom-style presentation conducted by a certified diabetes educator employed by the Novo-Nordisk pharmaceutical company. The coaching group involved usual care plus participation in six 2-hour group coaching sessions conducted over two

months. Dependent variables included HbA1c, diabetes knowledge, diabetes empowerment, and diabetes self-management. Figure 6 shows the research study flow chart.

The decision to conduct an exploratory study was based on the finding that group health coaching for diabetes has not been studied previously. In quantitative studies, health outcomes are typically measured to determine effectiveness of DSME interventions. This justifies the choice of HbA1c as the primary outcome. The theoretical framework used to guide this study provided the additional outcomes of diabetes knowledge, diabetes self-efficacy, and diabetes self-management. The literature on DSME supports these outcome measures. The research design also provided the foundation for testing study hypotheses that included the relationships between coaching and HbA1c levels, diabetes knowledge, diabetes empowerment, and diabetes self-management.

Project Setting

The setting for this research project was Volunteers in Medicine (VIM), a primary care medical clinic that provides free health care services to low income Hamilton County residents who do not have health insurance. The health care providers in this clinic include volunteer physicians, several part-time nurse practitioners, and a number of ancillary personnel (mostly volunteer). Although a wide variety of health problems are seen and treated in the clinic, the practice treats a number of patients with chronic diseases such as type 2 diabetes. A registered dietitian is available for individual nutritional counseling to diabetics and other patients one to two afternoons per month. The practice also recently began hosting a quarterly diabetes education program by a Novo Nordisk diabetes educator.

At the time that the research project was being designed, the Clinic Director at VIM arranged for a 90-minute diabetes education class to be conducted by a Novo-Nordisk diabetes

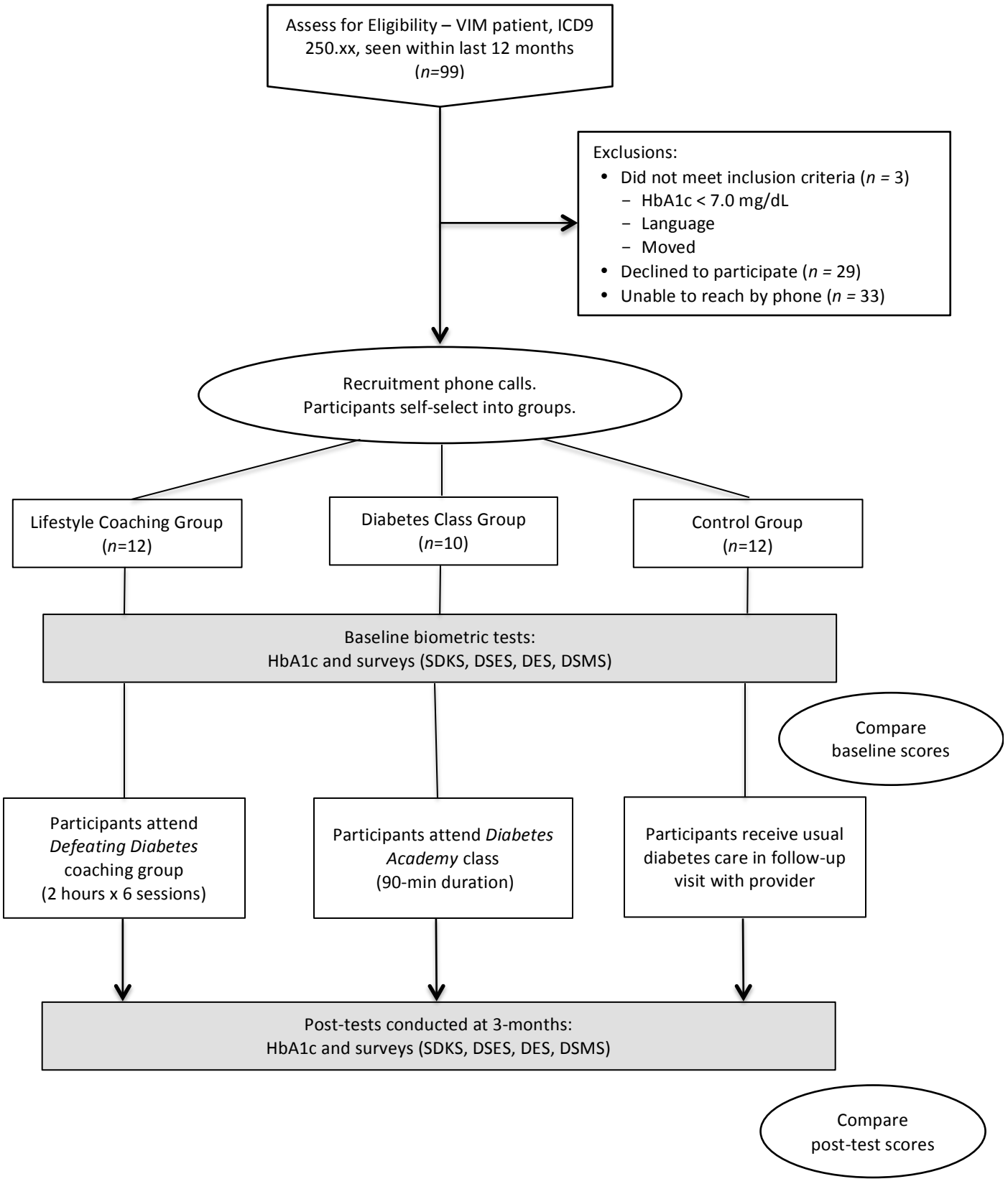


Figure 6. Research study flow chart

educator. Since the date of the class would fall into the same time frame as the research project, it was included as an intervention in the study. The researcher met with the VIM Medical Director to review the purpose and design of the project. A site authorization letter was obtained from the VIM Clinic Director for permission to conduct the study at the clinic (see Appendix A). The researcher worked closely with the Clinic Director to carry out the project details. Clinic providers and staff were briefed at staff meetings and as needed. Frequent and ongoing communication with the VIM staff via informal conversations, emails, and telephone calls regarding the research process was critical, since the primary investigator works only one day per week as an APN at the clinic and the clinic utilizes a high number of volunteers. This also provided opportunity for staff to offer valuable input about the process from their perspective.

Study Participants and Sampling Method

A sample size of 36 participants was desired for this study, with approximately 12 participants in each group. The justification for this sample size was that it was a pilot study in a small population, there were limited time constraints, and there had been no research on group health coaching published to date. Had the sample size been based on a formal power calculation using G-power version 3.1.7 from Duesseldorf University in Germany (Heinrich Heine Universität Düsseldorf website, 2007), the study would have required a minimum of 63 participants (21 per group) to detect the differences in changes in the primary outcomes at three months to ensure 80% power at a 0.05 significance level and an effect size *f* of 0.35 (based on effect size observed in a 2012 meta-analysis of nurse-led diabetes self-management education [Tshiananga et al., 2012] that used HbA1c as an outcome with an effect size of 0.335.) However, a sample size of 36 participants was deemed adequate based on Julious'

recommendation to use a sample size of 12 per group in a pilot trial when there is no prior information from which to base a sample size (Julious, 2005).

The VIM electronic medical record database was queried for patients who met the following inclusion criteria:

- VIM patient who had attended the clinic for a provider visit in 2013.
- Documented type-2 diabetes mellitus (ICD-9 category 250).
- HbA1c value of 7.0% or greater.

The query resulted in 99 patients who were eligible to participate in the study. The reason for limiting the sample to those with a HbA1c value of 7.0% or greater was to evaluate effectiveness of the interventions on glycemic control. Three patients were excluded from the study, based on exclusion criteria of dementia, mental illness, pregnancy, inability to hear, inability to provide written consent, or inability to obtain transportation to the clinic.

Patients who met the eligibility criteria were called by the researcher or research assistant to inform them that they were eligible to participate in a research study at the VIM clinic and to explain the purpose of the study (see Appendix B, Research Study Participant Recruitment Phone Script). Participation was also solicited through flyers posted in the waiting room and exam rooms and referral by providers, nurses, and staff (see Appendix C). Thirty-three patients were unable to be reached by phone. Twenty-nine declined to participate, citing reasons such as being a caregiver, moving, work conflict, surgery, and taking a diabetes class elsewhere. Recruitment challenges included the small number of eligible patients, difficulty of reaching patients by phone, work conflict due to daytime scheduling of interventions, and transportation issues.

A total of 34 participants were recruited for the study. Randomization to groups was not possible, because providers had already referred patients to the diabetes education class prior to the research study recruitment. If interested in participating, patients self-selected into either the coaching group, class group, or usual care. Participants that were already scheduled to attend the diabetes education class were assigned to the class group. The coaching and class groups were filled more quickly than the control group, as most patients queried wanted to participate in an intervention group. Therefore, a rolling enrollment method over the three-month period was used to recruit participants for the control group.

Ethical Considerations

The VIM Clinic Director and the Institutional Review Board Committee at Southern Adventist University approved conduct of the study (see Appendices A and D). Participants completed the informed consent process at the beginning of their baseline research visit. Each was informed about (a) the purpose of the study; (b) what participation in the study involved; (c) confidentiality and anonymity issues; and, (d) the right to voluntarily withdraw from the study at any time without penalty. All participants involved in the study were asked to sign a consent form prior to inclusion (See Appendix E).

Confidentiality was carefully protected throughout the study. Participants were assigned research identification numbers that were used in place of their names on all surveys. Consent forms and a list linking identification numbers with participants' names were filed separately from the surveys. All data collected from participants were used solely for research purposes. Data analysis is presented in group form only. Individual participants will not be identified in publications or presentations.

Measurements

The primary outcome was changes in HbA1c from baseline to three months. Secondary outcomes included diabetes knowledge, diabetes empowerment, and diabetes self-management measured by validated surveys (see Appendix F). Participants completed the survey tools without apparent difficulty and with minimal numbers of questions skipped. A problem with the Diabetes Self-Efficacy Survey and Diabetes Self-Management Survey instruments occurred in non-insulin dependent participants responding to five questions on each survey that were related to insulin use, despite written instructions to skip those questions if not applicable. These responses were re-coded as nonspecific responses and not included in the analysis.

Demographic Data and Background Information

The participant demographic characteristics measured in this study included self-reported gender, age in years since last birthday, number of years of formal education completed, ethnicity, marital status, number of people in household, number of years since diabetes diagnosis, prior attendance at a diabetes education class, and type of medications used to manage blood sugars.

Biological and Physical Measures

The HbA1c was measured by the chemistry lab at Memorial Hospital in Chattanooga, Tennessee. A trained phlebotomist performed venipuncture. Other data collected included height, weight, BMI, and blood pressures. Height and weight were measured with research participants in light clothing using a stadiometer and balance scale. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Blood pressure was measured using the Omron IntelliSense HEM-907XL automatic blood pressure device using the recommended guidelines in JNC 7 (Chobanian et al., 2003).

Simplified Diabetes Knowledge Scale (SDKS)

Participant's knowledge of diabetes was measured using the Simplified Diabetes Knowledge Scale (SDKS) developed by the University of Michigan and revised by Collins, Mughal, Barnett, Fitzgerald and Lloyd (2011). This brief and simple diabetes knowledge questionnaire consists of 20 true-false questions. In a research study of 100 patients in an outpatient setting, the SDKS demonstrated good internal reliability with a total Cronbach's alpha of 0.71 (Collins et al., 2011).

Diabetes Empowerment Scale—Short Form (DES-SF)

The Diabetes Empowerment Scale-Short Form, from the Michigan Diabetes Research and Training Center at the University of Michigan Medical School, measures the psychosocial self-efficacy of patients with diabetes (Anderson et al., 2000). Noting that self-efficacy was typically measured as the perceived ability to engage in various situation-specific self-management tasks (e.g., blood glucose monitoring), the developers' objective for the survey was to measure psychosocial dimensions such as assessing the need for change, developing a plan, overcoming barriers, asking for support, supporting oneself, coping with emotion, motivating oneself, and making diabetes care choices appropriate for one's priorities and circumstances. Initially created as a 37-item questionnaire, the DES-SF consists of an 8-item scale with ratings for each item ranging from 1 to 5. Higher ratings indicate greater self-efficacy. The internal consistency of this scale was measured by a Cronbach's alpha at 0.84 (Anderson, Fitzgerald, Gruppen, Funnell, & Oh, 2003).

Diabetes Self-Efficacy Scale (DSES)

The DSES measures confidence in capability for diabetes self-management. It was developed by Sousa, Hartman, Miller, and Carroll (2009) based on Bandura's self-efficacy

theory (Bandura, 1997), the 2008 ADA Standards of Diabetes Care (ADA,2008), and the National Standards for Diabetes Self-Management Education (Funnell et al., 2008). The DSES is composed of 60 Likert-type items with response options of 0 (strongly disagree) to 5 (strongly agree). Higher total scores indicate higher diabetes self-efficacy. The DSES total score can range from a minimum of 0 to a maximum of 300. The DSES has no subscales. Sample items of the scale include "I think I can make the right food choices all the time" and "I think I can figure out what to do when my blood sugar is low." Sousa tested the scale's reliability and validity with a sample of 10 clinicians and 10 subjects. The overall scale-level content validity index (S-CVI) was 0.97, which exceeded the minimum recommendation of S-CVI/Ave of 0**.**90 (Sousa, Hartman, Miller, & Carroll, 2009).

Diabetes Self-Management Scale (DSMS)

The Diabetes Self-Management Scale (DSMS) measures the actual performance of diabetes self-care activities, such as choosing healthy foods, being active, monitoring blood glucose, taking medication, problem solving, and reducing risks (Sousa et al., 2009). The DSMS was developed primarily based on Orem's theory of self-care (Orem, 1985), the 2008 ADA Standards of Diabetes Care (ADA, 2008), and the National Standards for Diabetes Self-Management Education (Funnell et al., 2008). Like the DSES, the DSMS scale is a 60-item scale with Likert-type response options of 0 (strongly disagree) to 5 (strongly agree). The DSMS total score can range from 0 to 300 with higher scores indicating higher self-management. Sample items of the scale include "I eat at least three meals every day" and "I wear closed-toe shoes every time I am outside my home." The overall scale-level content validity index (S-CVI) for the DSMS was 0.96, which exceeded the minimum recommendation of S-CVI/Ave of 0**.**90 (Sousa, Hartman, Miller, & Carroll, 2009).

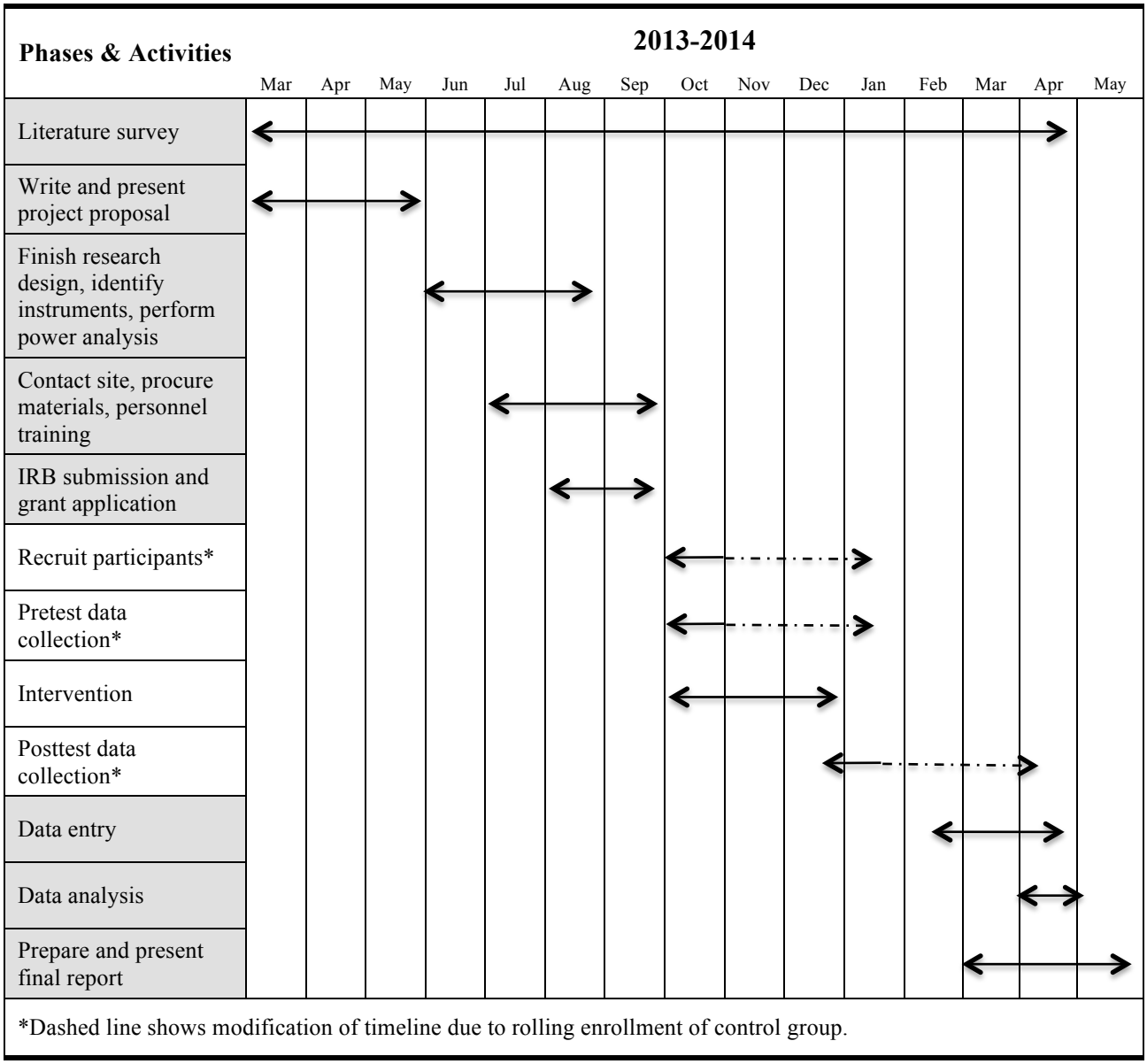
Data Collection Procedures

Once a patient agreed to participate, an appointment was scheduled at the clinic to sign the consent form, complete baseline surveys, and have blood drawn for HbA1c. Survey packets were compiled and given to the VIM Office Coordinator with a list of participants' appointment times. Since the clinic protocol involves first checking in with a volunteer receptionist, participants were encouraged to also speak with the Office Coordinator to ask for the survey packet so that they could complete it while waiting for their blood to be drawn. Repeat data collection was conducted in the same way three months after baseline. Upon completion of the three-month surveys and blood draw, participants were compensated for their time with a $20 gift card to Walmart.

Scholarly Project Timeline

The timeline for the entire scholarly project is shown in Table 2. The project had three phases. The preparation phase included survey of literature, project proposal, research design, site and materials acquisition, IRB submission, grant application, and personnel training. Phase 2, implementation, included participant recruitment, data collection, and the conduction of the education classes and coaching groups. This phase was anticipated to run over a three-month period between October and December, 2013 (see Figure 7). However, the VIM lab availability for scheduling labs around the holidays pushed posttest data collection into January for many participants. In addition, the rolling enrollment of the control group further extended the posttest data collection to early April, 2014. The focus of the third phase was to evaluate the effectiveness of the research process, complete the data entry, analyze the data, write up the results, and prepare and present the final report.

Table 2. *Scholarly Project Timeline*



*Dashed line shows modification of timeline due to rolling enrollment of control group.

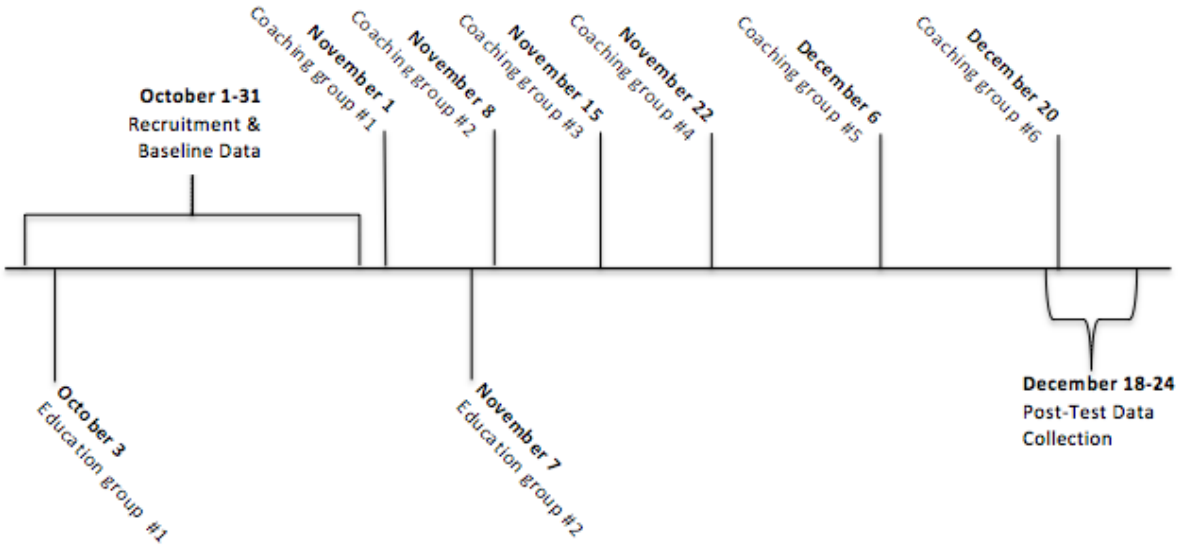


Figure 7. Research study implementation timeline

Resources Personnel

In addition to the primary investigator, the research project utilized a number of key players. A senior nurse practitioner student functioned as a research assistant to help with participant recruitment, data entry, and facilitation of group coaching sessions. A recent nurse practitioner graduate performed duplicate data entry. VIM staff, primarily the Clinic Director and the Office Coordinator, were crucial for scheduling and recruitment process efficiency. Health care providers were instrumental in identifying eligible participants and referring patients to either the education group or the coaching group. In addition, consultation was made as needed with the VIM Medical Director.

Interventions

There were two interventions in this research study: a single-session *Diabetes Academy* class and a six-session *Defeating Diabetes* Lifestyle Coaching Group.

Diabetes Academy Class

Participants in the class group attended a single 90-minute diabetes education program entitled *Diabetes Academy* that was conducted by a Novo Nordisk diabetes educator at the VIM clinic. Table 3 lists the topics presented during the class. The class format consisted of lecture and a period for questions and answers. A booklet covering the material presented was provided to those who attended. This class was offered on two different Thursday afternoons during the study period with approximately 10-12 in attendance at each class. Not everyone who attended the class was enrolled in the research study.

Table 3 *Diabetes Academy Class Topics*

***Diabetes Academy* Class Topics**	
Time to take charge!	Being active
Diabetes: What it is and why it happens	Tests and checkups
Some myths about diabetes—and the facts	Checking your blood sugar
The types of diabetes	Managing changes in your blood sugar
What causes diabetes?	Coping with diabetes
What are the signs of diabetes?	Diabetes at work
What can happen if diabetes is not managed?	Traveling with diabetes
Your diabetes care plan	Wrapping up
Diabetes medicines	Commitment to my health
Your diabetes meal plan	Diabetes care schedule

Defeating Diabetes Lifestyle Coaching Group

Participants in the lifestyle coaching group attended six group coaching sessions over a two-month period. The coaching group was entitled *Defeating Diabetes*. Sessions were spaced one week apart for the first month, and then every two weeks during the second month. Due to the number of participants in the coaching group (12), it was decided to conduct two coaching groups in order to allow for more participant interaction. This size is supported by a 2008 survey for group executive coaching, in which 48% of coaches surveyed coach groups of 2 to 6

participants and 48% between 7 and 12 (Nicholas, 2009). Participants were given a choice of enrolling in either the Friday morning (9:00 am to 11:00 am) coaching group or the Friday afternoon (12:00 pm to 2:00 pm) coaching group. Each group started with six participants at the first session. Although attendance at each session was highly encouraged, an average of four to five participants attended each coaching group session.

Coaching groups were conducted by the researcher (an APN) with the assistance of a senior nurse practitioner student. Biometric measurements (body weight, blood pressure) were taken prior to the start of each session. The session format included: (a) diabetes education through *Diabetes Conversation Map* group discussions; (b) PowerPoint presentations of success stories and CREATION Health strategies for lifestyle change; (c) food samples focusing on whole plant-based foods; (d) learning activities; and (e) group coaching for exploring motivation, problem-solving, and goal-setting. Appendix G describes the coaching group curriculum plan, Appendix H includes the *Diabetes Conversation Map* visuals, and Appendix I contains a sample of the PowerPoint for Session #1.

A *Defeating Diabetes* notebook was developed specifically for each coaching group participant as a tool for creating an individualized plan for diabetes self-management. It included sections for PowerPoint handouts, recipes, activity logs, blood sugar logs, and the participant's personalized plan for defeating diabetes. The participants received the notebook binder at the first session, took it home as a tool for making and tracking changes, and regularly brought it to each coaching session for reference and addition of new materials. The last section, *My Defeating Diabetes Plan,* was completed during the coaching sessions. It contained a personal vision for defeating diabetes, a decision balance, goals, potential barriers, strategies to deal with challenging situations, plans for rewarding success, and the SMART steps they chose

to work on between sessions. Appendix J contains a sample of the handouts provided at the first session. Participants were also provided with a pedometer, blood glucose monitoring supplies, and a copy of *The Full Plate Diet* book (Seale, Sherard, & Fleming, 2010).

Each coaching group session began with a discussion on the progress made on individual action steps and lessons learned since the last session about diabetes self-management. Participants were also encouraged to share questions and topics that would be most helpful to them if addressed during the session. During group sessions, there were discussions regarding the basic pathophysiology of diabetes, diabetes complications, medications, lifestyle interventions, and motivation for change. The researcher directed the flow of conversation, but allowed participants to relate information to their personal experiences and discuss issues related to diabetes self-management that were meaningful to them. Also provided were practical strategies for diabetes self-management and assistance in creating personalized diabetes wellness plans with action steps to carry out between sessions. The sessions closed with each participant sharing the most important lesson learned from the group coaching conversations that day. A related scripture promise was also provided to help participants apply their faith to their lifestyle change and diabetes self-management efforts.

Budget

The total budget for this research project was $1281.62. Sources for funding included the researcher's personal budget, donated materials, and volunteer staff. An Academic Research Committee grant was received from Southern Adventist University for obtaining additional funding needed to carry out the program. Table 4 includes a breakdown of project expenses.

Table 4. *Research Study Expenses*

Materials and Supplies	**Cost**
Printing costs for promotional flyers, consent forms, surveys, and group coaching materials (donated by VIM)	--
Lab costs for HbA1c (donated by Memorial Hospital for VIM patients)	--
Lab costs for patients who became ineligible for VIM services during study period	$150.00
Diabetes Conversation Map (donated by Merck)	--
Notebook binders and dividers for group coaching handouts	$85.01
Pedometers for participants of coaching group (donated by Blue Cross)	--
The Full Plate Diet book for participants of coaching group	$159.61
Blood sugar monitoring strips for participants in the coaching group	$252.00
Food demonstrations and samples for coaching group (donated by researcher)	--
Gift card for participants who completed surveys and blood work	$580.00
Thank you gifts for VIM clinic staff and data entry volunteer	$55.00
Total Research Study Expenses	**$1281.62**

Feasibility and Sustainability of the Project

The project was feasible in terms of practicality, time frame, budget, and institutional support. However several factors would need to be considered, and possible adjustments made to the project design, in order to ensure its sustainability. This is most notable in areas of budget, since this study was funded through donations and a grant. In addition, specific training was needed for use of the *Diabetes Conversation Map*, as well as for coaching methodology. It is the researcher's goal to continue the work of this exploratory study in future diabetes projects at VIM. Hence, several ideas are suggested in Chapter 5.

Data Analysis Procedures

Quality assurance data techniques included double entry into Microsoft Excel. Following entry, the datasets were imported into IBM™ Statistical Package for Social Sciences (SPSS) version 22.and verified to minimize data entry errors. A Data Codebook was developed (see

Appendix K). Data were examined for missing data and outliers. Uncertain values, discrepancies, and other data-related questions were clarified in the Data Clarification Form (see Appendix K).

Descriptive data analysis was carried out initially. Statistical assumptions were tested. Since some of the variables were not normally distributed, both parametric and nonparametric tests were used for analysis. Because of non-random sampling and non-random assignment into groups, the intervention and control group demographics and biometric parameters were compared using one-way analysis of variance (ANOVA) and Kruskal-Wallis to determine if the groups were statistically different on demographic, biometric, or survey characteristics. Paired-samples *t* test and Wilcoxon signed-rank tests were used to check differences within groups. Analysis of Covariance (ANCOVA) was used to determine the effect of the interventions after controlling for baseline biometric and psychosocial measures. A Pearson's product-moment correlation was used to assess the relationship between the three-month survey scores and HbA1c. In order to examine the unique contribution of the intervention group in the explanation of weight change and in diabetes self-efficacy, a hierarchical multiple regression analysis was performed. An alpha level of .05 was used for all statistical tests.

Missing data was a problem. Various factors contributed to this issue, including attrition, systematic error (a copying mistake resulting in the omission of the back pages of the surveys for some of the participants), and participant confusion in answering questions on the SDKS that applied only to those taking insulin. Because of the non-random nature of the missing data on entire survey pages, imputation methods useful for random skipped questions were not suitable in this study. Furthermore, there were too many missing values to impute a mean or use maximum likelihood, as this would result in a theoretical data set. Moreover, since the sample

size was small, it was important to keep as many cases as possible for the data points collected. Therefore, it was decided to not delete any participants from analyses, even though there were missing values for certain variables. Instead, pair-wise was selected as one of the options in the statistical analysis in order to keep as many cases as possible.

Another issue involved that of a participant in the class group who also showed up to the first session of the coaching group. Since she arrived late, it was not realized that she was a participant in the class group until the end of the session. By that point, the rest of the group members lobbied to allow her to continue as a coaching group member. It was decided to recode her as a participant of the coaching group and her attendance in the *Diabetes Academy* class was considered equivalent to prior attendance at a diabetes education class. The petition of the other coaching group participants on her behalf is demonstration of the power of group dynamics and mutual support.

Coaching Group Evaluation

Participants in the coaching group were asked to complete a paper and pencil evaluation of the diabetes lifestyle coaching program to evaluate their experience and the impact that the coaching program had on their life (See Appendix L). Participants evaluated the number and length of sessions, the group interaction, the materials, and their learning. Evaluation was primarily by Likert-type questions scored between 1 and 5 and open-ended questions regarding what they liked most and least about the program. Additional questions regarding some of the changes participants had made and the challenges faced in their management of diabetes allowed for qualitative-type data collection.

An evaluation of the entire research process was conducted through informal meetings with the VIM staff and volunteers who were instrumental in the study implementation. These comments were collected and filed for review when planning the next research phase.

Summary

A pretest posttest research design was used to explore the effectiveness of a group-based diabetes lifestyle coaching model compared with that of usual care and a traditional diabetes education class. A convenience sample of 34 participants at the VIM clinic was recruited for the research study. Participants self-selected into the coaching group, class group, or usual care group.

The goal of the coaching intervention was to collaborate with participants in identifying desired and attainable behavioral goals that could have a positive impact on their diabetes management. Once identified, the researcher collaborated with participants to develop an individualized behavioral plan, which was then monitored and adjusted at each session as participants attempted to implement their behavioral goals.

Each participant was asked to complete four surveys (Simplified Diabetes Knowledge Test, Diabetes Empowerment Scale—Short Form, Diabetes Self-Efficacy Scale, and the Diabetes Self-Management Scale) at baseline and again at three months. In addition, HbA1c, body weight, and blood pressure were measured. Participants in the coaching group also completed an evaluation of their participation in the *Defeating Diabetes* coaching group.

A variety of parametric and nonparametric tests were utilized to analyze the data. These results will be discussed in more detail in Chapter 4.

CHAPTER 4: ANALYSIS OF RESULTS

Chapter 4 presents the procedure of data preparation and missing data management. Descriptions of the study sample and outcome variables are provided. A review of the data analysis, including hypotheses testing and other relationships, is presented. In addition, participant responses to the coaching group evaluation are discussed.

Data Preparation and Missing Data Management

Microsoft® Excel for Mac 2011 was used to enter the data. The data were double entered by two different people, and then imported into SPSS version 22 statistical software for analysis. Once data were imported into SPSS, the datasets were verified to minimize data errors. Descriptive statistics were run to check for out of range results, and cases with outliers were rechecked to assure no error in data entry. Only one outlier was noted in the data for post HbA1c, where one participant scored considerably higher than other participants. The case was not removed from the analysis because it was checked against the lab report and found to be accurate. Missing data were also identified. Due to small sample size, complete-case analysis was not possible. See the Data Clarifications Form in Appendix K for the methods utilized.

Description of Sample

A total of 34 patients participated in the study, distributed somewhat evenly between the three groups. The class group was the smallest size, possibly due to the study recruitment beginning at approximately the same time as the first *Diabetes Academy* class was held. The numbers of participants per group are summarized in Table 5.

Frequency distributions were obtained on all the demographic variables, as well as measures of central tendency and dispersion. The typical study participant was a 53-year-old Caucasian (64.7%) female (73.5%), who was married (32.4%) and had at least a high school

Table 5. *Groups and Frequencies of Participants (N = 34)*

Group	Frequency	Percent
Coaching Group	12	35.3
Class Group	10	29.4
Control Group	12	35.3

education (79.4%). The mean years of having diabetes was 10.4 (*SD* = 7.72) and ranged from 3 months to 34 years. Nearly 60% (59.4%) had never received formal diabetes education. Over a third of participants (35%, *n* = 12) reported taking only oral medications to manage blood sugars, nine (26.5%) reported using only insulin, one (2.9%) did not take any medications, and the remaining third (32.4%, n = 11) reported taking both insulin and oral medications. See Table 6 for more detailed information about participant characteristics.

There were no significant differences in sociodemographic measures between groups. A one-way ANOVA was conducted to determine if the demographic variables were different in the three groups. Levene's test for homogeneity of variances was not violated for ethnicity, education, number of years with diabetes, medications, or previous attendance at a diabetes class. There were no statistically significant differences in scores for these values between the three groups ($p > .10$ for all variables). The homogeneity of variance assumption was violated, however, for gender, age, and marital status. Therefore, Welch ANOVA was used for the *p* value for these variables. There were no statistically significant differences in scores for age ($p = .55$) and marital status ($p = .34$). Robust tests of equality of means could not be performed for gender because the class group was entirely female (0 variance).

Table 6. *Baseline Demographic Characteristics (N = 34)*

Participant characteristic	Control group	Class group	Coaching group	*P value*
Gender				NA
Male	5 (41.7%)	0 (0%)	4 (33.3%)	
Female	7 (58.3%)	10 (100%)	8 (66.7%)	
Age in years, mean ± *SD*	50.4 ± 3.89	53.9 ± 2.27	55.5 ± 2.32	.551
Ethnicity*, *n* (%)				.939
White/Caucasian	8 (66.7%)	6 (60%)	8 (66.7%)	
Black or African American	4 (33.3%)	4 (40%)	4 (33.3%)	
Marital status*, *n* (%)				.341
Single, living alone	-	4 (40%)	5 (41.7)	
Cohabiting	1 (8.3%)	-	-	
Married	7 (58.3%)	2 (20%)	2 (16.7%)	
Divorced or separated	-	3 (30%)	5 (41.7)	
Widowed	2 (16.7%)	1 (10%)	-	
Level of education*, *n* (%)				.393
5-8 years	1 (8.3%)	-	-	
Some high school	1 (8.3%)	2 (20%)	1 (8.3%)	
HS diploma or GED	1 (8.3%)	-	6 (50%)	
Some college	7 (58.3%)	7 (70%)	3 (25%)	
Associates degree	-	1 (10%)	2 (16.7%)	
Years with diabetes*, *n* (%)				.999
Less than 1 year	-	-	1 (8.3%)	
1-5 years	3 (25%)	4 (40%)	2 (16.7%)	
6-10 years	3 (25%)	1 (10%)	4 (33.3%)	
11-15 years	3 (25%)	4 (40%)	2 (16.7%)	
More than 15 years	1 (8.3%)	1 (10%)	2 (16.7%)	
Diabetes medications*, *n* (%)				.310
None	1 (8.3%)	-	-	
Oral meds only	5 (41.7%)	3 (30%)	4 (33.3%)	
Insulin only	4 (33.3%)	2 (20%)	3 (25%)	
Oral meds and insulin	2 (16.7%)	4 (40%)	5 (41.7%)	
Previous diabetes education*, *n* (%)	5 (41.7%)	4 (44.4%)	4 (33.3%)	.749

Note: Robust tests of equality of means cannot be performed for gender because the class group was entirely female (0 variance).

*Data reflect participants with valid data on the variable.

Description of Outcome Variables

The main outcome variables were examined individually before the research questions were analyzed. Frequency distributions were obtained on the clinical and psychosocial indices, as well as measures of central tendency and dispersion.

Clinical Indices

Clinical indices examined included HbA1c percent, body weight in pounds, and BMI. Table 7 shows the descriptive statistics for this data.

Table 7. *Clinical Indices: Between- and Within-Group Pre/Post Intervention Results*

Variable	Control group	Class group	Coaching group	*P* value*
HbA1c, % [*n*]				
Baseline	8.1 ± 1.18 [12]	9.1 ± 1.59 [10]	8.7 ± 1.73 [11]	**.082**
3-months	8.0 ± .73 [7]	9.2 ± 1.46 [10]	9.2 ± 2.34 [11]	.341
Change	.17 ± .512 [7]	.1 ± 1.35 [10]	.5 ± 1.01 [11]	.698
P value*	.351	.859	.220	
Weight, lbs [*n*]				
Baseline	226.6 ± 64.64 [10]	266.8 ± 39.15 [10]	216.2 ± 67.16 [12]	.133
3-months	207.4 ± 30.69 [4]	270.9 ± 45.11 [9]	221.7 ± 69.48 [11]	.102
Change	10.0 ± 6.00 [3]	3.4 ± 5.73 [9]	.55 ± 5.55 [11]	**.056**
P value*	.109	.141	.894	
BMI [*n*]				
Baseline	36.5 ± 7.93 [10]	43.0 ± 5.64 [10]	35.6 ± 10.64 [11]	.168
3-months	35.0 ± 4.46 [4]	43.6 ± 6.56 [9]	35.7 ± 10.77 [11]	.107
Change	1.7 ± 1.02 [3]	.6 ± .92 [9]	.1 ± .85 [11]	**.082**
P value*	.109	.123	.929	

Note: Data are presented for participants who completed pretest and posttest. Data are presented as the mean ± standard deviation. HbA1c = Hemoglobin A1c, BMI = Body Mass Index.
**P* values represent between-group differences for weight in ANOVA and for HbA1c and BMI in Kruskal-Wallis tests. *P* values represent within-group differences in Wilcoxon-signed rank tests.

In the current sample, the mean baseline HbA1c was 8.1% (*SD* = 1.18) for the control group, 9.1% (*SD* = 1.59) for the class group, and 8.7% (*SD* = 1.73) in the coaching group. A

Kruskal-Wallis test was conducted to determine if baseline and 3-month test scores for HbA1c were different between the three groups. The differences in baseline HbA1c were significantly different between groups ($p = .082$); however, there was no statistically significant differences in 3-month test scores ($p = .341$) or change scores ($p = .698$) between the three groups.

The mean baseline weight was 226.6 lbs ($SD = 64.64$) in the control group, 266.8 lbs ($SD = 39.15$) in the class group, and 216.2 lbs ($SD = 67.16$) in the coaching group. A one-way ANOVA was conducted to determine if baseline, 3-month, and change scores for weight were different between the three groups. Data were normally distributed for each group, as assessed by Shapiro-Wilk test ($p > .05$); and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances. Data are presented as mean ± standard deviation. The differences between the control, class, and coaching groups for baseline weight were not statistically significant ($p = .133$). The differences between groups for 3-month weights were marginally significant ($p = .102$).

There was significance between groups, however, for weight change, $F(2,20) = 3.337$, $p = .056$, $\omega^2 = 0.17$. Tukey post-hoc analysis revealed that the mean difference in change between the coaching group and the control group was statistically significant ($p = .047$). This could be a possible aberration as a result of the change in n. Due to attrition, the control group only had four participants with 3-month weights. Because the standard deviations in the three groups were similar, it was not flagged for homogeneity variance.

The contribution of the intervention group to the change in body weight remained significant even after adjusting for age, medication changes, and years with diabetes. To examine the unique contribution of the intervention group in the explanation of weight change, a hierarchical multiple regression analysis was performed. A two model hierarchical multiple

regression was conducted with weight change as the dependent variable. Age, medication changes, and years with diabetes were entered in Model 1 of the regression to control for plausible reasons for a change in body weight. Model 2 added the intervention group. The full model of years with diabetes, age, medication changes, and intervention group to explain weight change was statistically significant, $R^2 = .416$, $F(4,18) = 3.201$, $p < .0005$; adjusted $R^2 = .286$. This means that almost 30% of the change in body weight can be attributed to the intervention. See Table 8 for full details on each regression model. Although not statistically significant, it is also interesting to note that the coaching group had the least weight gain over the course of the study (.55 lbs ± 5.55). No other group differences in weight change were statistically significant.

Table 8. *Hierarchical Multiple Regression for Weight Change*

	Model 1		Model 2	
Variable	B	β	B	β
Weight change (Constant)	3.07		6.28	
Age	.02	.04	.10	.17
Medication changes	2.81	.25	3.72	.33
Years with diabetes	-1.45	-.26	-1.53	-.27
Intervention group			**-4.11***	-.56*
R^2	**.121** →		**.416**	
F	.876		**3.201***	
ΔR^2	.121		.294	
ΔF	.876		9.063	

Note: B = unstandardized regression coefficient, β = standardized coefficient
*$p < .05$

The mean baseline BMI was 36.5 (*SD* = 7.93) in the control group, 43.0 (*SD* = 5.64) in the class group, and 35.6 (*SD* = 10.64) in the coaching group. A Kruskal-Wallis test was used to determine if there were differences in the baseline, 3-month, and BMI change scores between the groups. The differences were not statistically significant for the baseline ($p = .168$) or 3-month ($p = .107$) scores, although the latter was trending toward significance at an alpha of .10. A significant difference was noted between the groups for BMI change scores ($p = .082$). An ANCOVA was used to determine the effect of the coaching, class, and control groups on post-intervention BMI (see Table 9).

After adjustment for pre-intervention BMI, there was a statistically significant difference in post-intervention BMI values between the groups, $F(2,19) = 4.069$, $p = .034$, partial $\eta 2 = .300$. Post hoc analysis was performed with a Bonferroni adjustment. Post-intervention BMI values were statistically significantly greater in the control group versus the class group ($p < .05$) and the coaching group ($p < .05$). The coaching group had the lowest post-intervention BMI, but was not statistically significantly lower than the class group ($p > .05$).

Table 9. *Adjusted and Unadjusted Intervention Means and Variability for Post-Intervention Measures with Pre-Intervention Measures as Covariates*

		Unadjusted		***Adjusted***		
	n	*M*	*SD*	*M*	*SE*	*P value*
HbA1c_log10						.799
Control group	7	.90	.040	.94	.019	
Class group	10	.96	.064	.94	.016	
Coaching group	11	.95	.102	.95	.015	
BMI						**.034**
Control group	3	36.0	4.85	40.2	.52	
Class group	9	43.6	6.56	38.8	.31	
Coaching group	11	35.7	10.77	38.5	.27	
SDKS						.324
Control group	4	72.9	4.74	72.8	3.84	
Class group	9	81.2	8.20	79.0	2.62	
Coaching group	10	77.6	12.53	79.6	2.48	
DES-SF						.639
Control group	5	4.1	.72	4.0	.32	
Class group	10	3.9	.52	3.8	.22	
Coaching group	12	3.9	.94	4.1	.21	
DSES						.803
Control group	5	220.4	22.03	217.9	20.43	
Class group	10	213.4	51.57	201.8	14.88	
Coaching group	12	193.5	63.03	204.2	13.59	
DSMS						.308
Control group	4	215.3	25.2	210.1	26.50	
Class group	10	179.0	55.0	166.5	17.25	
Coaching group	12	151.2	72.0	163.3	15.81	

**P* values and adjusted means and standard error from ANCOVA test.

Psychosocial Indices

Psychosocial indices included the Simplified Diabetes Knowledge Scale (SDKS), the Diabetes Empowerment Scale—Short Form (DES-SF), the Diabetes Self-Efficacy Scale (DSES),

and the Diabetes Self-Management Scale (SDMS). Table 10 shows the descriptive statistics for these data.

Table 10. *Psychosocial Indices: Between- and Within-Group Pre/Post Intervention Results*

Variable	Control group	Class group	Coaching group	*P* value*
SDKS[1] [*n*]				
Baseline (*M*±*SD*)	69.3 ± 7.64 [7]	75.1 ± 14.89 [10]	66.7 ± 11.27 [12]	.270
3-months (*M*±*SD*)	74.7 ± 8.70 [6]	81.2 ± 8.20 [9]	77.6 ± 12.53 [10]	.490
Change (*M*±*SD*)	4.2 ± 8.3 [4]	8.8 ± 10.69 [9]	12.6 ± 7.64 [10]	.299
P value*	.391	**.038**	**.001**	
DES-SF[2] [*n*]				
Baseline (*M*±*SD*)	4.0 ± .59 [10]	3.8 ± .57 [10]	3.2 ± 1.09 [12]	.163
Baseline (median)	4.0	3.7	3.5	.183
3-months (*M*±*SD*)	4.3 ± .68 [7]	3.9 ± .52 [10]	3.9 ± .94 [12]	.681
3-months (median)	4.5	3.9	4.1	.359
Change (*M*±*SD*)	.30 ± .457 [5]	.10 ± .633 [10]	.71 ± 1.06 [12]	.344
P value*	.225	.683	**.005**	
DSES[3] [*n*]				
Baseline (*M*±*SD*)	198.8 ± 62.90 [10]	219.1 ± 41.58 [10]	179.3 ± 62.68 [12]	.124
Baseline (median)	224.0	216.5	180.0	.333
3-months (*M*±*SD*)	210.4 ± 49.64 [7]	213.4 ± 51.57 [10]	193.5 ± 63.03 [12]	.805
3-months (median)	224.0	216.5	188.5	.702
Change (*M*±*SD*)	17.6 ± 56.853 [5]	-5.7 ± 36.402 [10]	14.25 ± 57.489 [12]	.721
P value*	.500	.799	.328	
DSMS[4] [*n*]				
Baseline (*M*±*SD*)	166.2 ± 56.80 [10]	173.8 ± 34.85 [10]	133.6 ± 64.57 [12]	.195
3-months (*M*±*SD*)	168.8 ± 75.03 [6]	179.0 ± 54.97 [10]	151.2 ± 72.01 [12]	.622
Change (*M*±*SD*)	53.5 ± 71.26 [4]	5.2 ± 47.83 [10]	17.6 ± 56.75 [12]	.357
P value*	.230	.739	.306	

Note: Data are presented for participants who completed pretest and posttest. Data are presented as the mean ± standard deviation.

[1]Simplified Diabetes Knowledge Scale: % correct

[2]Diabetes Empowerment Scale—Short Form: Mean of responses

[3]Diabetes Self-Efficacy Scale: Total score (out of 300 possible)

[4]Diabetes Self-Management Scale: Total score (out of 300 possible)

**P* values represent between-group differences in ANOVA and Kruskal-Wallis tests and within-group differences in paired *t* tests and Wilcoxon signed-rank tests.

Simplified Diabetes Knowledge Scale. Diabetes knowledge was operationalized using the Simplified Diabetes Knowledge Scale (SDKS). The test consists of 20 true/false/don't know test questions that assess diabetes knowledge. For each correct answer one point is assigned. Missing values and "don't know" responses were scored as incorrect. Since two questions are specifically applicable to insulin use, the score was calculated out of 20 for insulin-dependent participants and out of 18 for participants who do not use insulin. The score was determined by dividing the number of correct responses by the number of applicable items, and multiplying the result by one hundred, giving the scale a range of 0 to 100. Higher scores indicate higher diabetes knowledge. In the current sample, the mean baseline score for the SDKS was 69.3 (*SD* = 7.64) in the control group, 75.1 (*SD* = 14.89) in the class group, and 66.7 (*SD* = 11.27) in the coaching group.

Diabetes Empowerment Scale—Short Form. Diabetes empowerment was operationalized using the Diabetes Empowerment Scale—Short Form (DES-SF). The scale consists of eight Likert-type items and each item has response options ranging from 1 (strongly disagree) to 5 (strongly agree). Items were added and then divided by eight to obtain an average score for diabetes empowerment. Higher scores indicate a higher level of diabetes empowerment. In the study sample, the mean baseline score for the DES-SF was 4.0 (*SD* = .58) in the control group, 3.8 (*SD* = .57) in the class group, and 3.2 (*SD* = 1.09) in the coaching group.

Diabetes Self-Efficacy Scale. In this study, self-efficacy was operationalized using the Diabetes Self-Efficacy Scale (DSES). The DSES is composed of 60 Likert-type items. Each item has response options of 0 (strongly disagree), 1 (moderately disagree), 2 (slightly disagree), 3 (slightly agree), 4 (moderately agree), and 5 (strongly agree). Items on the scale are worded so that higher scores indicate higher diabetes self-efficacy. The DSES total score can range from a

minimum of 0 to a maximum of 300. In the current sample, the mean baseline score for the DSES was 198.8 (*SD* = 62.90) in the control group, 219.1 (*SD* = 41.58) in the class group, and 179.3 (*SD* = 62.68) in the coaching group.

Diabetes Self-Management Scale. Diabetes self-management was the final outcome variable for the study and was operationalized using the Diabetes Self -Management Scale (DSMS). Each item has response options of 0 (strongly disagree), 1 (moderately disagree), 2 (slightly disagree), 3 (slightly agree), 4 (moderately agree), and 5 (strongly agree). The final score is calculated by summing the scores of all items, and can range from a minimum of 0 to a maximum of 300. A higher score on the scale indicates a higher level of diabetes self-management. In the study sample, the mean baseline score for the DSMS was 166.2 (*SD* = 56.80) in the control group, 173.8 (*SD* = 34.95) in the class group, and 133.6 (*SD* = 64.57) in the coaching group.

Findings

Hypothesis 1

The first hypothesis for this research study states: "An APN-led lifestyle coaching group will improve HbA1c." The research study failed to support this hypothesis. A Kruskal-Wallis test was used to determine if there were differences in the baseline and 3-month test scores for HbA1c between the three groups. The differences were not statistically significant ($p > .05$). In addition, a Wilcoxon signed-rank test was used to examine the differences between the baseline and 3-month HbA1c, body weight, and BMI scores within groups. No significant difference was found in the results (see Table 7).

An ANCOVA was used to determine the effect of the different diabetes programs and the control on post-intervention biometric and psychosocial measures after controlling for pre-

intervention biometric and psychosocial measures (see Table 9). There was a linear relationship between pre and post-intervention variables for each group, as assessed by visual inspection of a scatterplot. There was homogeneity of regression slopes as the interaction terms were not statistically significant ($p > .05$ for all interactions). There was homoscedasticity and homogeneity of variances, as assessed by visual inspection of a scatterplot and Levene's test of homogeneity of variance. There were no outliers in the data, as assessed by no cases with standardized residuals greater than ±3 standard deviations. After adjustment for pre-intervention HbA1c_log10 values, there was not a statistically significant difference in post-intervention HbA1c_log10 values between the groups, $\underline{F}(2,24) = .226$, $p > .05$, partial $\eta 2 = .018$.

Hypothesis 2

The research study also failed to support the second hypothesis, which stated: "An APN-led lifestyle coaching group will improve diabetes knowledge, diabetes empowerment, and diabetes self-management." A one-way ANOVA was conducted to determine if there were differences in SDKS and DSMS scores between the three groups. Levene's test for homogeneity of variance was not violated ($p > 0.5$ for each variable). The scores were not statistically significantly different. A Kruskal-Wallis test was used to determine if there were differences in DES-SK and DSES scores between the three groups. The scores were not statistically significantly different (see Table 10). This is likely because of differences in variability in standard deviation (which created noise), and because the sample size changed due to attrition in the control group. Also, a less discriminating test (Kruskal-Wallis) was used for two of the variables.

Although there was no statistically significant difference observed *between* groups for any of the psychosocial indices, there was a difference noted *within* groups. A paired-samples *t*

test and a Wilcoxon signed-rank test were used to determine whether there was a statistically significant mean change in the baseline survey scores and the post-intervention survey scores within groups. A significant increase from the baseline SDKS scores to the post-intervention SDKS scores was found in both the class group [$t(8) = 2.476$, $p < .05$] and the coaching group [$t(9) = 5.192$, $p = .001$]. The effect size (d) is large at 0.82 and 1.65, respectively. This represented an 18% increase in diabetes knowledge scores from baseline to 3-month in the coaching group and 12% in the class group. There was a 6% change in the control group, but the difference was not significant. Figure 8 depicts this difference in graphical format.

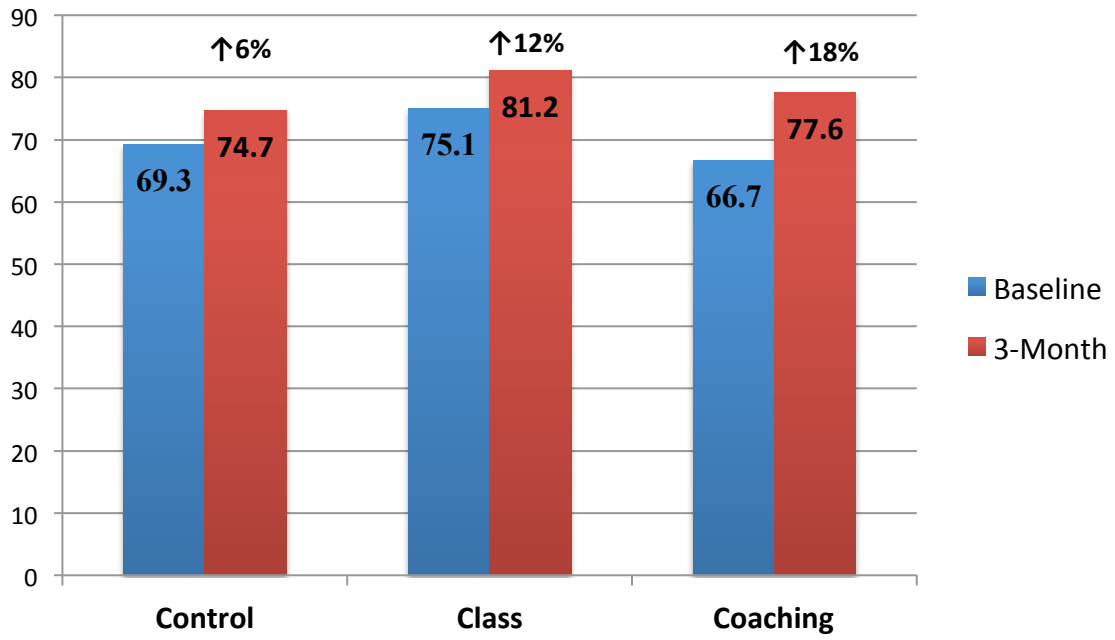


Figure 8. Percent change in diabetes knowledge scores from baseline to 3-months

This analysis suggests that both the class and the coaching group positively impacted diabetes knowledge scores. However, in a hierarchical regression, after controlling for multiple variables (ethnicity, age, gender, marital status, number in household, previous diabetes education, education level, and intervention group), the principle explanatory variable for the

diabetes knowledge at the end of the program was the knowledge that the participant had at baseline. A hierarchical multiple regression analysis was conducted to assess the unique contribution of several variables on the 3-month scores for the SDKS. A five model hierarchical multiple regression was conducted with the 3-month SDKS score as the dependent variable. The hierarchical multiple regression revealed that none of the independent variables added were statistically significant, other than the last variable added, baseline SDKS. In Model 5, baseline SDKS scores accounted for 37% of the variance (between the three treatment group means) in the 3-month knowledge scores. The full model was statistically significant, $R^2 = .763$, $F(9, 13) = 4.647$, $p < .05$; adjusted $R^2 = .599$. See Table 11 for full details on each regression model.

Table 11. *Hierarchical Multiple Regression for Simplified Diabetes Knowledge Scale Scores*

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	B	β	B	β	B	β	B	β	B	β
SDKS[1], 3-month (constant)	101.1**		108.5**		89.1**		85.7*		25.0	
Ethnicity	-7.7	.-.37	-7.9	-.38	-8.7	-.4	-8.9	-.4	-1.5	-.07
Age	.009	.009	.04	.04	.147	-.15	.14	.14	.23	.23
Gender	-7.5	-.33	-6.8	-.30	-7.7	-.34	-7.9	-.35	-6.8	-.30
Marital status			-2.2	-.29	-2.4	-.31	-2.2	-.29	-2.0	-.27
# in household			-2.0	-.14	-.5	-.04	-.03	-.002	-.58	-.04
Previous DM education					-5.8	.28	6.1	-.30	8.8	.43
Education					1.2	.15	1.3	.16	.60	.07
Intervention group							1.0	.08	1.7	.15
SDKS[1], baseline									.61**	.73*
R^2	.216		.298		.388		.392		.763	
F	1.74		1.44		1.36		1.13		4.65	
ΔR^2	.216		.082		.090		.005		.371	
ΔF	1.741		.998		1.100		.104		20.312**	

Note: B = unstandardized regression coefficient, β = standardized coefficient
[1]Simplified Diabetes Knowledge Scale
*$p < .05$, **$p \leq .001$

A significant difference was also found in the coaching group for the change between the baseline DES-SF scores and the post-intervention DES-SF scores ($z = 2.812$, $p = .005$). This represented a 7.5% increase in diabetes empowerment scores from baseline to 3-month in the control group, a 3.0% increase in the class group, and a 22% increase in the coaching group. Figure 9 depicts this difference in graphical format.

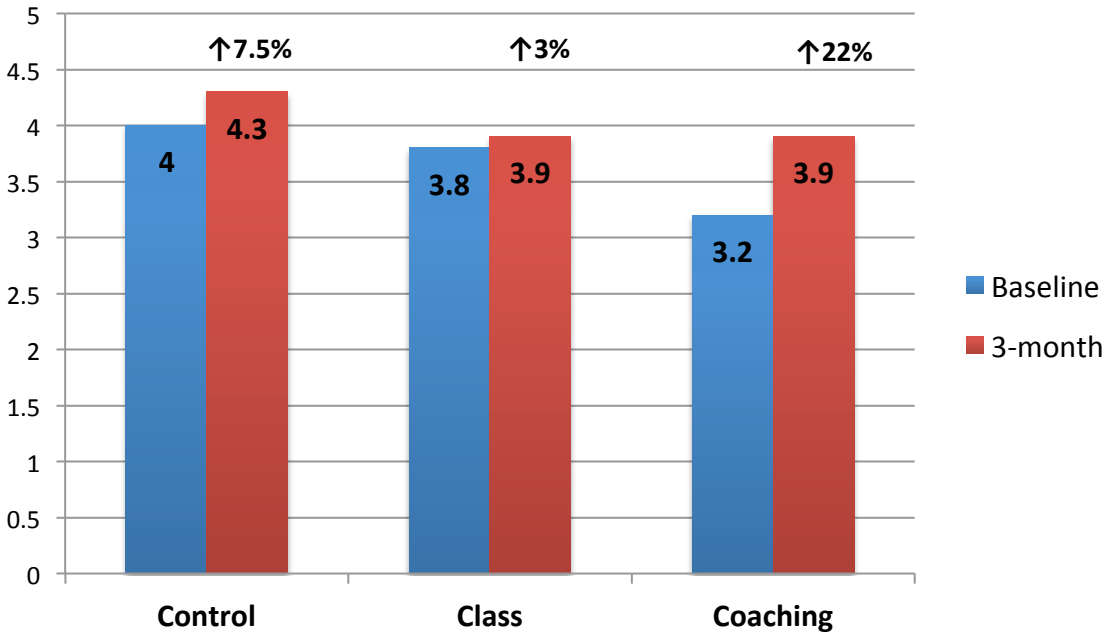


Figure 9. Percent change in diabetes empowerment scores from baseline to 3-months

This analysis suggests that the coaching group positively impacted diabetes empowerment scales. However, an ANCOVA was used to determine the effect of the groups on psychosocial measures after controlling for pre-intervention psychosocial measures (see Table 9). After holding constant the pre-intervention scores, there was not a statistically significant difference in post-intervention diabetes empowerment between the groups $F(2,23) = .456$, $p > .05$, partial $\eta 2 = .038$.

After controlling for multiple variables in a hierarchical regression analysis, it was noted that the principle explanatory variable for the diabetes self-efficacy at the end of the program was the diabetes self-efficacy that the participant had at baseline. A hierarchical regression analysis was performed to explore the unique contribution of variables such as demographics, social support, education, group intervention and baseline DSES on the 3-month scores for DSES. A five model hierarchical multiple regression was conducted with the 3-month DSES

score as the dependent variable. The hierarchical multiple regression revealed that none of the independent variables added were statistically significant, other than the last variable, baseline DSES. Baseline DSES scores accounted for 18% of the variation in the 3-month DSES scores ($p < .05$). Therefore, the most prominent explanation for the change in self-efficacy was the baseline. However, the full model was not statistically significant, $F(9,17) = 1.886$, $p > .05$). See Table 12 for full details on each regression model.

Table 12. *Hierarchical Multiple Regression for Diabetes Self-Efficacy Scale Scores*

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	B	β	B	β	B	β	B	β	B	β
DSES[1], 3-month (constant)	159.0		171.5		192.1		233.7		88.2	
Ethnicity	10.3	.09	22.5	.20	27.9	.25	30.2	.27	6.2	.06
Age	-.13	-.02	-1.0	-.19	-1.04	-.19	-.95	-.17	-.60	-.11
Gender	22.0	.18	26.2	.21	23.7	.19	25.9	.21	14.6	.12
Marital status			14.7	.34	16.5	.40	14.1	.34	15.1	.37
# in household			-16.6	-.21	-21.7	-.28	-27.6	-.35	-13.4	-.17
Previous DM education					-33.7	-.31	-37.3	-.34	-8.2	-.07
Education					5.7	.13	4.1	.09	1.6	.04
Intervention group							-11.7	-.18	-1.1	-.02
DSES[1], baseline									.5*	.5*
R^2	.035		.197		.298		.321		.500	
F	.276		1.028		1.150		1.063		1.886	
ΔR^2	.035		.162		.101		.023		.179	
ΔF	.276		2.116		1.366		.616		6.074	

Note: B = unstandardized regression coefficient, β = standardized coefficient
[1]Diabetes Self-Efficacy Scale
*$p < .05$

Other Relationships in the Study Framework

A Pearson's product-moment correlation was used to assess the relationship between the 3-month survey scores and HbA1c (see Table 13). Preliminary analyses showed the relationship to be linear with variables normally distributed, as assessed by Shaprio-Wilk test ($p > .05$), and there were no outliers. In the coaching group, there was a strong positive correlation between DSES scores and DES-SF scores, $r(10) = .693$, $p = <.05$, and between DSMS scores and DSES scores, $r(10) = .780$, $p = <.01$. These relationships are not surprising, since both DSES and DES-SF measure diabetes self-efficacy, and since the wording of test questions in DSMS and DSES surveys are similar. In the class group, there was also a strong positive correlation between DSES scores and DES-SF scores, $r(8) = .757$, $p = <.05$, and between DSMS scores and DSES scores, $r(8) = .809$, $p = <.01$. Also noted in the class group was a strong positive correlation between DSMS scores and DES-SF scores, $r(8) = .800$, $p = <.01$. It is understandable that diabetes self-management would be higher if one's diabetes empowerment was high. In the control group, there was a strong negative correlation between DSMS scores and HbA1c, $r(3) = .971$, $p = <.01$. This relationship supports previous research that links poor diabetes self-management with poor glycemic control (high HbA1c).

Table 13. *Pearson Correlations for Post-test Measures of Main Study Variables*

		HbA1c_log10[1]	SDKS[2]	DES-SF[3]	DSES[4]	DSMS[5]
Coaching group	**HbA1c_log10[1]**	1	.119	-.288	-.163	.069
	(*n*)	(11)	(9)	(11)	(11)	(11)
	SDKS[2]	.119	1	.192	.204	.049
	(*n*)	(9)	(10)	(10)	(10)	(10)
	DES-SF[3]	-.288	.192	1	.693*	.370
	(*n*)	(11)	(10)	(12)	(12)	(12)
	DSES[4]	-.163	.204	**.693***	1	.780**
	(*n*)	(11)	(10)	(12)	(12)	(12)
	DSMS[5]	.069	.049	.370	**.780****	1
	(*n*)	(11)	(10)	(12)	(12)	(12)
Class group	**HbA1c_log10[1]**	1	-.147	-.008	-.250	.092
	(*n*)	(10)	(9)	(10)	(10)	(10)
	SDKS[2]	-.147	1	-.137	.450	.040
	(*n*)	(9)	(9)	(9)	(9)	(9)
	DES-SF[3]	-.008	-.137	1	rr	.800**
	(*n*)	(10)	(9)	(10)	(10)	(10)
	DSES[4]	-.250	.450	**.757***	1	.809**
	(*n*)	(10)	(9)	(10)	(10)	(10)
	DSMS[5]	.092	.040	**.800****	**.809****	1
	(*n*)	(10)	(9)	(10)	(10)	(10)
Control group	**HbA1c_log10[1]**	1	.124	.728	-.254	-.971**
	(*n*)	(7)	(5)	(6)	(6)	(5)
	SDKS[2]	.124	1	.320	-.068	-.680
	(*n*)	(5)	(6)	(6)	(6)	(5)
	DES-SF[3]	.728	.320	1	.237	-.117
	(*n*)	(6)	(6)	(7)	(7)	(6)
	DSES[4]	-.254	-.068	.237	1	.537
	(*n*)	(6)	(6)	(7)	(7)	(6)
	DSMS[5]	**-.971****	.680	-.117	.537	1
	(*n*)	(5)	(5)	(6)	(6)	(6)

Note: Pairwise option used for treatment of missing values.
[1]HbA1c_log10 = Hemoglobin A1c, transformed due to abnormal distribution; [2]Simplified Diabetes Knowledge Scale; [3]Diabetes Empowerment Scale—Short Form; [4]Diabetes Self-Efficacy Scale; [5]Diabetes Self-Management Scale
* = statistically significant at $p < .05$ level; ** = statistically significant at $p < .01$ level.

Coaching Group Evaluation

The group coaching program was evaluated with an evaluation form designed by the researcher (see Appendix L). Eight (66.7%) of the participants in the coaching group completed the evaluation form. Overall, the participants rated various aspects of the coaching program very satisfactorily, with mean scores of 3.1 or higher (see Table 14). The highest positive responses (mean 4.6) were given for the book, handouts, and blood glucose testing supplies provided during the program.

Table 14. *Coaching Group Evaluations (n = 8)*

Variable	Mean ± SD
1. The number of sessions. (1=too few, 5=too many)	3.1 ± 1.55
2. The length of each session. (1=too short, 5=too long)	3.1 ± .83
3. The group interaction. (1=too little, 5=too much)	3.3 ± 1.28
4. Creating my personal action steps. (1=not helpful, 5=helpful)	3.9 ± .99
5. The recipes and food tasting. (1=not helpful, 5=helpful)	4.3 ± 1.04
6. The *Full Plate Diet* book. (1=not helpful, 5=helpful)	4.5 ± .93
7. The pedometer. (1=not helpful, 5=helpful)	3.6 ± 1.41
8. The blood sugar testing supplies. (1=not helpful, 5=helpful)	4.6 ± .74
9. The binder and handouts. (1=not helpful, 5=helpful)	4.6 ± .74

Narrative responses were also positive, and add a qualitative-like aspect to the study. In response to the question "what did you like *most* about the coaching program," five participants (63%) emphasized the group interaction and feedback from others. One commented that the group interaction "helped me a lot;" another that "I liked the interaction between the other clients in the program and the staff;" and another that "the ability to discuss problems associated with diabetes, and find different ways to deal with those issues" was helpful. Four participants (50%)

indicated that they most liked the teaching component in the group coaching program, and three (38%) specified food samples and/or recipes.

No problems were noted in the question about what participants liked *least* about the coaching program. Three participants (38%) wrote "nothing" or did not respond. Two participants (25%) mentioned components related to accountability (specifically, weigh-ins and keeping logs), but one countered the dislike with the comment that accountability was necessary. Another indicated that he or she would have liked "a little more time to discuss day-to-day issues with personal experiences in diabetes." This response is congruent with the participant responses to the first question that they most liked the group interaction.

Participants listed a wide range of behavior changes that they had made during the coaching program. Six participants (75%) indicated changes related to diet, such as trying new foods, organizing meal plans, using portion control, and making better food choices to control blood sugars. This may provide a possible explanation to the differences in body weight noted between groups. Two participants (25%) indicated that they were exercising more and a couple mentioned specific behavior change strategies, such as learning from mistakes and seeking support. One participant reported having stopped smoking during the program. Although smoking was not addressed directly, this participant had brought up the topic during the first session and had received encouragement and advice from several of the other group members. Since this behavior change was a result of the group dynamics rather than the content or coaching methodology, the response highlights the need for additional research on both the quantifiable and qualitative benefits of group coaching.

Also noted were the challenges that the participants faced in managing their diabetes. Six (75%) identified challenges in diabetes self-management behaviors (e.g., diet, exercise,

controlling snacks, and monitoring blood sugar levels). This is consistent with the research findings of no change in self-management scores. However, the fact that most had made changes related to diet indicates that they had moved into the action stage of change, a period characterized by a high degree of effort and strong urges to slip back into old behavior patterns (Prochaska, Norcross, & DiClemente, 2007). Three participants (38%) acknowledged financial challenges, although emphasis had been placed on economical food choices throughout the program. Interestingly, two participants (25%) admitted struggling with depression, which could affect self-efficacy.

Summary

Although the sample size in this study was small, demographic data revealed a fairly homogeneous group. Other than gender (the class group was entirely female), no significant differences in sociodemographic measures were noted between groups.

Two hypotheses were analyzed. Neither were supported. The APN-led lifestyle coaching group did not seem to make a difference in HbA1c, diabetes knowledge, diabetes empowerment, or diabetes self-management. However, there was borderline significance noted between groups for weight change. Post-hoc analysis revealed that the mean difference in weight change between the coaching group and the control group was statistically significant ($p = .047$). Furthermore, a hierarchical multiple regression revealed that almost 30% of the change in body weight can be attributed to the intervention. Although not statistically significant, it is also interesting to note that the coaching group had the least weight gain over the course of the study (.55 lbs ± 5.55).

Although a significant increase from baseline SDKS scores to the post-intervention SDKS scores was found in both the class group [$t(8) = 2.476$, $p < .05$] and the coaching group

[$t(9) = 5.192$, $p = .001$], after controlling for multiple variables, the principle explanatory variable was the baseline diabetes knowledge. A similar finding was noted in the baseline and post-intervention DSES scores.

Participants in the coaching group were asked to complete an evaluation of the diabetes lifestyle coaching program to evaluate their experience and the impact the coaching program had on their life. Overall, participants rated the program very satisfactorily, with mean scores of 3.1 or higher (out of 5). Narrative responses were also positive, with five participants (63%) indicating that the group interaction and support was what they liked most about the program. Six participants (75%) indicated that they had made changes related to diet as a result of attending the coaching group. In response to a question about challenges faced in managing their diabetes, three (38%) acknowledged financial challenges and two (25%) admitted struggling with depression.

Further discussion of these findings will be discussed in Chapter 5.

CHAPTER 5: DISCUSSION OF FINDINGS

This chapter presents a summary of the research study. Characteristics of the research sample are described. Research findings as they relate to the research question and hypotheses are considered in light of other current research, followed by a discussion of the implications of these findings. Limitations of the research study are acknowledged, as well as measures to address these limitations in future research. Finally, recommendations for practice improvement of diabetes care and DSME at the Volunteers in Medicine clinic are presented, followed by recommendations for future research.

Research Summary

Previous studies focused on the effect of shared medical appointments, group diabetes education, and individual health coaching on diabetes self-care management or glycemic control. Each has been found to have a positive (albeit inconsistent) impact on diabetes outcomes such as HbA1c and diabetes self-efficacy. However, there has not been any research to date that directly assesses the effect of group coaching on diabetes outcomes.

This exploratory study involved use of a pretest posttest design to explore the effectiveness of an APN-led coaching group compared with that of a traditional diabetes education class and usual care on HbA1c, diabetes knowledge, diabetes empowerment, and diabetes self-management. The proposed diabetes lifestyle coaching model was utilized as a guiding framework for the coaching intervention.

The setting of this study was a primary care medical clinic in Chattanooga, Tennessee that provides medical services to residents of Hamilton County who have no access to health care. Thirty-four patients agreed to participate in the study and self-selected into the coaching group, the class group, or the control group. The coaching group received usual care plus

participation in six 2-hour group coaching sessions over two months. The class group received usual care plus attended a single 90-minute educational presentation covering basic information for managing diabetes. The control group received usual diabetes care at the clinic.

Data collection consisted of baseline HbA1c, body weight, and other clinical indices, along with four psychosocial surveys and a tool to collect demographic data developed for this study. The coaching group also completed a survey to evaluate their experience in the coaching program. Data were analyzed and hypotheses evaluated. The results did not demonstrate significant differences between the groups. Of interest, however, was the observation that the coaching group had the least weight gain over the course of the study, even after adjusting for age, medication changes, and years with diabetes. Also noteworthy were the positive group experiences and health behavior changes noted on the post-program evaluations completed by the coaching group members.

Characteristics of the Sample

The participants in the study were Caucasian whites and African American, 65% and 35%, respectively. The ethnic make-up of the sample is similar to that of the county served by Volunteers in Medicine (VIM). The United States Census Bureau reported that in 2012 non-Hispanic white and Black or African American composed the majority of the population in Hamilton County, about 75.7% and 20.1% respectively (http://www.census.gov). Hispanic or Latino make up another 4.8%. The slight difference in the ratio of Caucasians and African Americans between the study sample and the Hamilton County population can be attributed to the fact that the patient base at VIM includes very few Hispanics. This is most likely due to a lack of Spanish-speaking providers and interpreters at the clinic.

Discussion of the Findings

The literature review revealed a lack of research studies that directly assessed the effect of group coaching on diabetes outcomes. However, the literature does offer an explanation for some of the findings in this research study.

Research Question

The research question addressed by this study was as follows: (P) In a sample of patients with uncontrolled diabetes at the Volunteers in Medicine clinic in Chattanooga, Tennessee, (I) what effect would a group lifestyle coaching model, (C) compared to participation in a single 90-minute diabetes education class or usual care, (O) have on glycemic control and three psychosocial constructs: knowledge of diabetes, diabetes empowerment (or self-efficacy), and diabetes self-management? Although the research did not show a significant effect, a number of interesting observations were noted. Following are some explanations for the lack of effect, as well as additional discussion related to the trend toward greater weight loss and the positive evaluation comments by the coaching group.

Explanations for lack of effect. A useful strategy when coaching lifestyle change is to help an individual reframe "failures" as learning opportunities that can be useful in moving toward a goal. The premise is that plans that don't work generate as much new knowledge as plans that succeed. Likewise, the lack of effect in this research study provides an opportunity to take a closer look at factors that may have contributed to this outcome, such as sample size, intervention dose, attrition, and barriers. Specific limitations of the research study will be discussed later in this chapter.

Sample size. It is commonly recognized that a small sample size can lead to a type 2 error, failing to observe a difference when in truth there is one. The overall sample size of this

study, as well as the number of participants in each group, was too small to give a reliable result. In addition, nonparametric tests, such as the Kruskal-Wallis, have less power to detect a difference if there is one. However, nonparametric tests were necessary because the data violated several assumptions.

Dose. A factor in the coaching group intervention that may explain the lack of effect is the number and frequency of coaching sessions provided. Attendance at the coaching group sessions was inconsistent, with the no-show rate being high at the last session. Eleven participants attended the first session, compared with four at the last. Only three participants attended all six coaching sessions; four participants attended five sessions; two participants attended four sessions; one participant attended two sessions; and three participants only attended the first session. Since participants of the coaching group who only attended one or two sessions were included in the analysis if they completed post-test surveys and blood work, this may have contributed to the lack of effect. Furthermore, two months of participation in group coaching may not be enough to influence sustained lifestyle change or changes in HbA1c, especially if participants were slow to make lifestyle changes or met with failed initial attempts.

Attrition. The higher attrition in the control group was interesting, as even the promise of the incentive did not motivate participants to return to the clinic for post-surveys and blood work. However, this challenge was also noted in a study of telephone coaching in 201 low-income patients with poorly controlled type 2 diabetes. Researchers experienced almost three times as many participants not completing the follow-up assessments in the control condition (Frosch, Uy, Ochoa, & Mangione, 2011).

Barriers. Another consideration for the lack of effect are the barriers experienced by this population in accessing health care (e.g., lack of transportation) and in non-adherence to

treatment plans. Martin, Haskard-Zolnierek, and DiMatteo (2010) list six reasons for non-adherence, including:

- poor two-way communication of information;
- a therapeutic relationship that "needs work;"
- a patient who does not believe in the treatment, and has a negative attitude towards it;
- a system in which the patient's cultural norms and social network do not support the regimen;
- lack of commitment to adherence; and
- practical barriers that stand in the way.

At least two of these reasons were observed in the coaching group. First, despite research cited and success stories shared, longtime diabetics had difficulty believing that any lifestyle change would make a difference. In addition, practical barriers such as lack of family support, transportation, money for food, and a broken stove were brought up in group discussions. In their review of barriers to self-management of diabetes, Ahola and Groop (2013) state that "individuals hold various intrinsic health beliefs that directly influence their attitudes towards health and health-related behaviours, influencing their motivation to act' (p. 415). They noted that of the four dimensions of the health belief model (perceived barriers, perceived susceptibility, perceived benefits, and perceived severity), perceived barriers best explained health behaviors.

Trend toward greater weight loss. Although there were no statistically significant differences between the groups in the variables measured at three months, it is important to note that the intervention group did explain 30% of the change in weight and that the coaching group had the least weight gain over the course of the study. The trend toward greater weight loss in

the coaching group is supported by a pilot randomized trial by Whittemore et al. (2009), in which they modified the Diabetes Prevention Program for implementation in the primary care setting by nurse practitioners. The program consisted of six in-person sessions and five phone sessions delivered over approximately six months. Content included: (a) education on nutrition, exercise, and type 2 diabetes prevention that included culturally relevant recipes and handouts; (b) behavioral support for identifying lifestyle change strategies and problem solving barriers to change; and (c) motivational interviewing. Lifestyle participants demonstrated a trend toward greater weight loss (p = .08) and improved exercise behavior (p = .08), compared to an enhanced standard care group. They found that 25% of the lifestyle participants met weight loss goals compared to 11% of those receiving standard care.

Although it remains unclear what accounted for the trend toward greater weight loss in the coaching group, one feature of the coaching group intervention that may explain this finding is the emphasis on a whole-food plant-based diet, compared with an ADA diet in the class group and no specific or consistent diet instruction provided to the control group. Barnard et al. (2006) and Bernard et al. (2009) conducted a randomized controlled trial of a low-fat plant-based diet with exercise held constant, compared with a diet based on current ADA guidelines. They noted greater improvements in HbA1c, plasma lipids, and body weight in the group eating the low-fat plant-based diet, even after controlling for medication changes.

Group coaching evaluation. The coaching group evaluation was provided to participants when they returned for their three-month HbA1c and completion of post-surveys. It might have been more useful to provide this tool immediately following the last coaching session. In addition, the form did not solicit any information about how participants felt that the group coaching had increased their diabetes knowledge, diabetes empowerment, or diabetes self-

management, which would have better complimented the diabetes lifestyle coaching model and helped in drawing conclusions about research findings. Nevertheless, 75% of coaching group participants indicated making positive lifestyle changes as a result of their experience in the coaching group. As noted previously, a longer intervention might have resulted in more significant differences in HbA1c and other outcomes between the groups.

The qualitative aspect of the program evaluations highlighted the positive responses to the group coaching format. This is supported by Van der Ven's review of group interventions for diabetes care (Van der Ven, 2003). She noted that the experience of being understood by others and exchanging help with other group members provides a richer learning environment for recognizing inadequate interpersonal patterns and skills. Her conclusion was that psychosocial interventions offered in a group format are a promising addition to diabetes care and education.

The incidental finding of self-reported depression in the coaching group is consistent with research by Ali, Stone, Peters, Davies, and Khunti (2006) that found the prevalence of depression and depressive symptoms increased twofold in type 2 diabetics compared with the general population (17.6% vs. 9.8%, OR = 1.6, 95%, CI 1.2 - 2.0). Depression may have contributed to the lack of effect in diabetes self-efficacy for this study. This has been documented in Gharaibeh's work using path-analysis techniques to examine the relationships between depression and diabetes self-efficacy (Gharaibeh, 2012). He noted a negative relationship between depression and diabetes self-efficacy (B = -1.43; $p < .01$; $r2$=.18). Lower self-efficacy would make lifestyle change efforts more difficult, as observed by Lin et al. (2004), who found a negative association between depression and physical activity, healthy diet, and adherence to medications.

Research Hypotheses

HbA1c. The primary outcome for this study was changes in glycemic control from baseline to three months. The research failed to support the hypothesis that an APN-led lifestyle coaching group will improve HbA1c. Even after adjustment for baseline HbA1c using ANCOVA, there was not a statistically significant difference in 3-month HbA1c values between the groups, $F(2,24) = .226$, $p > .05$, partial $\eta 2 = .018$.

Conversely, the COACH Study, which was delivered by an APN to a medically underserved population and included tailored educational and behavioral counseling for lifestyle modification, showed greater improvement in HbA1c in the intervention group (Allen et al., 2011). A key difference from this study, however, is the length (or dose) of the intervention. The COACH Study was conducted over 12 months, compared with only two months for the coaching intervention in this study. The positive outcomes associated with a longer intervention is also documented by Steinsbekk, Rygg, Lisulo, Rise, and Fretheim (2012), who found that diabetes self-management programs have been associated with improvements in self-management skills and self-efficacy at 6 months, improvements in body weight at 12 months, and improvements in HbA1c and diabetes knowledge at 2 years. This suggests that DSME is time dependent and that clinicians may need to invest in a longer process to provide ongoing support to their patients.

According to the ADA Standards of Medical Care (2014), modest weight loss (4 to 18 lbs) in individuals with type 2 diabetes has been shown to improve HbA1c at one year. Since this research study showed a trend toward greater weight loss in the coaching group at three months, a longer intervention may result in greater improvements in body weight, which would ultimately lead to lower HbA1c levels.

Diabetes knowledge, empowerment, and self-management. The second hypothesis, "An APN-led lifestyle coaching group will improve diabetes knowledge, diabetes empowerment, and diabetes self-management," was also not supported by this research. There was no statistically significant difference observed *between* groups for any of the psychosocial indices, and the principle explanatory variable for the difference noted *within* groups for diabetes knowledge and diabetes empowerment was the knowledge and empowerment that the participant had at baseline. Sample size could certainly be a factor. In addition, the number and length of the surveys may have skewed the data. For example, the DSES and DSMS each consisted of 60 questions. This increases probability of premature termination and random responding, which results in data of lower quality. "Straight-line responding" (using an identical response category for all items) was observed on both of these surveys. Herzog and Bachman (1981) note that this is common when questionnaires consist of long sets of items using identical response scales. This response pattern may be due to a decline in motivation when the survey process extends beyond what the participant anticipates.

Additional Discussion

In this research, participants of the coaching group who only attended one or two sessions were included in the analysis if they completed post-test surveys and blood work. This may have skewed results. Also, after running the data analysis, it was discovered that the participant in the class group who also attended the coaching group had not been recoded as a coaching group participant as intended. Since a single person can have a significant effect on analyses done in a small sample size, the data for the HbA1c and weight variables was re-analyzed with the participant recoded as a coaching group participant and also with the participant eliminated altogether. There was no significant difference from the data analysis discussed in Chapter 4.

Implications

Implications of this study are important for nurse practitioners who seek solutions for providing more effective diabetes care and fostering better diabetes self-management in their patients. Most primary care settings do not have the time, staff, budget, or resources for spending lengthy one-on-one time with diabetic patients. The diabetes lifestyle coaching model, however, offers a promising alternative that is worth additional exploration.

In a cross-sectional study of Chinese adults with type 2 diabetes, Gao et al. (2013) researched the effectiveness of an information-motivation-behavioral skills model for self-care in diabetes. They found that provider-patient communication ($\beta = 0.12$, $p = .037$), social support ($\beta = 0.19$, $p = .007$), and self-efficacy ($\beta = 0.41$, $p < .001$) were independent, direct predictors of diabetes self-care behavior. This supports the continued use and testing of models like the diabetes lifestyle coaching model that include strategies to enhance the diabetic patient's knowledge, motivation, and behavioral skills in order to foster lifestyle change and improved glycemic control.

Additionally, studies such as the Diabetes Prevention Program (Whittemore et al., 2009) and the COACH Study (Allen et al., 2011) provide evidence that a comprehensive lifestyle approach can result in improvements in patient-provider communication, treatment adherence, and diabetes outcomes. Although the current study only addressed educational, motivational, and behavioral components for lifestyle change, it would not be difficult to incorporate pharmacologic management and screening recommendations into the protocol. This package of evidence-based strategies to address glycemic control in diabetic patients would have tremendous potential for reducing the complications and impact of type 2 diabetes in many practice settings.

Study Limitations

Several limitations were identified in this research project. Limitations were related to the study design, a convenience sample, final sample size, and study protocols.

Limitations of Study Design

Limitations of study design include the fact that the research was conducted on a nonrandomized sample in one small clinic. However, the design and setting were appropriate for an exploratory study. In addition, the study used a nurse practitioner trained in motivational interviewing techniques and coaching methodology and a diabetes educator experienced in conducting diabetes classes. Other limiting factors include curriculum, instrument selection, type of data collected, and longitudinal effects.

Curriculum. A potential limitation is that a different curriculum was used for DSME between the two intervention groups. The curriculum used for the class group was produced by Novo-Nordisk, while the curriculum used for the coaching group was the *Diabetes Conversation Map* developed by Merck. Each followed ADA guidelines for DSME, however. One notable difference in the discussion on diet, though, was the emphasis on the ADA diet in the class group and a low-fat plant-based diet in the coaching group. Both diets have evidence to support their use for diabetes care (Craig & Mangels, 2009).

Self-reported data. Although the instruments used for measuring diabetes knowledge, diabetes empowerment, diabetes self-efficacy and diabetes self-management were carefully chosen to best represent the concepts explored in this study, they are self-reported questionnaires. This may have affected the validity of the data by introducing a potential for bias due to poor memory, attribution, and exaggeration.

Instrument selection. As noted previously, two of the instruments (DSES and DSMS) had potential for being difficult to use due to their length. This increased the probability of premature termination and random responding, which may have resulted in data of lower quality.

Longitudinal effects. Mortality was a threat to the study, since there was a three-month timeframe between data collection points. Although participants were promised a $20 gift card for completing the study and reminder phone calls were made to encourage them to return to the clinic for the three-month blood work and surveys, there were still a high percentage of participants who did not return. On the other hand, the short duration of the coaching group has already been mentioned as a possible factor in failing to see a difference in HbA1c. Academic time constraints for the scholarly project limited the time available to explore the research question and to measure differences between groups.

Limitations of a Convenience Sample

A convenience sample was used in this study, which limits the generalizability of the study findings. The class and coaching groups were predominantly female, Caucasian, and low-income. This limits generalizations to other groups such as adolescents and children, higher socioeconomic levels, insured patients, other geographic areas, and Hispanic populations.

Self-selection was also a threat to this study, as participants were allowed to choose whether or not to participate and which group to join. Patients who chose to participate may have had differences in levels of diabetes knowledge, diabetes empowerment, or diabetes self-management than those who chose not to participate.

Limitations of Sample Size

Because of the small number of eligible diabetics in VIM's patient base (99) and the barriers experienced by an uninsured population, an adequate sample size was difficult to obtain.

In addition, the study was affected by high rates of attrition, particularly in the control group. As previously pointed out, an inadequate sample size may have limited the ability to detect statistically significant relationships between the variables, resulting in a type 2 error since no differences were found in the final analysis. In addition, in a sample this small, one individual (outlier) could have significantly impacted results. Furthermore, due to the small sample size, there was no assurance that it is a representative distribution of the population.

Limitations in Study Protocols

Finally, there were issues related to study protocols that may have affected the results. A mistake made while photocopying surveys contributed to missing data. A lab technician failed to send blood samples to the lab, necessitating the rescheduling of lab draws for some of the participants—one of whom did not return. Another drawback was the part-time work schedule of the researcher at the VIM clinic. Frequent written and oral communication between the researcher and clinic staff was not an adequate substitute for having a point person onsite who was intimately familiar with the study protocols. This left volunteers and overworked clinic staff to make decisions that negatively affected data collection. Lastly, the study timeframe fell over three holidays: Thanksgiving, Christmas, and New Year. This may have contributed to participant attrition and lack of positive results.

Measures to Address Limitations

The limitations identified in this study are useful for determining measures that can strengthen subsequent research designs. A larger sample size and randomization to groups would increase power, validity, and generalizability. Offering the coaching program during evening or weekend hours might enable those who work during the day to participate. Increasing the length of the study, the coaching intervention in particular, would allow better measurement

of variables that necessitate time for change (e.g., body weight and HbA1c)—although important considerations in lengthening the study are the increased research time, cost, and attrition. Another measure for strengthening the research design is that of selecting participant-friendly instruments, including a shorter tool for measuring diabetes self-management and dropping the DSES altogether in favor of the eight-question DES-SF. Identifying a point person at the research site would provide better decision-making and consistency in data collection. Finally, telephone follow-ups between visits and pre-session reminder calls could contribute to better participation, decreased attrition, and improved process measures for both research and practice. This is important because loss to follow-up is associated with an increased risk of diabetic complications (Renders et al., 2001).

Recommendations for Diabetes Care at VIM

VIM's strategic plan includes providing high quality, professional health care services to the poor. Managing diabetic patients who are uninsured brings a number of unique challenges to diabetes care, as often these patients ignore chronic conditions, miss appointments, and fail to perform self-management behaviors due to lack of resources. An ongoing comprehensive program for fostering better diabetes knowledge, diabetes empowerment, and diabetes self-management is paramount for helping them to achieve glycemic control and prevent costly complications of diabetes—as well as responsibly managing the funds entrusted to VIM for carrying out their mission.

One recommendation for an ongoing program is to continue the partnership with Novo-Nordisk for quarterly *Diabetes Academy* education classes and require every diabetic patient to attend. This would provide them with the foundational information needed for *what* to change to better manage their diabetes. The next stage of their diabetes care could be participation in an

APN-led *Defeating Diabetes* coaching group to assist patients in exploring *why* they would want to change (motivation) and *how* to make the necessary modifications to their lifestyle (strategy). There should be experimentation in order to determine the most effective "dose" of coaching (length, frequency, and number of sessions). A volunteer could be assigned to each session to make reminder phone calls, assist with vital signs and food samples, and provide a supportive role. As the APN becomes more familiar with the perceived barriers and challenges of the patients, topics can be tailored to address these limitations. In addition to the diabetes lifestyle coaching model, protocol could be developed for the APN to address pharmacologic management and ADA standards of diabetes care immediately before, after, or during the group coaching sessions. The group coaching sessions could then be documented in the EMR as a patient encounter, utilizing a template for diabetic patients that includes their individualized goals and action steps, in order to provide better continuity of care when patients see other providers. VIM could also offer monthly "booster" sessions for *Defeating Diabetes* alumni to attend.

Additional ideas to be explored include:

- partnering with Southern Adventist University to provide nurse practitioner students or BSN community health students to assist with the coaching groups;
- expanding the curriculum to cover obesity prevention and weight loss strategies;
- encouraging patients to identify a support person to attend each coaching session with them;
- training volunteers and patients to be coaches. In low-income and minority populations, community health workers and peer leaders have both resulted in improvements in HbA1c (Ghorob et al., 2011; Tang et al., 2014);

- assigning coaching group members to bring food samples, so that they begin experimenting with recipes and exchanging ideas for healthy cooking; and
- conducting focus groups with patients to identify reasons for non-adherence to appointments and self-management regimens.

The comments of research participants regarding depression should not be over looked. Depression is not surprising among people who face poverty and/or chronic disease. Depression in diabetes has been associated with lower self-efficacy and poor glycemic control, which will result in higher health care costs (Gharaibeh, 2012). Providers at VIM should identify a validated tool for screening for depression and address this comorbidity as part of their protocol for diabetes care.

In working with underserved populations, it is vital to partner with other community organizations and resources. VIM is on the receiving end of tremendous community support. However, it might better serve their overall strategic plan to identify ways in which VIM health care providers can become involved in giving to the community outside of the clinic walls, such as participating in community health fairs, offering flu shot clinics, and involvement with other health promotion activities. Since partnership with many faith communities already exists, diabetes coaching groups (without pharmacologic management) and other health education programs could be offered at area churches. This could extend the impact of the clinic, essentially creating health centers in the community to offer convenient programs that foster the motivation, education, accountability, and supportive environment that disadvantaged people need to embrace a healthier lifestyle.

Recommendations for Future Research

This research project was exploratory, so it is only possible to suggest areas for further investigation of group coaching for diabetes care in research and clinical practice. Future research with a larger sample size and randomization to groups would be beneficial for a more powerful analysis of the data. This may require multiple APN-led groups at additional clinics in the Chattanooga area that serve uninsured populations. Other design changes to consider include the measures identified earlier for addressing the limitations noted in the study. A longer intervention period has also been suggested. In addition, since changes in lifestyle behaviors were noted on the coaching evaluations, future research could include an assessment of lifestyle behaviors as measured by tools such as the Stanford 7-day Physical Activity Recall or a habits and history food frequency questionnaire.

Another suggestion for future research is to use the 1,5-Anhydroglucitol blood test (1,5-AG) as an outcome for the coaching group. The test most often used to measure glycemic control is the HbA1c, which provides a picture of glucose levels for the preceding two or three months. The newer 1,5-AG test, on the other hand, is a two-week measure of average daily maximum blood glucose and may help motivate participants to adhere to diet and lifestyle changes by seeing results sooner (McGill et al., 2004).

A mixed methods research design could be used to gather phenomenological data about how participants feel that the group coaching increased their diabetes knowledge, self-efficacy, and self-management. This could allow for investigation into the experience of group coaching from the perspective of the participant and help to draw conclusions about the usefulness of the diabetes lifestyle coaching model. Further analyses could also evaluate the cost-effectiveness of the model in clinical practice. Decision makers in primary care settings are not only interested in

the efficacy of new approaches for diabetes care, but also their ability to provide effective care at a reasonable cost to the practice.

Conclusion

Type 2 diabetes is a lifestyle-related disease that impacts a large number of the U.S. population and is associated with higher mortality, morbidity, and health care costs. Recognizing that glycemic control is a key target for managing diabetes and reducing risks for complications, the ADA (2014) guidelines for diabetes care state that any diabetes management plan should recognize DSME as an essential component of care.

The literature cites several approaches for providing DSME in clinical practice. Both health coaching and group-based approaches have been found to be effective and practical solutions for busy health care providers. This research study fills a gap in the literature by exploring the effectiveness of a group coaching model on glycemic control and several psychosocial constructs. The findings of the study suggest a number of opportunities for future research and add to the body of knowledge for practitioners to design DSME interventions that are effective in improving knowledge, behavior, and metabolic control outcomes among patients with type 2 diabetes.

POSTFACE

As a byproduct of this research project, an article was accepted for publication in the July-August 2014 issue of *Vibrant Life* (www.vibrantlife.com), a bimonthly, peer-reviewed lifestyle magazine that promotes physical health, mental clarity, and spiritual balance from a practical, Christian perspective (see Appendix M). It shares the information-motivation-strategy keys for lifestyle change as experienced by four (unnamed) participants in the diabetes coaching group.

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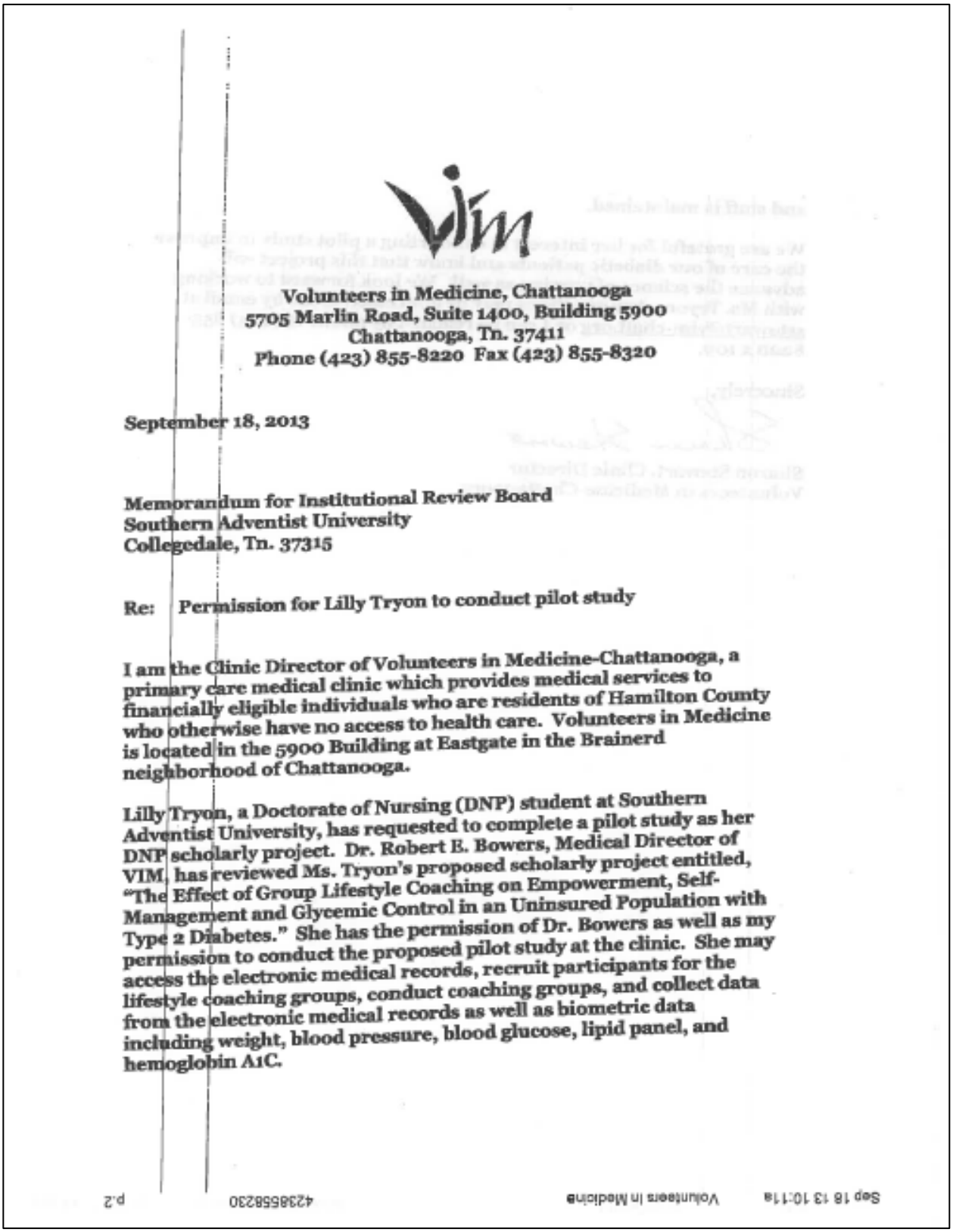
Appendix A. Site Authorization Letter



Volunteers in Medicine, Chattanooga
5705 Marlin Road, Suite 1400, Building 5900
Chattanooga, Tn. 37411
Phone (423) 855-8220 Fax (423) 855-8320

September 18, 2013

Memorandum for Institutional Review Board
Southern Adventist University
Collegedale, Tn. 37315

Re: Permission for Lilly Tryon to conduct pilot study

I am the Clinic Director of Volunteers in Medicine-Chattanooga, a primary care medical clinic which provides medical services to financially eligible individuals who are residents of Hamilton County who otherwise have no access to health care. Volunteers in Medicine is located in the 5900 Building at Eastgate in the Brainerd neighborhood of Chattanooga.

Lilly Tryon, a Doctorate of Nursing (DNP) student at Southern Adventist University, has requested to complete a pilot study as her DNP scholarly project. Dr. Robert E. Bowers, Medical Director of VIM, has reviewed Ms. Tryon's proposed scholarly project entitled, "The Effect of Group Lifestyle Coaching on Empowerment, Self-Management and Glycemic Control in an Uninsured Population with Type 2 Diabetes." She has the permission of Dr. Bowers as well as my permission to conduct the proposed pilot study at the clinic. She may access the electronic medical records, recruit participants for the lifestyle coaching groups, conduct coaching groups, and collect data from the electronic medical records as well as biometric data including weight, blood pressure, blood glucose, lipid panel, and hemoglobin A1C.

Sep 18 13 10:11a Volunteers In Medicine 4238558230 p.2

and staff is maintained.

We are grateful for her interest in conducting a pilot study to improve the care of our diabetic patients and know that this project will advance the science of nursing as well. We look forward to working with Ms. Tryon. Any questions may be addressed to me by email at sstewart@vim-chatt.org or I can be reached by phone at (423) 855-8220 x 109.

Sincerely,

Sharon Stewart

Sharon Stewart, Clinic Director
Volunteers in Medicine-Chattanooga

Appendix B. Research Study Participant Recruitment Phone Script

VIM Diabetes Education Study
Participant Recruitment Telephone Script

Good morning/afternoon/evening Mr./Ms._____

My name is Enesa Kanjesic and I am a family nurse practitioner student at Southern Adventist University. I am working with Lilly Tryon, one of the nurse practitioners at Volunteers in Medicine clinic.

The reason I am calling is to invite you to be part of a diabetes research study that we are conducting at the clinic. The purpose of the study is to see how well different options for diabetes education prepare you to manage your blood sugar.

You are being asked to be in this study because you are a current patient at Volunteers in Medicine, with a diagnosis of diabetes and a recent Hemoglobin A1C level at or above 7.0 mg/dl.

Would you like to hear more about the study?

If NO:
Well, thank you for your time, and I hope you have a great day!

If YES:
Each person that joins the study will be asked to choose a diabetes education option (which I will review in just a minute). In addition, you will sign a consent form and be scheduled for fasting labs (blood sugar, blood lipids, and hemoglobin A1c, unless done within the past two weeks). You will also be asked to complete four surveys about how well you understand and manage your diabetes. It should take no more than 30 minutes to complete the surveys.

There are three diabetes education options from which you can choose to participate.

1. Attend a single 90-minute *Diabetes Academy* class on Thursday, October 3 or on Thursday, November 7 from 2:00-3:30 pm, **OR**
2. Join a *Defeating Diabetes* lifestyle coaching group that will meet for six sessions on Friday mornings November 1 to December 20. The coaching group will focus on teaching you practical skills for managing your diabetes and helping you set and achieve personalized health goals, **OR**
3. Not attend a diabetes education event, but schedule a regular follow-up appointment with one of the VIM providers during October - December to review your diabetes.

The fasting labs and surveys will then be repeated in three months.

There's no cost to join the study.

The benefits for joining the study include:

- Learning about your diabetes and how to better manage your blood sugars.
- Earning a $20 gift card by attending the diabetes education of your choice and completing all pre/post lab tests and surveys.
- In addition, if you attend the *Diabetes Academy* class or the *Defeating Diabetes* lifestyle coaching group you will receive free educational materials. (Those attending the diabetes class will receive handouts. The coaching group will receive handouts, blood sugar testing strips, pedometer, and book).

Does this sound like something that would interest you?

If NO:
Well, thank you so much for your time, and I hope you have a great day!

If YES:
Great! Before I continue, do you have any questions about what I have shared so far? (Provide answers)

Ok. I need to share just a few more details about the research study with you:

- First, your information will be kept completely private and in a locked file cabinet. Your name will not be used in any public (oral or written) way from this research.

- The risk in this study is very small.
    - You may feel that some survey questions or group discussions are stressful. You do not have to answer anything you do not want to.
    - The risks of having your blood drawn are slight but may include: excessive bleeding; fainting or feeling light-headed; hematoma (blood accumulating under the skin); or infection (a slight risk any time the skin is broken).
    - If you begin to practice what you learn about managing your diabetes, there is a risk of low blood sugar reactions as your body makes adjustments to your lifestyle changes. This can be avoided by monitoring your blood sugars and calling the clinic to speak with a health care provider about changing the dose of your diabetes medications.

- It is your choice to be part of the study or not to be part. Your participation is voluntary. You may decide to not take part or to stop the study at any time. If you choose not to take part in this study, you will still receive the same clinic care. There is no penalty for not being part of the study.

- The Diabetes Lifestyle Coaching Study is to support, not substitute, the care provided by your health care provider.

Do you have any questions? (Provide answers)

Would you like to join this research study?

If NO:
Well, thank you so much for your time, and I hope you have a great day!

If YES:
Great! Which diabetes education option would you like for me to put you down for?

(Schedule appointment to sign consent form, have blood work done, and complete the surveys).

If you have any additional questions, please don't hesitate to contact the clinic.

Have a great day!

Goodbye.

Appendix C. *Defeating Diabetes* Coaching Group Flyer

DEFEATING DIABETES

WHAT?

A six-session diabetes lifestyle coaching group to give you motivation, knowledge and strategies needed to successfully manage your diabetes

WHEN?

9am-11pm or 12pm – 2pm
November 1, 8, 15, 22 &
December 6, 20

WHERE?

VIM Conference Room

FEATURING Wholistic Approach · Healthy Food Tasting
Glucose Monitoring Supplies · Pedometer · Cookbook

JOIN A COACHING GROUP TODAY!

WHO CAN JOIN

VIM patients who have diabetes and an A1C level greater than 7 (Group size is limited)

COST

There is no cost for taking part in this research study

WHAT'S INVOLVED

- Sign consent form
- Attend all of the diabetes coaching group sessions
- Do surveys and lab work at start and end of program for research study

BENEFITS

- Understand diabetes and key lifestyle strategies to defeat it
- Explore your personal motivation
- Identify your unique challenges
- Create a personalized diabetes wellness plan
- Set & achieve health goals
- Understand your medications
- Make easy, affordable, healthy (and tasty) meals
- Start an exercise program that fits your style and schedule
- Control your blood sugars
- Prevent complications
- Gain a valuable support network

Volunteers in Medicine
5705 Marlin Road
Chattanooga, TN 37411
423-855-8220

Appendix D. Human Subjects Committee Approval Letter

Southern Adventist University - IRB Committee - Research Approval

October 1, 2013

Research Project: The Effect of Group Lifestyle Coaching on Diabetes Self-Management, Glycemic Control and Cardiovascular Risk in an Uninsured Population with Type 2 Diabetes

IRB Tracking Number: 2013-0013

Dear Lilly,

Five Institutional Review Board Members have examined your research study and approved your application.

As this study was assigned a 2, on a scale of 0 – 5 for sensitivity, invasiveness and risk we are approving this on an expedited basis.

If there are minor changes to this research, before making those changes please notify us by completing and submitting Form B (Certification for Changes, Annual Review or Project Termination). Please submit applications to irb@southern.edu.

If substantial changes are planned, you as the investigator should submit a new IRB Application.

We look forward to reading your findings. Many blessings to you.

Always in His service,

Cynthia Gettys

Cynthia Gettys, Ph.D.
IRB Chair
Southern Adventist University
423-236-2285
cgettys@southern.edu

Southern Adventist University – IRB Committee – Research Approval

November 22, 2013

Research Project: The Effect of Group Lifestyle Coaching on Diabetes Self-Management, Glycemic Control and Cardiovascular Risk in an Uninsured Population with Type 2 Diabetes

IRB Tracking Number: 2013-2014-006

Dear LIllian,

It is a delight to inform you that four Institutional Review Board Members examined your research study proposal and supporting documents at the IRB committee and have voted to approve your research. We wish you the very best as you move forward with this study and look forward to reading your findings when they are ready.

If there are minor changes to this research, before making those changes please notify us by completing and submitting For B (Certification for Modification, Annual Review, or Project Termination/Completion). Please submit applications to irb@southern.edu. If substantial changes are planned you, as the principal investigator, should submit a new IRB application.

Many blessings to you as you move forward. Please let us know if there is anything else we can do to assist you with this research study.

Always in His service,

Cynthia

Cynthia Gettys, Ph.D.
IRB Chair
Southern Adventist University
423-236-2285
cgettys@southern.edu

"I applied my mind to **study** and to explore by wisdom all that is done under the heavens…" Ecclesiastes 2:13

"Research is to see what everybody else has seen and to think what nobody else has thought." Albert Szent-Gyorgyi

Appendix E. Research Study Consent Form

VIM Diabetes Study
Informed Consent Form

You are being invited to be part of a research study conducted by Lilly Tryon, a student at Southern Adventist University. Please read this form so that you know about this research study. The information in this form is provided to help you decide whether or not to take part. If you decide to take part in the study, you will be asked to sign this consent form. A copy of the signed consent form will be given to you.

What is the purpose of this research study?
The purpose of this study is to look at how well various approaches for diabetes education (provider visit, *Diabetes Academy* class, and diabetes group lifestyle coaching) prepare you to manage your blood sugar. By looking at these different approaches, we hope to learn ways we can improve and take better care of you and your diabetes in the future.

Why are you being asked to participate?
You are being asked to be in this study because you are a current patient at VIM with a diagnosis of diabetes and a recent Hemoglobin A1C level at or above 7.0 mg/dl.

How many people will be asked to participate in this study?
Up to 60 people will be invited to participate in the study.

What will happen during this study?
If you decide to be part of this study, you will sign this informed consent form. Then you will be scheduled for blood work (hemoglobin A1c). You will also be asked to complete some surveys about how yow you feel about how well you understand and manage your diabetes. It should take no more than 30 minutes to complete the surveys:

1. Simplified Diabetes Knowledge Scale
2. Diabetes Self-Efficacy Scale
3. Diabetes Empowerment Scale
4. Diabetes Self-Management Scale

You will not be putting your name on the surveys or any other forms except for this consent form. Only an ID number will be used on your surveys. Your information will be kept completely private. Your name will not be used in any public (oral or written) way from this research.

You will be asked to sign up to participate in ONE of the following diabetes education options (please circle):

1. A one-time 90-minute *Diabetes Academy* class on Thursday, October 3, from 2:00 – 3:30 pm OR Thursday, November 7 from 3:00 – 4:30 pm.
2. Meet with a *Defeating Diabetes* lifestyle coaching group from 9:00 am – 11:00 am OR 12:00 noon – 2:00 pm on the following Fridays: November 1, 8, 15, 22, and December 6 & 20. At each visit, your weight and blood pressure will be measured and your medications reviewed.
3. A usual follow-up visit with one of the health care providers at VIM during the next three months.

Approximately three months following your initial blood test, you will be scheduled for blood work to recheck your hemoglobin A1C levels. You will also complete the four surveys again.

Are there any risks to me?
The risk in this study is very small. You may feel that some survey questions or group discussions are stressful. You do not have to answer anything you do not want to. The risks of having your blood drawn are slight but may include: excessive bleeding; fainting or feeling light-headed; hematoma (blood accumulating under the skin); or infection (a slight risk any time the skin is broken). If you begin to practice what you learn about managing your diabetes, there is a risk of low blood sugar reactions as your body makes adjustments to your lifestyle changes. This can be avoided by monitoring your blood sugars and calling the clinic to speak with a health care provider about changing the dose of your diabetes medications. The Diabetes Coaching Study is to support, not substitute, the care provided by your health care provider.

Are there any benefits to me?
You may benefit from the study by learning about your diabetes and how to better manage your blood sugars. This may result in less medication and a reduction in your risk for diabetes complications. Your taking part in this study may also help other people living with diabetes to get better care. All eligible participants can earn a $20 gift card by attending the diabetes education of your choice and completing all pre/post lab tests and surveys. In addition, participants attending the *Diabetes Academy* class or the *Defeating Diabetes* lifestyle coaching group will receive the free materials given out at the sessions attended. You will not be paid to participate in this study.

Will there be any costs to me?
Aside from your time, there are no costs for taking part in the study.

Will the information that is obtained from me be kept confidential?
All study materials will be kept confidential. This consent form, completed surveys, and any other information about you will be stored in a locked file cabinet at the VIM clinic. All computer files will be protected with a password. If there are reports about this study, your name will not be in them.

May I change my mind about joining the study?
It is your choice to be part of the study or not to be part. Your participation is voluntary. You may decide to not take part or to stop the study at any time. If you choose not to take part in this study, you will still receive the same clinic care. There is no penalty for not being part of the study.

Who can I contact for additional information?
If you have any questions before starting the study or at any time during the study, please contact the Principal Investigator, Lilly Tryon, at 423-236-2154. You may also contact the Chair of the Human Participants in Research Committee at Southern Adventist University (423-236-2285) at any time.

STATEMENT OF CONSENT:

- I have read the above and understand the nature of this study.
- I agree to be a part of this study.
- I understand that I may refuse to take part or I may quit the study at any time without penalty.
- I understand that by taking part in this study I have not waived any legal or human rights.
- I understand that the Diabetes Education Study is to support, not substitute, the care provided by my health care provider.
- I may contact the Primary Investigator, Lilly Tryon, about any questions, complaints or concerns about the research at 423-236-2154.
- I understand that if I have any concerns about my treatment during this study or want to talk to someone other than the Investigator, I may contact the Chair of the Human Participants in Research Committee at Southern Adventist University (423-236-2285) at any time.
- A copy of this entire, signed consent form will be given to me.

_____ _____
Participant's Signature **Date**

I have carefully explained to the participant the nature of the above research study. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits and risks involved in his/her participation. Any questions raised have been answered to the participant's satisfaction.

_____ _____
Researcher (or Assistant) Signature **Date**

Appendix F. Research Instruments

ID_____

Date_____

DEMOGRAPHIC DATA/BACKGROUND INFORMATION

(Fill the blanks or make a check mark by choosing the best correct answer)

1. **What was your age on your last birthday?** _____ (in years)

2. **What is your gender**? _____ Male _____ Female

3. **What is your ethnic origin/race**?

   _____White or Caucasian

   _____Black or African American

   _____Hispanic or Latino

   _____American Indian or Alaska Native

   _____Asian

   _____Native Hawaiian or other Pacific Islander

   _____Other: Please specify _____

4. **What is your marital status?**

   _____Single, living alone

   _____Never married, but living with boyfriend or girlfriend

   _____Married

   _____Divorced/Separated

   _____Widowed

5. **How many people do you live with**?

   _____None _____1 to 3 _____4 to 5 _____More than 5

6. **How much schooling have you had (years of formal education completed)**? Check only the highest level achieved.

   _____Less than 4 years

   _____5 – 8 years (Elementary)

   _____Some High School Courses

   _____High School or GED

   _____Associate Degree

   _____Some College Courses

   _____College Degree

   _____Some Graduate Courses

   _____Master's Degree

   _____Doctoral Degree

7. **How long have you had diabetes**?

   _____ (in years) _____ (in months, if in years is not applicable)

8. **Have you ever attended diabetes class**? _____Yes _____No

   If you answered yes, how long ago did you attend the diabetes class?

   _____ (in years) _____ (in months, if in years is not applicable)

9. **What kind of medication do you take to control your diabetes**?

   _____ None

   _____ Pills only

   _____ Insulin Injections only

   _____ Pills and Insulin Injections

ID _____

Date _____

Revised Michigan Diabetes Knowledge Scale - True/False Version.

Here are 20 statements about diabetes, some are true statements and some are false. Please read each statement and then indicate whether you think it is true or false by putting a circle round either TRUE or FALSE. If you do not know the answer please put a circle around DON'T KNOW.

1. The diabetes diet is a healthy diet for most people	TRUE / FALSE / DON'T KNOW
2. Glycosylated haemoglobin (HbA1c) is a test that measures your average blood glucose level in the past week.	TRUE / FALSE / DON'T KNOW
3. A pound of chicken has more carbohydrate in it than a pound of potatoes.	TRUE / FALSE / DON'T KNOW
4. Orange juice has more fat in it than low fat milk.	TRUE / FALSE / DON'TKNOW
5. Urine testing and blood testing are both equally as good for testing the level of blood glucose.	TRUE / FALSE / DON'T KNOW
6. Unsweetened fruit juice raises blood glucose levels.	TRUE / FALSE / DON'T KNOW
7. A can of diet soft drink can be used for treating low blood glucose levels.	TRUE / FALSE / DON'T KNOW
8. Using olive oil in cooking can help lower the cholesterol in your blood.	TRUE / FALSE / DON'T KNOW
9. Exercising regularly can help reduce high blood pressure.	TRUE / FALSE / DON'T KNOW
10. For a person in good control, exercising has no effect on blood sugar levels.	TRUE / FALSE / DON'T KNOW

P.T.O.

Revised Michigan Knowledge Questionnaire – True/False Version, C.E.Lloyd, 12.12.08

11. Infection is likely to cause an increase in blood sugar levels.	TRUE / FALSE / DON'T KNOW
12. Wearing shoes a size bigger than usual helps prevent foot ulcers.	TRUE / FALSE / DON'T KNOW
13. Eating foods lower in fat decreases your risk for heart disease.	TRUE / FALSE / DON'T KNOW
14. Numbness and tingling may be symptoms of nerve disease.	TRUE / FALSE / DON'T KNOW
15. Lung problems are usually associated with having diabetes.	TRUE / FALSE / DON'T KNOW
16. When you are sick with the flu you should test for glucose more often.	TRUE / FALSE / DON'T KNOW

SKIP TO QUESTION 19 IF YOU DON'T TAKE INSULIN

17. High blood glucose levels may be caused by too much insulin.	TRUE / FALSE / DON'T KNOW
18. If you take your morning insulin but skip breakfast your blood glucose level will usually decrease.	TRUE / FALSE / DON'T KNOW
19. Having regular check-ups with your doctor can help spot the early signs of diabetes complications.	TRUE / FALSE / DON'T KNOW
20. Attending your diabetes appointments will stop you getting diabetes complications.	TRUE / FALSE / DON'T KNOW

THANK YOU FOR YOUR HELP!

Revised Michigan Knowledge Questionnaire – True/False Version, C.E.Lloyd, 12.12.08

ID_____

Date_____

University of Michigan Diabetes Research and Training Center
Diabetes Empowerment Scale-Short Form (DES-SF)

The 8 items below constitute the DES-SF. The scale is scored by averaging the scores of all completed items (Strongly Disagree =1, Strongly Agree = 5)

Check the box that gives the best answer for you. **In general, I believe that I:**

1. ...know what part(s) of taking care of my diabetes that I am **dissatisfied** with.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
2. …am able to turn my diabetes goals into a workable plan.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
3. ...can try out different ways of overcoming barriers to my diabetes goals.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
4. ...can find ways to feel better about **having** diabetes.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
5. ...know the positive ways I cope with diabetes-related stress.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
6. ...can ask for support for having and caring for my diabetes when I need it.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
7. ...know what helps me stay motivated to care for my diabetes.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree
8. ...know enough about myself as a person to make diabetes care choices that are right for me.	☐ 1 Strongly Disagree	☐ 2 Somewhat Disagree	☐ 3 Neutral	☐ 4 Somewhat Agree	☐ 5 Strongly Agree

ID_____

Date_____

DIABETES SELF-EFFICACY SCALE (DSES)

Circle the number that represents the extent to which you AGREE or DISAGREE with each statement listed below about your **confidence** (**think** or **believe**) in your capability to perform specific diabetes self-management activities. Use the following scale:

0 = STRONGLY DISAGREE **2 = SLIGHTLY DISAGREE** **4 = MODERATELY AGREE**
1 = MODERATELY DISAGREE **3 = SLIGHTLY AGREE** **5 = STRONGLY AGREE**

1. I think I can make the right food choices all the time.	0	1	2	3	4	5
2. I think I can eat at least three meals every day.	0	1	2	3	4	5
3. I think I can stay on my meal plan all the time.	0	1	2	3	4	5
4. I think I can stay on my meal plan even when I eat outside my home.	0	1	2	3	4	5
5. I think I can stay on my meal plan even when the people around me do not know I have diabetes.	0	1	2	3	4	5
6. I think I can stay on my meal plan even when I am at parties.	0	1	2	3	4	5
7. I think I can eat at least five servings of fruits and vegetables every day.	0	1	2	3	4	5
8. I think I can control my intake of carbohydrates all the time.	0	1	2	3	4	5
9. I think I can choose to eat foods that are lower in fats and cholesterol all the time.	0	1	2	3	4	5
10. I think I can eat foods high in fiber all the time.	0	1	2	3	4	5
11. I think I can control my food portion sizes at every meal.	0	1	2	3	4	5
12. I think I can adjust my food choices and portion sizes based on my blood sugar results.	0	1	2	3	4	5
13. I think I can stop eating when I feel full.	0	1	2	3	4	5
14. I think I can drink plenty of sugar-free fluids every day.	0	1	2	3	4	5
15. I think I can read food labels all the time……..	0	1	2	3	4	5
16. I think I can engage in one or more forms of exercise (e.g., walking, jogging/running, weightlifting).	0	1	2	3	4	5
17. I think I can exercise for 30 minutes at least five times a week.	0	1	2	3	4	5
18. I think I can exercise even when I feel a little tired.	0	1	2	3	4	5
19. I think I can get enough exercise to meet my desired goals.	0	1	2	3	4	5

20. I think I can adjust my exercise routine based on my blood sugar results.	0	1	2	3	4	5
21. I think I can adjust my exercise routine when recommended by my health care provider.	0	1	2	3	4	5
22. I think I can check my blood sugar at least three to four times a day.	0	1	2	3	4	5
23. I think I can check my blood sugar even when I am away from home.	0	1	2	3	4	5
24. I think I can check my blood sugar more often than usual when I feel sick.	0	1	2	3	4	5
25. I think I can keep a record of my blood sugar tests.	0	1	2	3	4	5
26. I think I can check my blood sugar level every time before and after I exercise.	0	1	2	3	4	5
27. I think I can have my blood checked for diabetes control (A1c or HbA1c) at least two times a year.	0	1	2	3	4	5
28. I think I can discuss the effectiveness of my self-care activities based on my diabetes control (A1c or HbA1c) results.	0	1	2	3	4	5
29. I think I can prepare and inject my insulin correctly.	0	1	2	3	4	5
30. I think I can take my insulin even when I am away from home.	0	1	2	3	4	5
31. I think I can adjust my insulin dose based on my blood sugar results..	0	1	2	3	4	5
32. I think I can adjust my insulin dose when my daily routine changes.	0	1	2	3	4	5
33. I think I can adjust my insulin dose when recommended by my health care provider.	0	1	2	3	4	5
34. I think I can take my insulin or other medications as prescribed by my health care provider.	0	1	2	3	4	5
35. I think I can inspect my feet every day.	0	1	2	3	4	5
36. I think I can keep my toenails clean and trimmed.	0	1	2	3	4	5
37. I think I can completely dry my feet after taking a bath or shower.	0	1	2	3	4	5
38. I think I can wear closed-toe shoes every time I am outside my home.	0	1	2	3	4	5
39. I think I can wear socks or stockings every time I wear shoes.	0	1	2	3	4	5
40. I think I can wear comfortable shoes and socks or stockings that fit me well all the time.	0	1	2	3	4	5
41. I think I can have a complete foot exam at least once a year.	0	1	2	3	4	5
42. I think I can recognize when my blood sugar is high.	0	1	2	3	4	5
43. I think I can figure out what to do when my blood sugar is high.	0	1	2	3	4	5

44. I think I can recognize when my blood sugar is low.	0	1	2	3	4	5
45. I think I can figure out what to do when my blood sugar is low.	0	1	2	3	4	5
46. I think I can adjust my diabetes self-care routine when I feel sick.	0	1	2	3	4	5
47. I think I can carry hard candies or glucose tablets every time I am away from home.	0	1	2	3	4	5
48. I think I can carry or wear my diabetes identification all the time.	0	1	2	3	4	5
49. I think I can see my healthcare provider at least every three to six months.	0	1	2	3	4	5
50. I think I can have a dilated eye exam every year.	0	1	2	3	4	5
51. I think I can check my weight on a regular basis and at least every three months.	0	1	2	3	4	5
52. I think I can adjust my self-care activities to fit changes in my daily routine.	0	1	2	3	4	5
53. I think I can adjust my self-care activities to fit my social activities.	0	1	2	3	4	5
54. I think I can do all my self-care activities every day.	0	1	2	3	4	5
55. I think I can check or have my blood pressure checked on a regular basis and at least every three months.	0	1	2	3	4	5
56. I think I can get a flu shot every year.	0	1	2	3	4	5
57. I think I can have a dental check-up at least every six months.	0	1	2	3	4	5
58. I think I can have my blood checked for cholesterol at least once a year.	0	1	2	3	4	5
59. I think I can have other tests to screen for diabetes complications when recommended by my health care provider.	0	1	2	3	4	5
60. I think I can check my urine for ketones when my blood sugar results are greater than 240 mg/dL (or when I feel sick) at least every 4 to 6 hours.	0	1	2	3	4	5

ID_____

Date_____

DIABETES SELF-MANAGEMENT SCALE (DSMS)

Circle the number that represents the extent to which you AGREE or DISAGREE with each statement listed below about what you **actually do** to self-manage your diabetes.. Use the following scale:

0 = STRONGLY DISAGREE **2 = SLIGHTLY DISAGREE** **4 = MODERATELY AGREE**
1 = MODERATELY DISAGREE **3 = SLIGHTLY AGREE** **5 = STRONGLY AGREE**

1. I make the right food choices all the time.	0	1	2	3	4	5
2. I eat at least three meals every day.	0	1	2	3	4	5
3. I stay on my meal plan all the time.	0	1	2	3	4	5
4. I stay on my meal plan even when I eat outside my home.	0	1	2	3	4	5
5. I stay on my meal plan even when the people around me do not know I have diabetes.	0	1	2	3	4	5
6. I stay on my meal plan even when I am at parties.	0	1	2	3	4	5
7. I eat at least five servings of fruits and vegetables every day.	0	1	2	3	4	5
8. I control my intake of carbohydrates all the time.	0	1	2	3	4	5
9. I choose to eat foods that are lower in fats and cholesterol all the time.	0	1	2	3	4	5
10. I eat foods high in fiber all the time.	0	1	2	3	4	5
11. I control my food portion sizes at every meal.	0	1	2	3	4	5
12. I adjust my food choices and portion sizes based on my blood sugar results.	0	1	2	3	4	5
13. I stop eating when I feel full.	0	1	2	3	4	5
14. I drink plenty of sugar-free fluids every day.	0	1	2	3	4	5
15. I read food labels all the time……...	0	1	2	3	4	5
16. I engage in one or more forms of exercise (e.g., walking, jogging/running, weightlifting).	0	1	2	3	4	5
17. I exercise for 30 minutes at least five times a week.	0	1	2	3	4	5
18. I exercise even when I feel a little tired.	0	1	2	3	4	5
19. I get enough exercise to meet my desired goals.	0	1	2	3	4	5
20. I adjust my exercise routine based on my blood sugar results.	0	1	2	3	4	5

21. I adjust my exercise routine when recommended by my health care provider.	0	1	2	3	4	5
22. I check my blood sugar at least three to four times a day.	0	1	2	3	4	5
23. I check my blood sugar even when I am away from home.	0	1	2	3	4	5
24. I check my blood sugar more often than usual when I feel sick.	0	1	2	3	4	5
25. I keep a record of my blood sugar tests.	0	1	2	3	4	5
26. I check my blood sugar level every time before and after I exercise.	0	1	2	3	4	5
27. I have my blood checked for diabetes control (A1c or HbA1c) at least two times a year.	0	1	2	3	4	5
28. I discuss the effectiveness of my self-care activities based on my diabetes control (A1c or HbA1c) results.	0	1	2	3	4	5
29. I prepare and inject my insulin correctly.	0	1	2	3	4	5
30. I take my insulin even when I am away from home.	0	1	2	3	4	5
31. I adjust my insulin dose based on my blood sugar results..	0	1	2	3	4	5
32. I adjust my insulin dose when my daily routine changes.	0	1	2	3	4	5
33. I adjust my insulin dose when recommended by my health care provider.	0	1	2	3	4	5
34. I take my insulin or other medications as prescribed by my health care provider.	0	1	2	3	4	5
35. I inspect my feet every day.	0	1	2	3	4	5
36. I keep my toenails clean and trimmed.	0	1	2	3	4	5
37. I completely dry my feet after taking a bath or shower.	0	1	2	3	4	5
38. I wear closed-toe shoes every time I am outside my home.	0	1	2	3	4	5
39. I wear socks or stockings every time I wear shoes.	0	1	2	3	4	5
40. I wear comfortable shoes and socks or stockings that fit me well all the time.	0	1	2	3	4	5
41. I have a complete foot exam at least once a year.	0	1	2	3	4	5
42. I recognize when my blood sugar is high.	0	1	2	3	4	5
43. I figure out what to do when my blood sugar is high.	0	1	2	3	4	5
44. I recognize when my blood sugar is low.	0	1	2	3	4	5
45. I figure out what to do when my blood sugar is low.	0	1	2	3	4	5

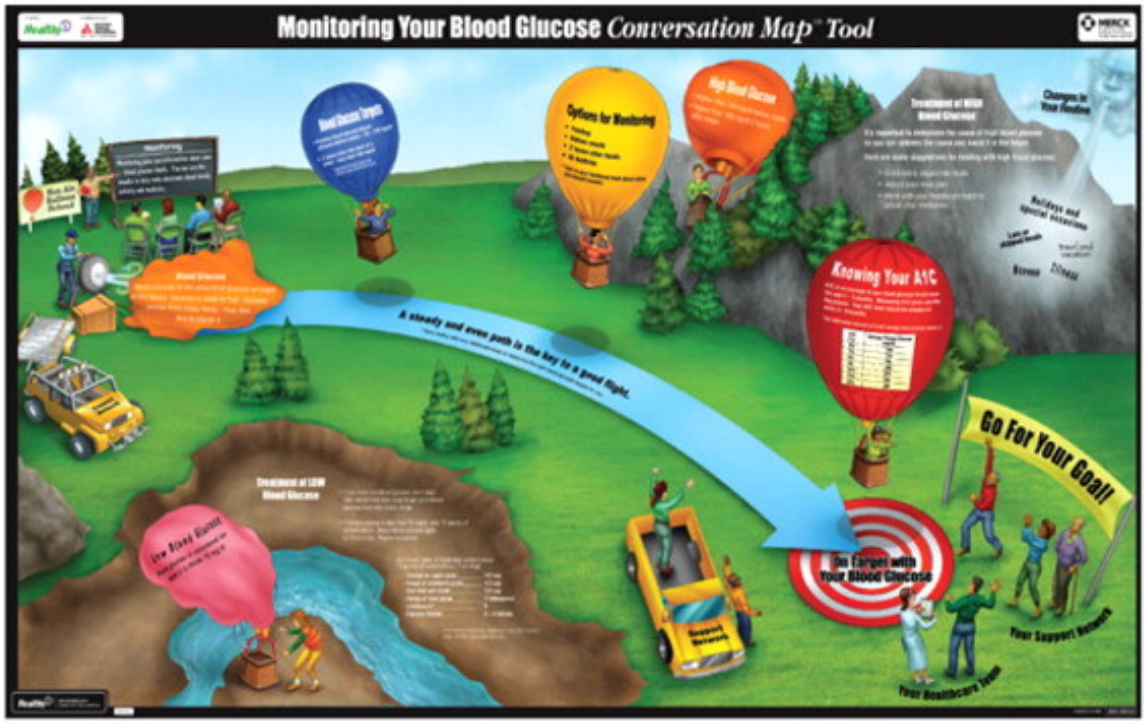
46. I think I can adjust my diabetes self-care routine when I feel sick.	0	1	2	3	4	5
47. I carry hard candies or glucose tablets every time I am away from home.	0	1	2	3	4	5
48. I carry or wear my diabetes identification all the time.	0	1	2	3	4	5
49. I see my healthcare provider at least every three to six months.	0	1	2	3	4	5
50. I have a dilated eye exam every year.	0	1	2	3	4	5
51. I check my weight on a regular basis and at least every three months.	0	1	2	3	4	5
52. I adjust my self-care activities to fit changes in my daily routine.	0	1	2	3	4	5
53. I adjust my self-care activities to fit my social activities.	0	1	2	3	4	5
54. I do all my self-care activities every day.	0	1	2	3	4	5
55. I check or have my blood pressure checked on a regular basis and at least every three months.	0	1	2	3	4	5
56. I get a flu shot every year.	0	1	2	3	4	5
57. I have a dental check-up at least every six months.	0	1	2	3	4	5
58. I have my blood checked for cholesterol at least once a year.	0	1	2	3	4	5
59. I have other tests to screen for diabetes complications when recommended by my health care provider.	0	1	2	3	4	5
60. I check my urine for ketones when my blood sugar results are greater than 240 mg/dL (or when I feel sick) at least every 4 to 6 hours.	0	1	2	3	4	5

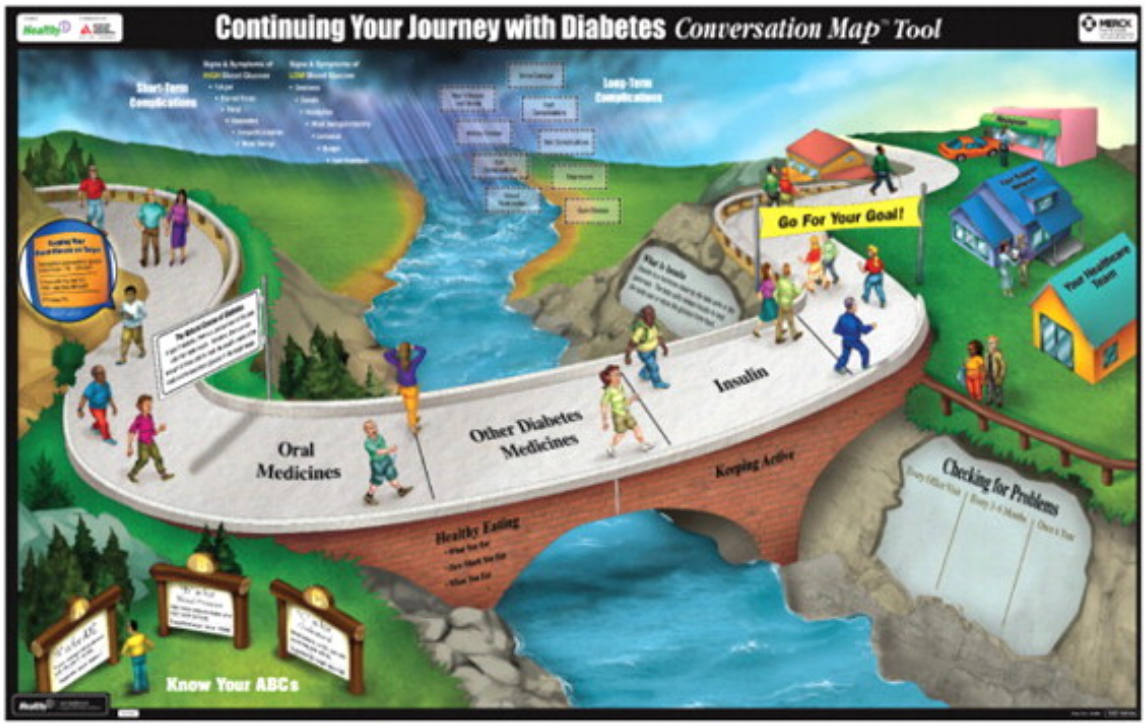
Appendix G. *Defeating Diabetes* Curriculum Plan

Session	Learning Objectives (*Participants will…)*	Content Outline	Teaching Strategies	Food Samples	Handouts
1	• Explore personal motivation for lifestyle change and better diabetes self-management. • Define diabetes. • Identify common myths and facts about diabetes. • Describe their feelings about living with diabetes. • List causes and sxs of hyper- and hypoglycemia. • Identify personal barriers and supports for diabetes self-management. • Explain the CREATION Health acronym. • Discuss lifestyle strategies for achieving better diabetes self-management. • Create a personal wellness vision to defeat diabetes. • Discuss the importance of having a plan for diabetes self-management. • Set one-week SMART steps to defeat diabetes and move toward their vision.	• Intro to Coaching Model • Defining the *Why*? • *Diabetes Conversation Map:* On the Road to Better Managing Your Diabetes (Diabetes Overview; Diabetes Myths & Facts; Feelings About Diabetes; Signs of High & Low Blood Sugar) • Review Diabetes Lending Library • Intro to CREATION Health • Creating a Personal Wellness Vision Around Diabetes	• Group Discussion • PowerPoint Presentation • Group Coaching • Handouts • Weekly SMART Steps • Takeaways	• Crockpot Breakfast • Breakfast Beans • Ezekiel 4:9 Bread • Baked Apple Oatmeal	• PPT Handout • CREATION Health Recap • Session #1 Recipes • My Blood Sugar Log • My Steps Log • My Vision • My Decision Balance • SMART Steps
2	• Discuss personal progress and learnings. • Describe their feelings about food and how it influences their behavior. • Define the major nutrients and their effect on blood glucose levels. • List 5 strategies for eating smaller portions. • Describe the impact of timing of meals on blood glucose. • Identify a situation they find challenging when making food choices and one or more strategies for dealing with that situation. • Discuss lifestyle strategies for achieving better diabetes self-management. • Set one-week SMART steps to defeat diabetes and move toward their vision.	• *Diabetes Conversation Map:* Diabetes and Healthy Eating (Feelings About Food; Meal Planning; Quantity and Timing of Food; Challenges Faced) • Success Story • CREATION Health, part 2 • Goal-Setting	• Progress & Learnings • Group Discussion • PowerPoint Presentation • Group Coaching • Success Stories • Weekly SMART Steps • Takeaways	• Cranberry & Mango Quinoa Salad • Mexican Quinoa Vegetable Soup • Vegetable Chili • Black Bean Brownies	• PPT Handout • CREATION Health Recap • Session #2 Recipes • My Blood Sugar Log • My Steps Log • SMART Steps
3	• Define blood glucose, and HgA1c, and targets for each. • State one reason why monitoring blood glucose is important to them personally for managing their diabetes. • Identify their feelings related to monitoring blood glucose. • List 3 s/s of low and high blood glucose and how to treat. • Identify the effect of food, exercise, stress, and meds on blood glucose levels. • Discuss lifestyle strategies for achieving better diabetes self-management. • Set one-week SMART steps to defeat diabetes and move toward their vision.	• *Diabetes Conversation Map:* Monitoring Your Blood Sugar (Blood Glucose Targets; Recognition and Treatment of Highs and Lows; Changes in Your Routine; Knowing Your A1c) • Success Story • Understanding Insulin Resistance* • CREATION Health, part 3	• Progress & Learnings • Group Discussion • PowerPoint Presentation • Group Coaching • Success Stories • Weekly SMART Steps • Takeaways	• Black Bean Avocado Salad • Lentil Vegetable Soup • Hummus • Green Smoothies	• PPT Handout • CREATION Health Recap • Session #3 Recipes • My Blood Sugar Log • My Steps Log • SMART Steps
4	• Describe the natural course of type 2 diabetes. • Name the diabetes med(s) they are taking and how they work. • Define the ABCs of diabetes: A1c, BP, Cholesterol. • Discuss how to use food labels to choose healthier foods. • Discuss lifestyle strategies for achieving better diabetes self-management. • Set two-week SMART steps to defeat diabetes and move toward their vision.	• *Diabetes Conversation Map:* Continuing Your Journey with Diabetes (Short-term and long-term complications of diabetes; Diabetes medications; Knowing your ABCs) • Success Story • CREATION Health, part 4 • Understanding Food Labels	• Progress & Learnings • Group Discussion • PowerPoint Presentation • Group Coaching • Success Stories • Weekly SMART Steps • Takeaways	• Acorn Squash Supreme • Mashed Cauliflower • Chicken-style Gravy • Kale Apple Salad • Pumpkin Mousse • Whipped Coconut Cream	• PPT Handout • CREATION Health Recap • Session #4 Recipes • My Blood Sugar Log • My Steps Log • SMART Steps
5	• Discuss how to choose the most nutritious foods in their local grocery store. • List three new foods they are willing to try. • Discuss lifestyle strategies for achieving better diabetes self-management. • Identify three strategies for choosing healthy foods during holidays and when eating out. • Explain how to turn a "failure" into a stepping stone toward success. • Set two-week SMART steps to defeat diabetes and move toward their vision.	• *Taking Control of Diabetes* grocery store tour • Eating out healthfully. • Success Story • CREATION Health, part 5 • ABCs of Behavior Change • Anticipating Obstacles • Redefining Failure	• Progress & Learnings • Video • PowerPoint Presentation • Group Coaching • Success Stories • Label Reading Quiz & Activity • Weekly SMART Steps • Takeaways	• Commercial Non-Dairy Milks • Commercial Whole Food Plant-Based Convenience Items (Morningstar Farms vegetarian burgers, Amy's burritos, etc.)	• PPT Handout • CREATION Health Recap • My Blood Sugar Log • My Steps Log • ABCs of Behavior Change • Anticipating Obstacles • Setbacks to Comebacks • SMART Steps
6	• Discuss the benefits of a low-fat plant-based diet for diabetics. • List three strategies for taking control of diabetes. • Define two 3-month SMART goals for defeating diabetes. • Set two-week SMART steps to defeat diabetes and move toward their vision.	• *Taking Control of Diabetes* lecture by Dr. Neal Barnard • Understanding Metformin* • Why Blood Sugar Rises During the Night* • Your Success Story • CREATION Health, part 6 • Diet and Diabetes	• Progress & Learnings • Video • PowerPoint Presentation • Group Coaching • Success Stories • Weekly SMART Steps • Takeaways	• None	• PPT Handout • CREATION Health Recap • My Video Notes • My Blood Sugar Log • My Steps Log • SMART Steps • *Defeating Diabetes* 3-Month Goals

*Topics added per participant request.

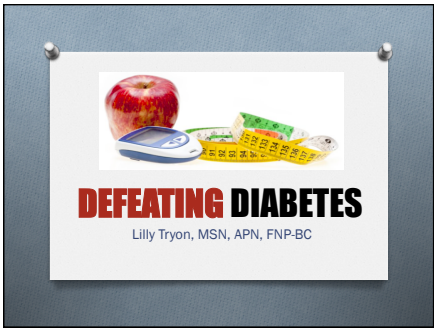
Appendix H. U.S. Diabetes Conversation Map Visuals

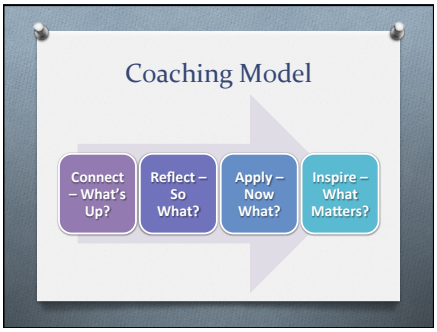

Monitoring Your Blood Glucose Conversation Map™ Tool
Options for Monitoring
Knowing Your A1C
A steady and even path is the key to a good night.
Go For Your Goal!
Be Target with Your Blood Glucose
Your Support Network
Your Healthcare Team

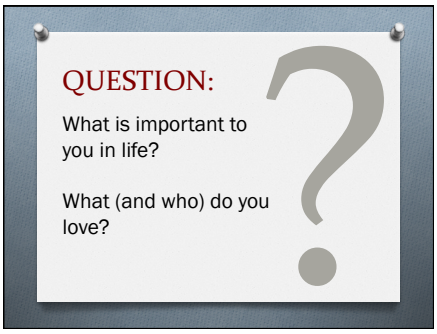

Continuing Your Journey with Diabetes Conversation Map™ Tool
Short-Term Complications
Long-Term Complications
Go For Your Goal!
Your Healthcare Team
Insulin
Other Diabetes Medicines
Oral Medicines
Keeping Active
Checking for Problems
Healthy Eating
Know Your ABCs

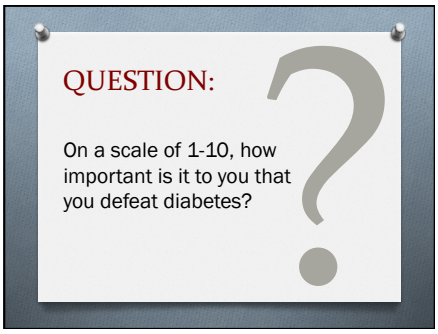
Appendix I. *Defeating Diabetes* Session #1 PowerPoint Slides

Session #1 November 1, 2013









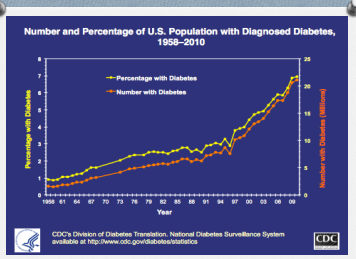
Defeating Diabetes Lifestyle Coaching 1

Session #1 November 1, 2013

Background: The Diabedemic

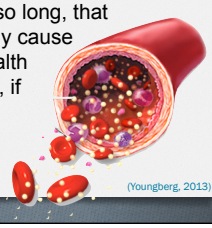
- 8.3 % of Americans have diabetes
- 35-40% of American adults have prediabetes
- More than 1 in 3 patients are at high risk for acquiring diabetes and its complications
- 7th leading cause of death in US – Heart disease, stroke, blindness, kidney failure, amputations, chronic pain

(CDC, 2011)



(CDC, 2011)

Diabetes is simply having blood sugar levels so high, and for so long, that they eventually cause significant health complications, if not corrected.



(Youngberg, 2013)

There is a cure for type 2 diabetes.

☐ True ☐ False

(Youngberg, 2013)

PREVAILING MEDICAL PARADIGM

- American Diabetes Association:
  "There is no cure for diabetes."
- U.S. National Library of Medicine:
  "Diabetes is a lifelong disease... There is no cure."
- The Mayo Clinic:
  "There is no cure for type 2 diabetes."

(Youngberg, 2013)

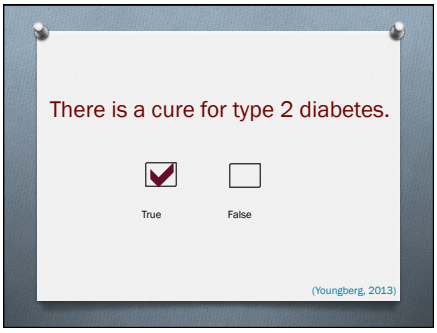
LIFESTYLE MEDICINE PERSPECTIVE

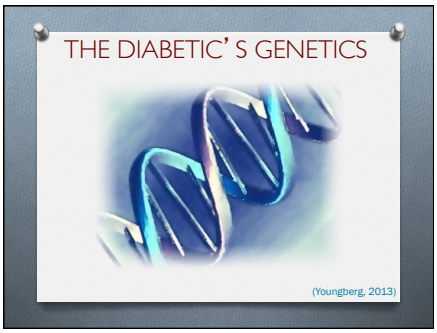
- Dean Ornish, MD:
  "Got diabetes? Get rid of it!"
- Joel Fuhrman, MD:
  "We won't be controlling your [type 2] diabetes, we'll be having you become undiabetic."
- John McDougall, MD:
  "A simple cure is possible for essentially everyone with type 2 diabetes."

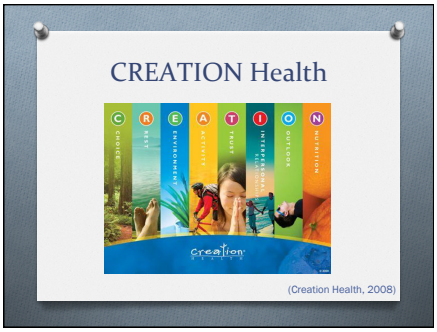
(Youngberg, 2013)

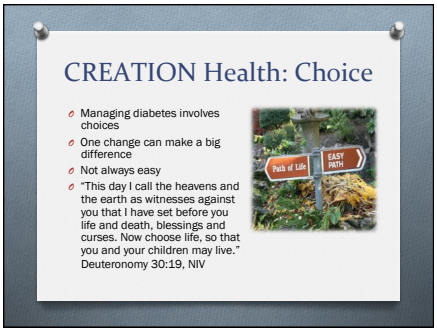
Defeating Diabetes Lifestyle Coaching 2

Session #1 November 1, 2013









Session #1 November 1, 2013

Self-Control

- Research suggests that blood sugar levels are an important part of self-control.
- Acts of self-control deplete relatively large amounts of glucose.
- Self-control failures are more likely when glucose is low or cannot be mobilized effectively to the brain (i.e., when insulin is low or insensitive).
- **Restoring glucose to a sufficient level typically improves self-control.**
- Alcohol reduces glucose throughout the brain and body and likewise impairs many forms of self-control.

(Gailliot, 2007)

Help When Needed

"Call upon me in the day of trouble; I will deliver you, and you shall glorify Me."

Psalm 50:15

Checking Blood Sugars

CREATION Health: Rest

- Sleep deprivation raises blood sugar
- Poor quality sleep contributes to both obesity and diabetes

(Hernandez et al, 2012)

How much rest is needed?

- 7-8 hours per night
- Over past 40 years average sleep has decreased by about 2 hours

(Hernandez et al, 2012)

CREATION Health: Environment

- Colors in nature (blue & green) are associated with lower anxiety
- 2007 study found that a daily dose of walking outside could be as effective as taking antidepressant drugs for treating mild to moderate depression.
- How much time do you spend outside?

(University of Essex, 2007)

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CREATION Health: Activity

- Improves insulin sensitivity
- Increases glucose utilization
- Improves circulation
- Lipid and BP improvements
- Decreases stress and anxiety

(Youngberg, 2013)

Activity

- Relationship between amount & results
- May be broken up to small times
- After Meal Exercise: 10-15 minutes after each meal will decrease blood sugar and insulin spikes.
- Be well hydrated
- Carry ID, CHO
- Each increase of 500 kcal (2100 kJ) in energy expenditure per week associated with a decreased incidence of DM2 of 6%
- **Increased glucose disposal during & after exercise – up to 72 hrs.**

(Youngberg, 2013; Warburton, 2006)

Track Your Steps

(Youngberg, 2013)

CREATION Health: Trust

- Can trust in God, a relationship with God, spirituality have an effect on diabetes?
- Newlin et al (2008) reported a relationship between these factors.
- Spirituality and religion linked to tighter blood glucose control in Black women.

(Newlin et al., 2008)

Stress

- Stress is linked to many chronic diseases
- Many forms of stress
- Increases fight-flight response
- Increases inflammatory markers
- Linked to increased diabetes
- **Give all your worries and cares to God, for he cares about you. I Peter 5:7 NLT**

CREATION Health: Interpersonal Relationships

- Family impact of diabetes
- Build a strong support system, including your family, friends, church, co-workers, and healthcare team.

Session #1 November 1, 2013

CREATION Health: Outlook

- Strong association between positive emotion and longevity among people with diabetes
- For every one point increase in positive emotion, the risk of dying sooner decreased 13 percent
- Those who reported enjoying life showing the biggest longevity boost
- Focus on bringing more positive experiences into your everyday life
- Set aside moments for gratitude

Notice beauty around you

Think Good Thoughts

- Remind yourself why you want to improve your health.
- Set SMART health goals.
- Be positive about your potential to succeed.
- Obey your plan, not your feelings.

(Youngberg, 2013)

CREATION Health: Nutrition

- The most important thing that you can do both to prevent and treat diabetes.
- Focus on:
  - Whole foods whole
  - Adding nutritious food

(Seale et al., 2010)

Plant-based Diet

- Low-fat Vegan diet vs ADA diet

Measure	Vegan	ADA
Reduced medications	43%	26%
A1c change (no med change)	Down 1.23%	Down 0.38%
Body weight	Down 6.5 kg (14.3 lb)	Down 3.1 kg (6.8 lb)
LDL change	Down 21.2%	Down 10.7%

(Barnard et al., 2006)

Power Ups

- Add great-tasting fiber foods to "power-up" the food you already eat
  - Feel full longer
  - Eat fewer calories
  - Lower your blood sugar
  - Lose weight
  - All while eating more!

(Seale et al., 2010)

Top 5

- Fruits – Raspberries/blackberries, pears, apples, oranges, bananas
- Vegetables – avocado, broccoli, spinach, sweet potatoes, carrots
- Beans – navy beans, lentils, pinto beans, black beans, kidney beans
- Nuts & Seeds – flaxseeds, almonds, sunflower seeds, peanuts, walnuts
- Grains – whole wheat, pearl barley, quinoa, oats, brown rice

(Seale et al., 2010)

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Meal times

- Always eat breakfast
- Regularly scheduled meals
- No snacks unless low blood sugar

God's Plan for Defeating Diabetes

- CREATION health
- Try one step at a time – small changes
- One improvement is better than none

(Creation Health, 2008)

QUESTION:

What steps will you take this week to defeat diabetes?

QUESTION:

What do you want to remember from today's coaching session?
What awareness do you have not that you didn't have before?
What was most useful to you?

God's Promise

"Commit your actions to the LORD, and your plans will succeed."

Proverbs 16:3, NLT

References

- *CREATION health: God's 8 principles for living life to the fullest. Seminar personal study guide*. (2008). Orlando, FL: Florida Hospital Mission Development.
- Seale, S. A., Sherard, T., & Fleming, D. (2010). *The full plate diet: Slim down, look great, be healthy!* Austin, TX: Bard Press.
- Youngberg, W. (2013). *Goodbye diabetes: Preventing and reversing diabetes the natural way.* Fallbrook, CA: Hart Books.

Appendix J. *Defeating Diabetes* Group Coaching Session #1 Handouts

CREATION Health for Diabetes

Choice:
- Defeating diabetes involves choices.
- Restoring glucose to a sufficient level typically improves self-control
- Monitor your blood sugars regularly and record on your blood sugar log.

Rest:
- Sleep deprivation raises blood sugar
- Poor quality sleep contributes to both obesity and diabetes
- Adults need 7-8 hours of sleep per night.

Environment:
- Colors in nature (blue & green) are associated with lower anxiety
- A 2007 study found that a daily dose of walking outside could be as effective as taking antidepressant drugs for treating mild to moderate depression.
- Spend some time outdoors every day.

Activity:
- Physical activity improves insulin sensitivity, increases glucose utilization, improves circulation, improves cholesterol, lowers blood pressure, decreases stress and anxiety
- Walking 15 minutes immediately after a meal will decrease blood sugar and insulin spikes.
- Track your steps with a pedometer and record on your steps log.

Trust:
- Spirituality and religion linked to tighter blood glucose.
- Stress is linked to increased diabetes. Give your worries to God!

Interpersonal Relationship:
- Build a strong support system, including your family, friends, co-workers, healthcare team.

Outlook:
- Strong association between positive emotion and longevity among people with diabetes.
- Focus on bringing more positive experiences into your everyday life
- Set SMART goals. Obey your plan, not your feelings.

Nutrition:
- Power-up your diet by adding high fiber foods. Focus on the "Top 5's" and aim for 35-50 grams of fiber per day.
- Always eat balanced breakfast and don't skip meals. No snacks unless low blood sugar.

Session #1 Recipes

Crockpot Breakfast

Ingredients:
6 – 7 cups water
1 cup oats
½ cup bulgur wheat or increase oats by 1/2 cup
½ cup whole grain barley
½ cup cornmeal
1 ¼ teaspoon salt
½ cup dried fruit (raisins, dates, apricots, your favorites).
½ cup soy or nut milk

Instructions: Add a light application of non-stick spray in crockpot before placing ingredients. Place all ingredients in crockpot and cover. Cook on low overnight. In the morning, add chopped fresh fruit and serve with soy, rice or nut milk.

Breakfast Great Northern Beans

Ingredients:
2 15-oz cans Great Northern beans, drained
¾ cups water
½ tsp onion powder
¼ tsp garlic powder
½ tsp cumin
½ tsp Red Star nutritional yeast flakes (optional)

Instructions: Combine all the ingredients in a saucepan and heat through. Smash about 1/3 of the beans against the side of the pan to make thick and saucy beans. The beans can be refrigerated for up to 3 days or frozen for up to 1 month.

Baked Apple Oats

Ingredients:
¾ cup chopped apple with peel
1 ½ cups old-fashioned rolled oats
1 ½ cups unsweetened or plain soymilk
½ tsp vanilla extract
½ tsp salt
½ tsp ground cinnamon
1 Tbsp unsweetened shredded coconut
¼ cup chopped walnuts

Instructions: Preheat oven to 350° F. Spread the apple on the bottom of an 8-inch-square baking dish. Distribute the oats evenly over the apples. Briefly whisk the soymilk, vanilla, salt and cinnamon together, and pour slowly over the apples and oats. Sprinkle the coconut and walnuts on top. Bake for about 45 minutes, until golden brown.

My Vision for Defeating Diabetes

Take 10 minutes and write your vision for defeating diabetes. What does it mean for you to defeat diabetes? Close your eyes and picture yourself with your diabetes under control. How will you look? How will you feel physically? What will you be doing differently? How will you feel about yourself? Write in present tense, as if you have already achieved this level of wellness.

Why is this important? Why does defeating diabetes matter to you? What difference would it make in your life? Take a few minutes to write down those feelings.

Weighing the Cost

Whenever we consider a change –even for the better—there is always ambivalence. We want to change—and we don't. We want to get fit—and we want to just relax in front of the TV at night. We want to eat better—and we want to keep enjoying the taste and convenience of fast foods. This is completely normal. Research shows that throughout the cycle of change we weigh the advantages and disadvantages of changing. Whenever the benefits outweigh the costs, we take action. Take a few minutes to explore why you want to better manage your diabetes and why you want to stay the same.

Reasons to NOT Change (Resistance)	Reasons TO Change (Motivation)
Benefits of not changing: What do you like about your current lifestyle? What else? What are the benefits of staying the same?	**Concerns about not changing:** What concerns you about your current lifestyle? What concerns do others have about your health? What would happen if you stayed the same? What long-term consequences would there be for not changing?
Concerns about changing: What concerns do you have if you were to make lifestyle changes? What effects would changing have on you?	**Benefits of changing:** How do you think your health would improve if you were to change? In what ways would you benefit from changing?

Does your motivation for change outweigh your resistance? What have you learned from this activity?

My Next Steps for Defeating Diabetes

In the next week, what specific things could you think about or do, that would move you forward toward your vision of defeating diabetes? Think of these smart action steps as one-week self-management experiments, because we learn from experiments, whether they work or not. In fact, often an experiment that doesn't work can teach us more than plans that succeed.

My SMART Steps (Specific, Measurable, Attainable, Relevant, Time-sensitive)

On a scale of 1 – 10, how confident are you that you will accomplish these action steps? If your answer is less than 8, consider how you could revise your action steps to make them more achievable. If necessary, reword them so that your confidence level is an 8 or higher.

Now, take out your calendar and schedule any time you need to make it happen. Are there any scheduled activities that you need to plan around?

Is there anything that can get in the way of accomplishing your action steps? If so, what could you do about it?

DEFEATING DIABETES | **My SMART Steps – November 1-8, 2013**

My Blood Sugar Log

When you change your diet or activity level, or lose weight, blood sugar levels can change, often dramatically. It is important to keep a close eye on your levels. Use the chart below to record your blood glucose checks. Note your results and use the "My behavior today" column to note behaviors (the foods you ate, your activity level, and how stressful your day was) which may have affected your blood glucose level.

Stay in touch with your health care provider. If your blood sugars are too low, it may indicate the need to adjust your medications.

November 1 - 8	Before Breakfast	Before Lunch	Before Dinner	After Exercise *(Note time)*	Before Bed	My behavior Today
Friday						
Saturday						
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						

Do you notice any patterns? What do you think some possible causes of this pattern might be? What can you do to address this pattern and improve your blood glucose results?

How Active Am I Now?

Remember that physical activity is as powerful as taking medication. Use the table below to log how active you are for the next week. Indicate how many minutes you walked after each meal, and your total number of steps for the day. Include any additional activities.

November 1-8	Walk after Breakfast	Walk after Lunch	Walk after Dinner	Total # Steps	Additional Activities
Friday					
Saturday					
Sunday					
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

What Difference Does It Make?
To get an idea of how physical activity affects your blood sugar levels, test your blood sugar right before you exercise, right after you exercise, and 1 hour after you are done exercising.

	Day 1	Day 2	Day 3
Right before you begin to exercise			
Immediately after you exercise			
1 hour after completing your exercise			

Appendix K. Data Codebook & Data Clarification Form

VIM Diabetes Study Data Codebook				
Question Number	**Variable Name**	**Variable Label**	**Value Code**	**Value Label**
Demographics				
	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	Age	Age	Self-coding -88 -99	Self-coding Nonspecific Response Missing Value
2	Gender	Gender	1 2 -88 -99	Male Female Nonspecific Response Missing Value
3	Ethnicity	Ethnicity	1 2 3 4 5 6 7 -88 -99	White/Caucasian Black/African American Hispanic/Latino American Indian/Alaska Native Asian Native Hawaiian/Pacific Islander Other Nonspecific Response Missing Value
4	Marital	Marital Status	1 2 3 4 5 -88 -99	Single, living alone Never married, but cohabiting Married Divorced/Separated Widowed Nonspecific Response Missing Value
5	Household	# Living in Household	1 2 3 4 -88 -99	None 1-3 4-5 >5 Nonspecific Response Missing Value
6	Education	Education	1 2 3 4 5 6 7 -88 -99	<4 years 5-8 years some HS HS diploma or GED AD some college College degree Nonspecific Response Missing Value

Question Number	Variable Name	Variable Label	Value Code	Value Label
7	DMDuration	# Years Participant Has Had Diabetes	1 2 3 4 5 -88 -99	< 1 year 1-5 years 6-10 years 11-15 years >15 years Nonspecific Response Missing Value
8	DMClass	Previous Attendance at DM Class	1 2 -88 -99	No Yes Nonspecific Response Missing Value
9	DMMeds	DM Medications at Baseline	1 2 3 4 -88 -99	None oral only insulin only oral and insulin Nonspecific Response Missing Value
	DMMedChg	DM Medication Changes During Study Period	1 2 3 4 5 6 7 8 -88 -99	No change oral med added oral med increased oral med decreased insulin added insulin increased insulin decreased oral med and insulin increased Nonspecific Response Missing Value
Biometrics				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
	VSDateA	Baseline Vital Signs Date	Date	None
	WeightA	Baseline Weight (lbs)	Varies -88 -99	Varies Nonspecific Response Missing Value
	HeightA	Baseline Height (in)	Varies -88 -99	Varies Nonspecific Response Missing Value
	BMIA	Baseline BMI	Varies -88 -99	Varies Nonspecific Response Missing Value
	SBPA	Baseline Systolic Blood Pressure (mmHg)	Varies -88 -99	Varies Nonspecific Response Missing Value

Question Number	Variable Name	Variable Label	Value Code	Value Label
	DBPA	Baseline Diastolic Blood Pressure (mmHg)	Varies -88 -99	Varies Nonspecific Response Missing Value
	LabDateA	Baseline Lab Date	Date	None
	HgA1cA	Baseline HgA1c %	Varies -88 -99	Varies Nonspecific Response Missing Value
	VSDateB	Post-Intervention Vital Signs Date	Date	None
	WeightB	Post-Intervention Weight (lbs)	Varies -88 -99	Varies Nonspecific Response Missing Value
	HeightB	Post-Intervention Height (in)	Varies -88 -99	Varies Nonspecific Response Missing Value
	BMIB	Post-Intervention BMI	Varies -88 -99	Varies Nonspecific Response Missing Value
	SBPB	Post-Intervention Systolic Blood Pressure (mmHg)	Varies -88 -99	Varies Nonspecific Response Missing Value
	DBPB	Post-Intervention Diastolic Blood Pressure (mmHg)	Varies -88 -99	Varies Nonspecific Response Missing Value
	LabDateB	Post-Intervention Lab Date	Date	None
	HgA1cB	Post-Intervention HgA1c %	Varies -88 -99	Varies Nonspecific Response Missing Value
DD Attendance: Attendance at Defeating Diabetes Coaching Sessions				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
	DD#1	Defeating Diabetes Coaching Session #1	1 2	Absent Present
	DD#2	Defeating Diabetes Coaching Session#2	1 2	Absent Present

Question Number	Variable Name	Variable Label	Value Code	Value Label
	DD#3	Defeating Diabetes Coaching Session #3	1 2	Absent Present
	DD#4	Defeating Diabetes Coaching Session #4	1 2	Absent Present
	DD#5	Defeating Diabetes Coaching Session #5	1 2	Absent Present
	DD#6	Defeating Diabetes Coaching Session #6	1 2	Absent Present
DES-A: Diabetes Empowerment Scale (Pre-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	DESA01	DES-A-01	1 2 3 4 5 -88 -99	Strongly Disagree Somewhat Disagree Neutral Somewhat Agree Strongly Agree Nonspecific Response Missing Value
2	DESA02	DES-A-02	Same	Same
3	DESA03	DES-A-03	Same	Same
4	DESA04	DES-A-04	Same	Same
5	DESA05	DES-A-05	Same	Same
6	DESA06	DES-A-06	Same	Same
7	DESA07	DES-A-07	Same	Same
8	DESA08	DES-A-08	Same	Same
	DESAAvg	DES-A Score (Average)		SPSS computed variable, average of values in DESA01-DESA08
DES-B: Diabetes Empowerment Scale (Post-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups

Question Number	Variable Name	Variable Label	Value Code	Value Label
1	DESB01	DES-B-01	1 2 3 4 5 -88 -99	Strongly Disagree Somewhat Disagree Neutral Somewhat Agree Strongly Agree Nonspecific Response Missing value
2	DESB02	DES-B-02	Same	Same
3	DESB03	DES-B-03	Same	Same
4	DESB04	DES-B-04	Same	Same
5	DESB05	DES-B-05	Same	Same
6	DESB06	DES-B-06	Same	Same
7	DESB07	DES-B-07	Same	Same
8	DESB08	DES-B-08	Same	Same
	DESBAvg	DES-B Score (Average)		SPSS computed variable, average of values in DESA01-DESA08
DSES-A: Diabetes Self-Empowerment Scale (Pre-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	DSESA01	DSES-A-01	0 1 2 3 4 5 -88 -99	Strongly Disagree Moderately Disagree Slightly Disagree Slightly Agree Moderately Agree Strongly Agree Nonspecific Response Missing value
2	DSESA02	DSES-A-02	Same	Same
3	DSESA03	DSES-A-03	Same	Same
4	DSESA04	DSES-A-04	Same	Same
5	DSESA05	DSES-A-05	Same	Same
6	DSESA06	DSES-A-06	Same	Same
7	DSESA07	DSES-A-07	Same	Same
8	DSESA08	DSES-A-08	Same	Same
9	DSESA09	DSES-A-09	Same	Same
10	DSESA10	DSES-A-10	Same	Same
11	DSESA11	DSES-A-11	Same	Same
12	DSESA12	DSES-A-12	Same	Same
13	DSESA13	DSES-A-13	Same	Same
14	DSESA14	DSES-A-14	Same	Same
15	DSESA15	DSES-A-15	Same	Same
16	DSESA16	DSES-A-16	Same	Same
17	DSESA17	DSES-A-17	Same	Same
18	DSESA18	DSES-A-18	Same	Same
19	DSESA19	DSES-A-19	Same	Same
20	DSESA20	DSES-A-20	Same	Same
21	DSESA21	DSES-A-21	Same	Same

Question Number	Variable Name	Variable Label	Value Code	Value Label
22	DSESA22	DSES-A-22	Same	Same
23	DSESA23	DSES-A-23	Same	Same
24	DSESA24	DSES-A-24	Same	Same
25	DSESA25	DSES-A-25	Same	Same
26	DSESA26	DSES-A-26	Same	Same
27	DSESA27	DSES-A-27	Same	Same
28	DSESA28	DSES-A-28	Same	Same
29	DSESA29	DSES-A-29	Same	Same
30	DSESA30	DSES-A-30	Same	Same
31	DSESA31	DSES-A-31	Same	Same
32	DSESA32	DSES-A-32	Same	Same
33	DSESA33	DSES-A-33	Same	Same
34	DSESA34	DSES-A-34	Same	Same
35	DSESA35	DSES-A-35	Same	Same
36	DSESA36	DSES-A-36	Same	Same
37	DSESA37	DSES-A-37	Same	Same
38	DSESA38	DSES-A-38	Same	Same
39	DSESA39	DSES-A-39	Same	Same
40	DSESA40	DSES-A-40	Same	Same
41	DSESA41	DSES-A-41	Same	Same
42	DSESA42	DSES-A-42	Same	Same
43	DSESA43	DSES-A-43	Same	Same
44	DSESA44	DSES-A-44	Same	Same
45	DSESA45	DSES-A-45	Same	Same
46	DSESA46	DSES-A-46	Same	Same
47	DSESA47	DSES-A-47	Same	Same
48	DSESA48	DSES-A-48	Same	Same
49	DSESA49	DSES-A-49	Same	Same
50	DSESA50	DSES-A-50	Same	Same
51	DSESA51	DSES-A-51	Same	Same
52	DSESA52	DSES-A-52	Same	Same
53	DSESA53	DSES-A-53	Same	Same
54	DSESA54	DSES-A-54	Same	Same
55	DSESA55	DSES-A-55	Same	Same
56	DSESA56	DSES-A-56	Same	Same
57	DSESA57	DSES-A-57	Same	Same
58	DSESA58	DSES-A-58	Same	Same
59	DSESA59	DSES-A-59	Same	Same
60	DSESA60	DSES-A-60	Same	Same
	DSESAScore	DSES-A Composite Score		SPSS computed variable, sum of values in DSESA01-DSESA60. Total possible = 300.
DSES-B: Diabetes Self-Empowerment Scale (Post-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups

Question Number	Variable Name	Variable Label	Value Code	Value Label
1	DSESB01	DSES-B-01	0 1 2 3 4 5 -88 -99	Strongly Disagree Moderately Disagree Slightly Disagree Slightly Agree Moderately Agree Strongly Agree Nonspecific Response Missing value
2	DSESB02	DSES-B-02	Same	Same
3	DSESB03	DSES-B-03	Same	Same
4	DSESB04	DSES-B-04	Same	Same
5	DSESB05	DSES-B-05	Same	Same
6	DSESB06	DSES-B-06	Same	Same
7	DSESB07	DSES-B-07	Same	Same
8	DSESB08	DSES-B-08	Same	Same
9	DSESB09	DSES-B-09	Same	Same
10	DSESB10	DSES-B-10	Same	Same
11	DSESB11	DSES-B-11	Same	Same
12	DSESB12	DSES-B-12	Same	Same
13	DSESB13	DSES-B-13	Same	Same
14	DSESB14	DSES-B-14	Same	Same
15	DSESB15	DSES-B-15	Same	Same
16	DSESB16	DSES-B-16	Same	Same
17	DSESB17	DSES-B-17	Same	Same
18	DSESB18	DSES-B-18	Same	Same
19	DSESB19	DSES-B-19	Same	Same
20	DSESB20	DSES-B-20	Same	Same
21	DSESB21	DSES-B-21	Same	Same
22	DSESB22	DSES-B-22	Same	Same
23	DSESB23	DSES-B-23	Same	Same
24	DSESB24	DSES-B-24	Same	Same
25	DSESB25	DSES-B-25	Same	Same
26	DSESB26	DSES-B-26	Same	Same
27	DSESB27	DSES-B-27	Same	Same
28	DSESB28	DSES-B-28	Same	Same
29	DSESB29	DSES-B-29	Same	Same
30	DSESB30	DSES-B-30	Same	Same
31	DSESB31	DSES-B-31	Same	Same
32	DSESB32	DSES-B-32	Same	Same
33	DSESB33	DSES-B-33	Same	Same
34	DSESB34	DSES-B-34	Same	Same
35	DSESB35	DSES-B-35	Same	Same
36	DSESB36	DSES-B-36	Same	Same
37	DSESB37	DSES-B-37	Same	Same
38	DSESB38	DSES-B-38	Same	Same
39	DSESB39	DSES-B-39	Same	Same
40	DSESB40	DSES-B-40	Same	Same
41	DSESB41	DSES-B-41	Same	Same
42	DSESB42	DSES-B-42	Same	Same
43	DSESB43	DSES-B-43	Same	Same
44	DSESB44	DSES-B-44	Same	Same
45	DSESB45	DSES-B-45	Same	Same

Question Number	Variable Name	Variable Label	Value Code	Value Label
46	DSESB46	DSES-B-46	Same	Same
47	DSESB47	DSES-B-47	Same	Same
48	DSESB48	DSES-B-48	Same	Same
49	DSESB49	DSES-B-49	Same	Same
50	DSESB50	DSES-B-50	Same	Same
51	DSESB51	DSES-B-51	Same	Same
52	DSESB52	DSES-B-52	Same	Same
53	DSESB53	DSES-B-53	Same	Same
54	DSESB54	DSES-B-54	Same	Same
55	DSESB55	DSES-B-55	Same	Same
56	DSESB56	DSES-B-56	Same	Same
57	DSESB57	DSES-B-57	Same	Same
58	DSESB58	DSES-B-58	Same	Same
59	DSESB59	DSES-B-59	Same	Same
60	DSESB60	DSES-B-60	Same	Same
	DSESBScore	DSES-B Composite Score		SPSS computed variable, sum of values in DSESB01-DSESB60. Total possible = 300.
DSMS-A: Diabetes Self-Management Scale (Pre-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	DSMSA01	DSMS-A-01	0 1 2 3 4 5 -88 -99	Strongly Disagree Moderately Disagree Slightly Disagree Slightly Agree Moderately Agree Strongly Agree Nonspecific Response Missing value
2	DSMSA02	DSMS-A-02	Same	Same
3	DSMSA03	DSMS-A-03	Same	Same
4	DSMSA04	DSMS-A-04	Same	Same
5	DSMSA05	DSMS-A-05	Same	Same
6	DSMSA06	DSMS-A-06	Same	Same
7	DSMSA07	DSMS-A-07	Same	Same
8	DSMSA08	DSMS-A-08	Same	Same
9	DSMSA09	DSMS-A-09	Same	Same
10	DSMSA10	DSMS-A-10	Same	Same
11	DSMSA11	DSMS-A-11	Same	Same
12	DSMSA12	DSMS-A-12	Same	Same
13	DSMSA13	DSMS-A-13	Same	Same
14	DSMSA14	DSMS-A-14	Same	Same
15	DSMSA15	DSMS-A-15	Same	Same
16	DSMSA16	DSMS-A-16	Same	Same
17	DSMSA17	DSMS-A-17	Same	Same
18	DSMSA18	DSMS-A-18	Same	Same
19	DSMSA19	DSMS-A-19	Same	Same

Question Number	Variable Name	Variable Label	Value Code	Value Label
20	DSMSA20	DSMS-A-20	Same	Same
21	DSMSA21	DSMS-A-21	Same	Same
22	DSMSA22	DSMS-A-22	Same	Same
23	DSMSA23	DSMS-A-23	Same	Same
24	DSMSA24	DSMS-A-24	Same	Same
25	DSMSA25	DSMS-A-25	Same	Same
26	DSMSA26	DSMS-A-26	Same	Same
27	DSMSA27	DSMS-A-27	Same	Same
28	DSMSA28	DSMS-A-28	Same	Same
29	DSMSA29	DSMS-A-29	Same	Same
30	DSMSA30	DSMS-A-30	Same	Same
31	DSMSA31	DSMS-A-31	Same	Same
32	DSMSA32	DSMS-A-32	Same	Same
33	DSMSA33	DSMS-A-33	Same	Same
34	DSMSA34	DSMS-A-34	Same	Same
35	DSMSA35	DSMS-A-35	Same	Same
36	DSMSA36	DSMS-A-36	Same	Same
37	DSMSA37	DSMS-A-37	Same	Same
38	DSMSA38	DSMS-A-38	Same	Same
39	DSMSA39	DSMS-A-39	Same	Same
40	DSMSA40	DSMS-A-40	Same	Same
41	DSMSA41	DSMS-A-41	Same	Same
42	DSMSA42	DSMS-A-42	Same	Same
43	DSMSA43	DSMS-A-43	Same	Same
44	DSMSA44	DSMS-A-44	Same	Same
45	DSMSA45	DSMS-A-45	Same	Same
46	DSMSA46	DSMS-A-46	Same	Same
47	DSMSA47	DSMS-A-47	Same	Same
48	DSMSA48	DSMS-A-48	Same	Same
49	DSMSA49	DSMS-A-49	Same	Same
50	DSMSA50	DSMS-A-50	Same	Same
51	DSMSA51	DSMS-A-51	Same	Same
52	DSMSA52	DSMS-A-52	Same	Same
53	DSMSA53	DSMS-A-53	Same	Same
54	DSMSA54	DSMS-A-54	Same	Same
55	DSMSA55	DSMS-A-55	Same	Same
56	DSMSA56	DSMS-A-56	Same	Same
57	DSMSA57	DSMS-A-57	Same	Same
58	DSMSA58	DSMS-A-58	Same	Same
59	DSMSA59	DSMS-A-59	Same	Same
60	DSMSA60	DSMS-A-60	Same	Same
	DSMSAScore	DSMS-A Composite Score		SPSS computed variable, sum of values in DSMSA01-DSMSA60. Total possible = 300.
DSMS-B: Diabetes Self-Management Scale (Post-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups

Question Number	Variable Name	Variable Label	Value Code	Value Label
1	DSMSB01	DSMS-B-01	0 1 2 3 4 5 -88 -99	Strongly Disagree Moderately Disagree Slightly Disagree Slightly Agree Moderately Agree Strongly Agree Nonspecific Response Missing value
2	DSMSB02	DSMS-B-02	Same	Same
3	DSMSB03	DSMS-B-03	Same	Same
4	DSMSB04	DSMS-B-04	Same	Same
5	DSMSB05	DSMS-B-05	Same	Same
6	DSMSB06	DSMS-B-06	Same	Same
7	DSMSB07	DSMS-B-07	Same	Same
8	DSMSB08	DSMS-B-08	Same	Same
9	DSMSB09	DSMS-B-09	Same	Same
10	DSMSB10	DSMS-B-10	Same	Same
11	DSMSB11	DSMS-B-11	Same	Same
12	DSMSB12	DSMS-B-12	Same	Same
13	DSMSB13	DSMS-B-13	Same	Same
14	DSMSB14	DSMS-B-14	Same	Same
15	DSMSB15	DSMS-B-15	Same	Same
16	DSMSB16	DSMS-B-16	Same	Same
17	DSMSB17	DSMS-B-17	Same	Same
18	DSMSB18	DSMS-B-18	Same	Same
19	DSMSB19	DSMS-B-19	Same	Same
20	DSMSB20	DSMS-B-20	Same	Same
21	DSMSB21	DSMS-B-21	Same	Same
22	DSMSB22	DSMS-B-22	Same	Same
23	DSMSB23	DSMS-B-23	Same	Same
24	DSMSB24	DSMS-B-24	Same	Same
25	DSMSB25	DSMS-B-25	Same	Same
26	DSMSB26	DSMS-B-26	Same	Same
27	DSMSB27	DSMS-B-27	Same	Same
28	DSMSB28	DSMS-B-28	Same	Same
29	DSMSB29	DSMS-B-29	Same	Same
30	DSMSB30	DSMS-B-30	Same	Same
31	DSMSB31	DSMS-B-31	Same	Same
32	DSMSB32	DSMS-B-32	Same	Same
33	DSMSB33	DSMS-B-33	Same	Same
34	DSMSB34	DSMS-B-34	Same	Same
35	DSMSB35	DSMS-B-35	Same	Same
36	DSMSB36	DSMS-B-36	Same	Same
37	DSMSB37	DSMS-B-37	Same	Same
38	DSMSB38	DSMS-B-38	Same	Same
39	DSMSB39	DSMS-B-39	Same	Same
40	DSMSB40	DSMS-B-40	Same	Same
41	DSMSB41	DSMS-B-41	Same	Same
42	DSMSB42	DSMS-B-42	Same	Same
43	DSMSB43	DSMS-B-43	Same	Same
44	DSMSB44	DSMS-B-44	Same	Same
45	DSMSB45	DSMS-B-45	Same	Same

Question Number	Variable Name	Variable Label	Value Code	Value Label
46	DSMSB46	DSMS-B-46	Same	Same
47	DSMSB47	DSMS-B-47	Same	Same
48	DSMSB48	DSMS-B-48	Same	Same
49	DSMSB49	DSMS-B-49	Same	Same
50	DSMSB50	DSMS-B-50	Same	Same
51	DSMSB51	DSMS-B-51	Same	Same
52	DSMSB52	DSMS-B-52	Same	Same
53	DSMSB53	DSMS-B-53	Same	Same
54	DSMSB54	DSMS-B-54	Same	Same
55	DSMSB55	DSMS-B-55	Same	Same
56	DSMSB56	DSMS-B-56	Same	Same
57	DSMSB57	DSMS-B-57	Same	Same
58	DSMSB58	DSMS-B-58	Same	Same
59	DSMSB59	DSMS-B-59	Same	Same
60	DSMSB60	DSMS-B-60	Same	Same
	DSMSBScore	DSMS-B Composite Score		SPSS computed variable, sum of values in DSMSB01-DSMSB60. Total possible = 300.
SDKS-A: Simplified Diabetes Knowledge Survey (Pre-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	SDKSA01	SDKS-A-01	1 2 3 -88 -99	True False Don't Know Nonspecific Response Missing value
2	SDKSA02	SDKS-A-02	Same	Same
3	SDKSA03	SDKS-A-03	Same	Same
4	SDKSA04	SDKS-A-04	Same	Same
5	SDKSA05	SDKS-A-05	Same	Same
6	SDKSA06	SDKS-A-06	Same	Same
7	SDKSA07	SDKS-A-07	Same	Same
8	SDKSA08	SDKS-A-08	Same	Same
9	SDKSA09	SDKS-A-09	Same	Same
10	SDKSA10	SDKS-A-10	Same	Same
11	SDKSA11	SDKS-A-11	Same	Same
12	SDKSA12	SDKS-A-12	Same	Same
13	SDKSA13	SDKS-A-13	Same	Same
14	SDKSA14	SDKS-A-14	Same	Same
15	SDKSA15	SDKS-A-15	Same	Same
16	SDKSA16	SDKS-A-16	Same	Same
17	SDKSA17	SDKS-A-17	Same	Same
18	SDKSA18	SDKS-A-18	Same	Same
19	SDKSA19	SDKS-A-19	Same	Same
20	SDKSA20	SDKS-A-20	Same	Same

Question Number	Variable Name	Variable Label	Value Code	Value Label
	SDKSA#	SKDS-A # Correct Responses		Scored against survey answer key
	SDKSAPercent	SKDS-A Percentage Correct		SPSS computed variable, value in SDKSA# / 20
SDKS-B: Simplified Diabetes Knowledge Survey (Post-Intervention)				
Identification Number	ID	Participant Identification Number	C01-C12 DA01-DA10 DD01-DD12	None
Group	Group	Intervention Group	1 2 3 4	Usual Care Group (Control) Diabetes Academy Group (Class) Defeating Diabetes Group (Coaching) Attended Class & Coaching Groups
1	SDKSB01	SDKS-B-01	1 2 3 -88 -99	True False Don't Know Nonspecific Response Missing value
2	SDKSB02	SDKS-B-02	Same	Same
3	SDKSB03	SDKS-B-03	Same	Same
4	SDKSB04	SDKS-B-04	Same	Same
5	SDKSB05	SDKS-B-05	Same	Same
6	SDKSB06	SDKS-B-06	Same	Same
7	SDKSB07	SDKS-B-07	Same	Same
8	SDKSB08	SDKS-B-08	Same	Same
9	SDKSB09	SDKS-B-09	Same	Same
10	SDKSB10	SDKS-B-10	Same	Same
11	SDKSB11	SDKS-B-11	Same	Same
12	SDKSB12	SDKS-B-12	Same	Same
13	SDKSB13	SDKS-B-13	Same	Same
14	SDKSB14	SDKS-B-14	Same	Same
15	SDKSB15	SDKS-B-15	Same	Same
16	SDKSB16	SDKS-B-16	Same	Same
17	SDKSB17	SDKS-B-17	Same	Same
18	SDKSB18	SDKS-B-18	Same	Same
19	SDKSB19	SDKS-B-19	Same	Same
20	SDKSB20	SDKS-B-20	Same	Same
	SDKSB#	SKDS-B # Correct Responses		Scored against survey answer key
	SDKSBPercent	SKDS-B Percentage Correct		SPSS computed variable, value in SDKSB# / 20

VIM Diabetes Study Data Clarifications			
Data	**ID#**	**Discrepancy/Question**	**Action Taken**
Biometrics			
HgA1cB	DA06	Lab value out of expected range**.**	Value confirmed.
HgA1cB	DD05	Lab value out of expected range**.**	Only attended first session of DD coaching group. Excluded from analysis.
SBPA, SBPB, DBPA & DBPB	DD03	Measurements out of expected range**.**	Measurements confirmed.
BMIB	DA01	Ratio out of expected range.	Ratio (and post-weight) confirmed.
BMIB	DA02	Ratio out of expected range.	Ratio (and post-weight) confirmed.
DD Attendance: Attendance at Defeating Diabetes Coaching Sessions			
DD Attendance	DA03	Attended both DD coaching group and DA class.	Recoded as DD13. Attendance in the DA class was considered equivalent to prior attendance at a diabetes education class.
DES: Diabetes Empowerment Scale			
DES-A Q01-Q08	C10	Two DES surveys included in packet. Participant completed both (with different responses).	Researcher randomly chose one survey to include in data analysis.
DSES: Diabetes Self-Efficacy Survey			
DSES-A Q29-Q33	C02 DA05 DA06 DD02 DD07	Non-insulin dependent participant should have skipped questions per instructions.	Responses recoded as nonspecific responses and not included in the data analysis.
DSES-A Q20-Q42	C09 C10 C12	Systematic error (copying mistake resulting in the omission of the second page of survey)	Pair-wise selected as one of the options in the statistical analysis.
DSES-B Q29-Q33	C02 DA05 DA06 DD07 DD11	Non-insulin dependent participant should have skipped questions per instructions.	Responses recoded as nonspecific responses and not included in the data analysis.
DSES-B Q20-Q42	C07 DA10 DD10 DD12	Systematic error (copying mistake resulting in the omission of the second page of survey).	Pair-wise selected as one of the options in the statistical analysis.
DSMS: Diabetes Self-Management Survey			
DSMS-A Q29-Q33	C02 C11 DA04 DA05 DA06 DD02 DD07	Non-insulin dependent participant should have skipped questions per instructions.	Responses recoded as nonspecific responses and not included in the data analysis.
DSMS-A Q21-Q45	C09 C10 C12	Systematic error (copying mistake resulting in the omission of the second page of survey)	Pair-wise selected as one of the options in the statistical analysis.

VIM Diabetes Study Data Clarifications			
Data	**ID#**	**Discrepancy/Question**	**Action Taken**
DSMS-B Q29-Q33	C02 DA06 DD07	Non-insulin dependent participant should have skipped questions per instructions.	Responses recoded as nonspecific responses and not included in the data analysis.
DSMS-B Q29-Q33	DD09 DD11	Non-insulin dependent participant should have skipped questions per instructions.	Responses recoded as nonspecific responses and not included in the data analysis.
DSMS-B Q21-Q45	C07 DA05 DA10 DD10 DD12	Systematic error (copying mistake resulting in the omission of the second page of survey).	Pair-wise selected as one of the options in the statistical analysis.
SDKS: Simplified Diabetes Knowledge Survey			
SDKS-A Q17 & Q18 (related to insulin use)	C02 C06 C11 DA06	Non-insulin dependent participant should have skipped questions per instructions on survey.	If non-insulin dependent, responses for Q17 & Q18 disregarded when scoring.
SDKS-A (Various questions)	C02 C09 C11 DA04 DA06	Non-specific or missing values	Counted as incorrect when scoring.
SDKS-A Q11-Q20	C09 C10 C12	Systematic error (copying mistake resulting in the omission of the second page of survey).	Pair-wise selected as one of the options in the statistical analysis.
SDKS-B (Various questions)	DA06 DA07 DD09	Non-specific or missing values	Counted as incorrect when scoring.
SDKS-B Q11-Q20	C07 DA10 DD10 DD12	Systematic error (copying mistake resulting in the omission of the second page of survey).	Pair-wise selected as one of the options in the statistical analysis.

Appendix L. *Defeating Diabetes* Group Coaching Evaluation

Diabetes Lifestyle Coaching Evaluation

Thank you for participating in the diabetes lifestyle coaching program. Please evaluate your experience and the impact this program has had on your life. Use may use the back of the form for any additional comments. We appreciate your feedback!

What did you like ***most*** about the coaching program? _____

_____

What did you like ***least***? _____

_____

What are some of the ***changes*** you have made in the day-to-day management of your diabetes as a result of attending this coaching group?

_____

_____

What are the ***challenges*** you face in managing your diabetes? _____

_____

Please rate the diabetes lifestyle coaching in the following areas:

The number of sessions.	*Too few*	1	2	3	4	5	*Too many*
The length of each session.	*Too short*	1	2	3	4	5	*Too long*
The group interaction.	*Too little*	1	2	3	4	5	*Too much*
Creating my personal action steps.	*Not helpful*	1	2	3	4	5	*Helpful*
The recipes and food tasting.	*Not helpful*	1	2	3	4	5	*Helpful*
The *Full Plate Diet* book.	*Not helpful*	1	2	3	4	5	*Helpful*
The pedometer.	*Not helpful*	1	2	3	4	5	*Helpful*
The blood sugar testing supplies.	*Not helpful*	1	2	3	4	5	*Helpful*
The binder and handouts.	*Not helpful*	1	2	3	4	5	*Helpful*

Name (optional)_____ **Date** _____

Appendix M. Article Published in *Vibrant Life*

What to Ask Yourself to Ignite a Transformation

The 3 Questions That Lead to Change

*You know you need to make some healthy changes, but you're not sure where to begin. Lifestyle coach **Lilly Tryon** shares the three questions to ask yourself when you are ready to make a change.*

Any health scare—including a diabetes diagnosis—comes with a recommendation for various lifestyle changes in order to prevent complications. We're told to eat differently, exercise more, lose weight, check blood sugars—but where do we begin? Not only that, change is hard because it pushes us out of our comfort zones.

Meet Pat, Maria, Lynn, and Robert*—four people with diabetes who discovered that lifestyle changes don't have to be overwhelming or hard. While attending a diabetes coaching group, they learned three necessary keys for lifestyle change: information, motivation, and strategy. We can think of these keys as three simple questions to ask ourselves when considering making a change.

**Names have been changed to protect privacy.*

What?

The Information

ASK YOURSELF:
What needs to change?

Before you can begin to make change, you need to know *what* to change. The more that you know about a change and the more you feel it is necessary and urgent, the more ready you will be to do whatever is required to make the change. In addition to clarifying specific behaviors that need attention, asking *What?* also creates an awareness of how our current habits and thoughts are hurting us.

Lynn, a single mother who worked two jobs, was too busy to think about her blood sugars, but her interest was piqued when she picked up a book on diabetes. "I now understand what is going on inside my body," she says, "and the difference that simple changes can make." Like Lynn, you can increase your diabetes IQ and better answer the question *What?* by learning more through books, videos, Web sites, classes, or health-care providers.

Why?

The Motivation

ASK YOURSELF: ***Why would I want to make these changes? Why now?***

Motivation needs to be personal. Pat, a recent widow who had spent the last five years taking her diabetic husband to dialysis, was frightened by the possibility of developing kidney disease herself—and that motivated her. For Maria, the motivation was different: she looked forward to her grandchildren's visits, but was frustrated that she didn't have the energy to play with them.

List your most compelling reasons for making lifestyle change. Make the reasons very specific and personal, and then put your list where it can continue to inspire you.

Another aspect of motivation involves weighing your pros and cons. Lynn had a long list of challenges that made it difficult to change her eating habits, but after reading other people's success stories she had an even longer list of positive things that could come from the change. There are many reasons you might be hanging on to old behaviors. Write them down, and then weigh them against the benefits and rewards you will experience by changing.

The 3 Questions That Lead to Change

How?

The Strategy

ASK YOURSELF: ***How do I go about making these changes? How can I make it work for me?***

During the *How?* stage, the change becomes real as you learn new behaviors, processes, and ways of thinking. This is also the stage in which most people struggle. To make this stage a success, here are a few helpful strategies:

Start small.

For people with diabetes, simple changes can have huge results. Pat discovered that a 10-minute walk after meals lowered her hemoglobin A1C. Robert saw a big difference in his blood sugar just by eating more regular meals. Lynn changed her snacks at night and saw morning sugars come down. Avoid trying to change everything at once. One improvement is better than none.

Experiment.

Each person's body, personality, schedule, environment, and life is unique. What works for someone else may not work for you. Approach change as an experiment and you will generate new knowledge about yourself and be better prepared for the next step.

Be prepared.

Maria made the decision to begin her change at the grocery stores: she would put only healthy food in her shopping cart. "If it isn't in the house, I won't eat it," she declares. Another way to be prepared is to plan ahead for the next meal. Don't wait until you are hungry to think about what you are going to eat. The same strategy—plan ahead and be prepared—can be used for eating out, traveling, holidays, and other high-risk situations.

Keep record.

Keeping track of blood glucose levels, physical activity, or other factors gives you information needed to fine-tune your plan. Another way to see what is and isn't working is by doing daily or weekly check-ins: ask yourself, *How did things go? What worked? What didn't? What did I learn about diabetes? about myself?*

Minimize stress.

Robert, a 35-year-old computer specialist, discovered that focusing on regular sleep habits and a positive attitude helped him manage his stress and his blood sugars. Lynn, a caregiver for her aged mother, found that her best stress defense was to nurture her relationship with God. "God tells us to call on Him in the day of trouble and He will deliver us. He never lets me down," she affirms.

Enlist support.

"The opportunity to discuss the day-to-day issues associated with diabetes and learn different ways to deal with them is the best part of being in a diabetes support group," reports Pat. One of the best things you can do is team up with someone else on a similar journey. In addition, regularly visit your health-care provider to ensure that you're maintaining overall health.

No matter where you are in your health journey—whether you have no major health problems, have been recently diagnosed with diabetes, or have lived with it for years—you can use the questions *What? Why?* and *How?* to create a healthier life. Soon you'll see your desired lifestyle change become a new reality.

Lilly Tryon is a nurse practitioner, lifestyle coach, and assistant professor at Southern Adventist University, in Collegedale, Tennessee. She especially enjoys coaching people with diabetes as they make positive lifestyle change.