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# Effects of an Online Diabetes Self-Management Educational Class on Perceived Self-Efficacy in Patients with Type 2 Diabetes Mellitus

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# Effects of an Online Diabetes Self-Management Educational Class on Perceived Self-Efficacy in Patients with Type 2 Diabetes Mellitus

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## Abstract

**Background:** Diabetes is a complex, chronic disease that, without adequate glycemic control, may result in avoidable complications. Without proper diabetes self-management education, achieving good glycemic control is difficult. Furthermore, lacking self-efficacy to perform such tasks may prevent even the most educated patients from achieving good glycemic control. Studies have shown that live diabetes education has improved self-efficacy in patients with diabetes, but few look at the effects of a lecture-style educational format in an online approach.

**Objectives:** The purpose of this study is to determine if an online, lecture-style diabetes self-management educational class will improve self-efficacy among patients with type 2 diabetes.

**Methods:** In this pre-post prospective design study, 50 participants with type 2 diabetes recruited from a private endocrinology practice in Ocala, FL were asked to complete a pre-self-efficacy survey called the Diabetes Self-Efficacy Scale, after which they attended an online diabetes educational class with an optional 1-hour discussion session. Following the class, they completed the same self-efficacy survey with 2 additional investigator-developed questions regarding class benefit. Wilcoxon Signed-Rank and Mann-Whitney U Tests were performed via SPSS23 for statistical analysis.

**Results:** The study found improvements in self-efficacy scores in participants with type 2 diabetes after the online class; however, these results were not significant. Over 92% of the participants reported perceived benefit in the class and 100% were interested in participating in another similar class.

**Conclusions:** The study found a perceived benefit in an online diabetes self-management educational class on diabetes self-management behaviors in patients with type 2 diabetes.

# Research Plan

## Background

Diabetes is a complex, progressive, and chronic disease that, without proper management and adequate glycemic control, can lead to a plethora of microvascular and macrovascular complications affecting various body systems and increasing the risk for mortality. In fact, in 2013, diabetes was found to be the seventh leading cause of death in the United States and was the "leading cause of kidney failure, lower-limb amputations, and adult-onset blindness" (CDC, 2016). In 2016, the Center for Disease Control and Prevention (CDC) found that more than 29 million people in the United States were diagnosed with diabetes. Furthermore, about 86 million were diagnosed with prediabetes which increases the risk for developing the chronic disease later in life (CDC, 2016). It is projected that by the year 2050, one in three people living in the United States may be diagnosed with diabetes (CDC, 2014).

## Problem Statement

Without proper self-management of diabetes, adequate glycemic control is impossible. There are many perceived barriers that affect a patient's ability to adequately manage their diabetes at home. Studies have shown that diabetes education can effectively lower a patient's hemoglobin A1C, indicating adequate or improved glycemic control (Abazari, Vanaki, Mohammadi & Aminia, 2012). Conversely, a lack of adequate education has been shown to decrease glycemic control and reduce quality of life (Abazari et al., 2012). In 2012, Healthy People 2020 discovered that 57.6% of diabetic patients had ever attended a diabetes self-management class (CDC, 2014). This means that nearly half of patients have never received a

formal educational class to adequately manage their diabetes, increasing their risk for poor glycemic control.

However, the self-management of diabetes is not as simple as receiving the knowledge needed to perform self-care activities. Even with proper education, if patients lack self-efficacy to perform tasks needed to manage their diabetes, then their performance may be lacking. Self-efficacy is the "belief that a person has in his or her ability to perform a task; if people lack self-efficacy, they will likely behave ineffectually, even if they know what to do and how to do it" (Bradshaw, Richardson, Kumpfer, Carlson, Stachfield, Overall…& Kulkarni, 2007, p.651). Therefore, it may be argued that having a strong sense of self-efficacy may be more important than just having proper diabetes self-management education alone.

In my own practice, I observed that patients whose diabetes was poorly controlled often lacked the knowledge and understanding to comply with their treatment plan. Furthermore, many patients expressed feelings of inadequacy in terms of managing their diabetes on their own, with or without having received proper self-management education. This lack of confidence in their self-management represented a possible opportunity for intervention.

Ocala, Florida is a relatively small city located within Marion County. According to the 2010 census data, the population of Ocala was 56,315 (United States Census Bureau, n.d.). Ocala is very interesting because it is a more suburban geographic area; however, many rural towns surround it. Many of my patients travel 30 to 60 minutes to visit our endocrine office. Many of the patients are less fortunate financially and often report their insurance company would not cover a diabetes education class. Whatever their reasons, only a small percentage of our patients have received diabetic education, resulting in low levels of knowledge and skills in diabetes self-management. I often noticed patients' confusion and frustration regarding what they should be

eating or when they should be taking their insulin. Others report they knew what they needed to be doing, they just did not believe that they could.

Often, there is minimal time in a 15-minute office visit to treat the patient and provide education as well; therefore, the education we provide is limited. Our practice has one nurse practitioner and one physician. We do not have a diabetic educator, registered dietician nor a registered nurse to provide thorough diabetes self-management education to our patients. Therefore, the barriers patients face regarding their self-management care may be reduced by receiving adequate diabetes education in a way that is affordable and convenient for them.

**Purpose**

The purpose of our project was to determine if an online formal diabetes educational class improved the perceived self-efficacy of patients with type 2 diabetes.

**Aims**

1. To create a formal diabetes educational class discussing diabetes pathophysiology, diet, exercise, self-monitoring, medication regimens, and other behaviors related to the proper self-management of diabetes.
2. To evaluate the perceived benefit and whether patients were interested or not in attending another similar online diabetes self-management educational class discussing other aspects related to diabetes self-management.
3. To evaluate whether this intervention helped to improve perceived self-efficacy amongst patients with type 2 diabetes.

## Research Questions

The overarching research question for this study was: what is the effect of an online diabetes self-management educational class on participants' perceived self-efficacy?

## Hypotheses

1. There will be a difference in the total scores for perceived self-efficacy in patients with type 2 diabetes prior to and after completion of an online diabetes self-management educational class.
2. There will be a difference in the subscale-1 diet and exercise behaviors scores for perceived self-efficacy in patients with type 2 diabetes prior to and after completion of an online diabetes self-management educational class.
3. There will be a difference in the subscale-2 diabetes self-management behaviors scores for perceived self-efficacy in patients with type 2 diabetes prior to and after the completion of an online diabetes self-management educational class.
4. There will be a difference in the total scores for perceived self-efficacy in patients with type 2 diabetes who attended the diabetes self-management educational class alone in comparison to those who attended the class with the optional 1-hour post-class discussion.
5. There will be a difference in the subscale-1 diet and exercise behaviors scores for perceived self-efficacy in patients with type 2 diabetes who attended the diabetes self-management educational class alone in comparison to those who attended the class with the optional 1-hour post-class discussion.
6. There will be a difference in the subscale-2 diabetes self-management behaviors scores for perceived self-efficacy in patients with type 2 diabetes who attended

the diabetes self-management educational class alone in comparison to those who attended the class with the optional 1-hour post-class discussion.

### Significance

This study contributes to nursing knowledge because findings will help nurses and nurse practitioners determine what issues contribute to poor glycemic control among diabetic patients. In understanding why our patients are unable to achieve adequate glycemic control, we can find solutions to resolve issues and to find ways to better educate our patients so they can manage the disease on their own.

Many studies have found improved self-efficacy in diabetic patients after a live educational program; however, few have looked at the effects of a lecture-style online class. Our study was designed to determine if an online formal, lecture style diabetes self-management educational class had similar benefits, thus helping to identify another means to provide education to patients in a way that may be more convenient to them. Significant results may persuade other providers to utilize a formal online diabetes self-management educational class format to help their patients better understand how to manage their disease.

## Literature Review

### Introduction

There has been much research to study the effects of diabetes self-management educational classes on clinical, behavioral, and psychological outcomes in patients with diabetes. Many of these studies have different focuses: some are group-based, some based on individual sessions, some focus on participants with limited education, and some are culturally tailored.

Whatever their focus, all these studies have one target, educating diabetic patients on the tasks and knowledge needed to manage their disease.

**Description of Studies**

Fifteen studies were reviewed. Nine of the studies had an intervention related to in-person diabetes education (Bradshaw et al., 2007; Garcia, Brown, Horner, Zuniga & Arheart, 2015; Jalilian, Motlagh, Solhi & Gharibnavaz, 2014; Naccashian, 2014; Pena-Purcell, Jiang, Ory & Hollingsworth, 2015; Shakibazadeh, Bartholomew, Rashidian & Larjani, 2015; Sperl-Hillen et al., 2013; Swavely, Vorderstrasse, Maldonado, Eid & Etchason, 2013; Wichit, Mnatzaganian, Courtney, Schultz & Johnson, 2017). Six of the studies had interventions utilizing web-based interactive educational content directed toward patients with chronic disease (Bashi, Windsor & Douglas, 2016; Cote et al., 2017; Heisler, et al., 2014; Lorig et al., 2012; Son & Lim, 2014; Yu et al., 2014).

The 9 studies related to in-person diabetes education enrolled a range of 60 (Garcia et al., 2015) to 628 participants (Sperl-Hillen et al., 2013). Of those 9 studies, 5 studies were randomized controlled trials (RCTs) (Bradshaw et al., 2007; Garcia et al., 2015; Jalilian et al., 2014; Sperl-Hillen et al., 2013; Wichit et al., 2016) and the other 4 were quasi-experimental (Naccashian, 2014; Pena-Purcell et al., 2015; Shakibazadeh et al., 2016; Swavely et al., 2013).

Although all the interventions used in these 9 studies were formal in-person diabetes self-management classes, they were all a bit different in structure and content. The programs ranged from 6 to 15 total hours of education over 5 to 12 weeks, each class being 30 to 120 minutes in length. All classes were taught by a registered nurse, registered dietician, pharmacist, diabetes educator, counselor, or some combination of these types of people. The content of the courses

included some combination of (a) diet; (b) exercise and activity; (c) medications; (d) blood sugar monitoring; (e) foot hygiene; (f) complications of type 2 diabetes and coping with them; (g) smoking; (h) diabetes symptoms; (i) managing emotions, memory, concentration, sleeping; (j) vision; (k) oral health; (l) pain; (m) sexual health; (n) when to talk to health care provider; (o) problem solving; and (p) risk reduction. All the studies measured self-efficacy, but some also measured hemoglobin A1c scores (Bradshaw et al., 2007; Garcia et al., 2015; Naccashian, 2014; Pena-Purcell et al., 2015; Shakibazadeh et al., 2016; Sperl-Hillen et al., 2013; Swavely et al., 2013). A few studied other measures as well such as diabetes knowledge (Swavely et al., 2013; Wichit et al., 2016;) and patient satisfaction (Swavely et al., 2013). It was unclear whether a longer or shorter time-period or number of classes was better for improvement in A1c and self-efficacy scores as all the studies yielded different results. For example, one study with only 3 classes found significant differences in both A1c and self-efficacy scores (Sperl-Hillen et al., 2013), one study with 6 classes found significant differences in both A1c and self-efficacy scores (Naccashian, 2014), and one study that intervened with classes over 7 weeks but did not indicate the number of classes found significant differences in self-efficacy scores but not in A1c scores (Pena-Purcell et al., 2015). All studies, regardless of class length or number of classes found statistically significant improvements in self-efficacy scores.

The 6 studies related to web-based interactive education enrolled a range of 29 (Bashi et al., 2016) to 249 participants (Lorig et al., 2012). Of those 6 studies, 3 of the studies were quasi-experimental (Cote et al., 2015; Lorig et al., 2012; Son et al., 2014), 2 were RCTs (Bashi et al., 2016; Heisler et al., 2014), and 1 was a cohort study (Yu et al., 2014). All studies involved patients with chronic disease. One study was directed toward mothers of children with atopic dermatitis (Son & Lim., 2014), 1 toward heart failure patients (Bashi et al., 2016), 1 toward HIV

patients (Cote et al., 2015), 2 toward type 2 diabetic patients (Yu et al., 2014; Heisler et al., 2014) and 1 toward a variety of chronic conditions (Lorig et al., 2012).

All the interventions involved a web-based interactive, self-directed program with educational content toward the management of their chronic disease. The interventions or the programs were all different in content and structure. The programs utilized various web-learning techniques such as e-learning modules, self-monitoring online logs, interactive blogs, interactive teaching tools, and self-care questionnaires and quizzes. Topics discussed included a combination of (a) disease pathophysiology; (b) signs and symptoms of their specific disease; (c) self-management of their specific disease including diet, exercise, and medications; (d) emotional management; and (e) when to seek help. The sessions ranged from 20 minutes to 2 hours and the amount of time involved in the intervention ranged from 4 to 6 weeks. The studies measured self-efficacy and various other measures. Some studies, however, did not specifically measure self-efficacy but rather adherence behavior (Cote et al., 2015) or self-management (Heisler et al., 2014). The studies found mixed results, 3 studies found statistically significant differences in self-efficacy or adherence behavior scores (Cote et al., 2015; Lorig et al., 2012; Yu et al., 2014) and 3 studies did not find statistically significant results in self-efficacy or self-management scores (Bashi et al., 2016; Heisler et al., 2014; Son & Lim, 2014). Taken together, due to the lack of studies demonstrating changes in self-efficacy scores, the web-based program studies were not as strong as investigations employing a formal, instructor-led format; all of which found statistically significant improvements in self-efficacy scores.

**Glycosylated Hemoglobin (A1c) Levels**

Of the 9 studies that reviewed in-person diabetes educational classes, 8 studies reported on A1c (Bradshaw et al., 2007; Garcia et al., 2015; Naccashian et al., 2014; Pena-Purcell et al.,

2015; Shakibazadeh et al., 2016; Sperl-Hillen et al., 2013; Swavely et al., 2013; Wichit et al., 2016). Three studies found no significant reduction in A1c ($p$=.3, N=140) (Wichit et al., 2016), ($p$=.46, N=117) (Pena-Purcell et al., 2015), and (no p-value; N= 54) (Bradshaw et al., 2007). Of the 5 other studies that reported on A1c, all found reductions. One study found reductions in long-term sustainability after 18-21 months ($p$=.00, N=280) (Shakibazadeh et al., 2016). Two other studies, while noting an initial reduction in A1c at 2 months ($p$=.001, N=72), found that this reduction was not sustained after 6 months ($p$=.065, N=72) (Garcia et al., 2015) and in the second study short term follow up 6 months after the intervention was statistically significant ($p$=.01, N=623) but long-term follow up after 12 months was not ($p$=.11, N=623) (Sperl-Hillen et al., 2015). The last 2 studies, while noting the 3-month post-intervention data collection period found a significant reduction in A1c ($p < .05$, N=75) (Naccashian, 2014) ($p < .001$, N=106) (Swavely et al., 2014), they did not gather any further A1c data to determine sustainability.

**Self-efficacy**

Of the 9 studies that reviewed in-person diabetes educational classes, all the studies reported on self-efficacy, and of these studies, they all found significant improvements in self-efficacy with their interventions. P-values for each study were as follows: $p < .001$, N=117 (Pena-Purcell et al., 2015); $p < .05$, N=75 (Naccashian, 2014); $p$=.00, N=623 (short term-6 months) and $p$=.06, N=623 (long term-12 months) (Sperl-Hillen et al., 2013); $p < .001$, N=106 (Swaverly et al., 2014); $p < .001$, N=140 (Wichit et al., 2017); $p$=.007, N=54 (Bradshaw et al., 2007); $p$= .000, N=120 (Jallilion et al., 2014); $p$=.001, N=72 (Garcia et al., 2015); and $p < .001$, N=280 (Shakibazadeh et al., 2015).

**Web-based Educational Content and Self Efficacy**

Of the 6 studies that were directed toward web-based educational content and their effects on self-efficacy, 3 of the studies found improvements in self-efficacy scores after the intervention, but did not assess for sustainability ($p$= .001, N=43) (Son & Lim, 2014), ($p$ < .001, N=249) (Lorig et al., 2012) and ($p$= .001, N=188) (Heisler et al., 2014). Yu et al. (2014) found an initial improvement in self-efficacy ($p$=.004, N=81) but no significant difference at 9 months ($p$=.263, N=81). Finally, 2 of the studies found no improvements ($p$=.61, N=28) (Bashi et al., 2016) and (no p-value) (Cote et al., 2015).

**Self-Efficacy Scales**

All the studies used various scales to determine effects of their intervention on numerous variables including a self-efficacy scale. The following scales were utilized in the literature review to assess self-efficacy: Diabetes Management Self-Efficacy Scale (DMSES) that had an established internal consistency of α=0.95 but no discussion on validity (Wichit et al., 2017); Perceived Diabetes Self-Management Scale (PDSMS) which had an internal consistency score of α=0.7 but did not discuss validity; a 12-item self-efficacy scale created by Godin et al. (2004) that had an internal consistency score of 0.88 which made note that they carried out content validation (Cote et al., 2015); Stanford Diabetes Self-Efficacy tool but did not report on validity or reliability (Swaley et al., 2013); a 36-item, multi-variable scale that included six items on self-efficacy which had an internal consistency value of α=0.76 but did not discuss validity (Jalilion et al., 2014); a researcher-developed questionnaire which measured diabetes-specific behaviors in which questions were taken from several different scales with reliability for the Diabetes Attitudes Scale of α=0.93, the Diabetes Care Profile in which α=0.81 and the DES with α=0.91. This study noted that the scales were both valid and reliable, but made no further mention of

validity factors (Bradshaw et al., 2007); the 6 item Self-Efficacy for Managing Chronic Disease Scale (SEMCD) did not discuss validity or reliability (Bashi et al., 2016); Self-Efficacy by Diabetes Empowerment Scale (DES-SF) had an internal consistency value of $\alpha$=>0.7 and found that six different specialists utilized tools to measure and found content validation (Shakibazadeh et al., 2015); Modified Grossman Self-efficacy for Diabetes Scale with a reliability of $\alpha$=0.51-0.86 but did not discuss validity (Yu et al., 2014); a Diabetes Self-Efficacy Scale with a Cronbach's alpha of 0.93, but had no discussion for validity (Pena-Purcell., 2015); a researcher-developed scale from previously validated instruments had an internal consistency of .91 but made no mention of validity (Lorig et al., 2015). Finally, 2 studies did not go into further detail regarding the scale they used, nor did they discuss validity or reliability (Heisler et al., 2014; Sperl-Hillen et al., 2013).

A few studies utilized the same scale in their investigations, the Diabetes Empowerment Scale (DES). Garcia et al. (2015) found an internal consistency score of $\alpha$=0.8 but did not assess validity (Garcia et al., 2015). Naccashian (2014) found an internal consistency score of 0.77 and reported that because both A1C levels and DES scores changed in positive directions after the program, concurrent validity was established. Bradshaw et al. (2007) utilized part of the DES in their researcher-developed questionnaire and found an internal consistency of $\alpha$=0.91, also making mention that there was validity with no mention of factors affecting it.

Many of the studies reviewed did not discuss validity in their self-efficacy scales, making this a weakness. Two of the studies did not even indicate the scale that they used. For this reason, I decided to look elsewhere for a valid and reliable scale to use in this project. I decided to use the Diabetes Self-Efficacy Scale (DSES) created by Stanford University due to its strength in validity and reliability. Furthermore, there were only 8 items which made it less tedious for

participants and the questions were more pertinent to the topics I plan to review in the intervention class. This scale is discussed in detail under instrumentation in the methods section (Stanford Patient Education Research Center, n.d.).

## Summary

While self-efficacy scores were improved in 100% of the studies involving in-person diabetes self-management education, the web-based educational content designed for patients with chronic diseases did not have such dramatically improved results. One possible reason for this might be the difference between formal and self-directed education. In formal, in-person educational sessions, it was known that the participants were receiving the education that was delivered. Furthermore, they were guided through the educational process by a licensed healthcare professional. When patients were working alone in an online fashion, they were directing the learning process themselves and engaging in as much of the information they cared to, the amount of information they may or may not have received or understood was unknown.

## Conclusion

Evidence shows that in-person, lecture style education for diabetes self-management has a significant positive effect on self-efficacy in patients with diabetes; however, web-based interactive self-directed programs such as modules or interactive websites have not had such strong positive results on self-efficacy in patients with chronic disease. However, gaps in the literature leave room to study the effects of a healthcare professionals' lecture in a virtual classroom which may thereby provide a more beneficial method of education in a professionally directed manner while increasing accessibility to diabetic patients.

## Theoretical Foundations

The theory utilized in this research project was Albert Bandura's Self-Efficacy Theory (1977). Self-efficacy is the belief that a person has in their ability to perform a task. Without self-efficacy, people would not take steps to act on those tasks (Bradshaw et al., 2007). Therefore, even if a patient has received the appropriate education to perform certain tasks, they may lack perthe self-efficacy to do it and therefore it will not get done. Studies have shown that education can improve self-efficacy, making education a valuable tool in this process (Sperl-Hillen et al., 2013; Wichit et al., 2017).

## Study Variables

The main independent variable in this study was the live online diabetes self-management educational class which was categorical as well as binary. Attendance of the 1-hour post-class discussion session was the covariate and was also categorical as well as binary. The dependent variables were the self-efficacy scores: pre-test and post-test total scores, and subscale scores, the "helpfulness of the intervention in managing diabetes" variable and the "interest in future classes" variable. Both pre-test and post-test self-efficacy scores for total scores, subscale 1 and subscale 2 scores were interval variables. The "helpfulness of the intervention in managing diabetes" and "interest in future classes" variables were binary. Demographic variables included age, gender, race, educational attainment, and marital status, all of which were explanatory and all but gender were categorical variables. Gender was binary and categorical. Refer to table 1 for a detailed report of the study variables.

# Methods

## Design

A prospective pre-post quasi-experimental study was used to study changes in self-efficacy scores after one diabetes self-management educational online class with analysis based on a pre-intervention and post-intervention survey to quantify self-efficacy scores related to the self-management of diabetes.

## Sample

English-speaking adults aged 18 through <81 years of age with a diagnosis of type 2 diabetes were evaluated in this study. A convenience sampling was used as the participants were recruited from one endocrinology practice in Ocala, Florida from December 11, 2017 to January 5, 2018. Inclusion criteria were (1) a diagnosis of type 2 diabetes; (2) ages 18 through <81 years; (3) ability to read English; (4) adequate natural or corrected vision to read 12-point font print; and (5) access to a computer and the internet. The study included both male and female participants as well as all ethnic and racial groups. Exclusion criteria were (1) End-stage-renal-disease on dialysis, (2) pregnancy, or (3) dementia.

## Sample Size

The sample size was determined based on power analysis. It was calculated with the anticipated effect size of 0.5, the desired statistical power level of 0.8, and the probability level of 0.05. This yielded the result of a minimum total sample size of 128 for this two-tailed hypothesis. Due to the short time-frame of the study, I aimed to enroll 50 participants.

## Recruitment

Recruitment was done via a flyer (Appendix A) that patients found in the waiting room in the endocrinology office located in Ocala, Florida or by direct request of recruitment from myself, Samantha Sugarman, a nurse practitioner, during their office visit. The recruitment flier had information on what the class would discuss, inclusion and exclusion criteria, date and time the class would take place, and my contact information. The flier was attached to an enrollment form (Appendix B) that asked for the participant's name and e-mail address. Conditions under which their information would be used as well as a pre-consent form were also attached. The pre-consent form was the same form as the actual consent statement (Appendix C). The enrollment form instructed the participant to fill out the enrollment form and give it to the office staff in the endocrinology private practice office.

## Setting

Participants were recruited from an endocrinology, private practice in Ocala, Florida between December 11, 2017 to January 5, 2018. This office employed one physician, one nurse practitioner, one medical assistant, one office manager, one full-time and one part-time receptionist, and one administrator. The setting in which the intervention took place was web-based through an online conference call platform called WebEx and therefore participants were able to participate from their own homes, or wherever they had access to a computer and the internet.

## Intervention

The self-management educational intervention involved one live, lecture-style session with myself as the instructor teaching participants about diabetes self-management using slides

from a pre-created PowerPoint presentation that I designed. The PowerPoint slides incorporated information related to (1) the pathophysiology of type 2 diabetes; (2) symptoms of hypoglycemia and hyperglycemia and how to treat or when to seek help; (3) the diabetes diet including education on how to count carbohydrates; (4) physical activity and exercise; (5) blood glucose monitoring and its importance; and (6) medications including insulin. The live session was approximately 60 minutes in length and took place on Sunday, January 7, 2018 at 3:00pm, one week after the consent, pre-survey, and demographic data survey were sent to the participant's e-mail address. Due to the small number of participants who attended the class, an additional class was approved by the IRB and was held on Sunday, January 21, 2018 at 3:00pm. That class was identical in structure utilizing the same script as the first class. I was available 60 minutes before the live session to assist participants with technical difficulties. Once the presentation had finished, participants were given the option of attending the 1-hr question-answer discussion session. Any questions related to adjustments of personal treatment plans were deferred to in-person office visits for safety reasons. The participants were asked to complete the post survey the same day after the educational class ended, however, they had up to 3 weeks after the class to submit their survey.

**Measurement**

The same valid and reliable survey, the DSES, was administered prior to and after the intervention. Demographic information was collected with the pre-survey. The post survey included two additional investigator-developed questions that assessed perceived benefit from the class as well as a question regarding whether they attended the optional 1-hour post-class discussion session. Each participant had an individual anonymous identification number (AIN) comprised of their three-letter initials and month and day of birth that they applied to the pre-

class survey, post-class survey, post-class 2 additional questions, and demographic survey for more individualized analysis. (eg. AIN SLS0509).

**Instruments**

The instruments used in our project were: (a) a demographic data form (Appendix D), (b) the DSES which was formatted in Survey Monkey as a pre-intervention survey (Appendix E) and (c) a post-intervention survey with the 2 investigator-developed questions along with the question regarding their attendance in the optional post-class discussion (Appendix F). Due to Survey Monkey limitations on survey length, the 2 investigator-developed questions along with the question regarding optional post-class discussion session attendance were placed in a separate survey. These 4 surveys were provided through 4 separate web links. This format was used because Survey Monkey restricts non-paying customers of the website to only 10 questions per survey, which restricted my ability to put all pre-intervention surveys in one link and all post-intervention surveys into a second link. As this study was not funded, there were financial limitations.

We used the 8-item self-efficacy Likert scale called the Diabetes Self Efficacy Survey (DSES). In an article that reviewed this scale, it was indicated that the scale is “freely available to use without additional permission” (Ritter, Lorig & Lorent, 2016). Items are rated from 1 (not at all confident) to 10 (totally -confident). “The score for the scale is the mean of the eight items…higher number indicates higher self-efficacy” (Stanford Patient Education Research Center, n.d.). While the tool developers did not initially intend on creating subscales, following component analysis two subscales were identified because the first 4 questions related to behaviors of diet and exercise and the last 4 questions related to behaviors that dealt with more

diabetes specific self-care behaviors (Ritter et al. 2016). Therefore, we referred to subscale-1 as diet and exercise behaviors and subscale-2 as diabetic self-care behaviors.

A literature review was done to assess the validity and reliability of this scale. The article reviewed 3 RCTs that administered this scale at 2 points in time (Ritter et al. 2016). The review found that "internal consistency reliabilities were consistently high across the different samples" and that "item-scale correlations were sufficiently high to suggest convergent validity for the DSES items" (Ritter et al. 2016, p. 175). Internal consistency scores ranged from $\alpha$=0.828 to 0.882. When dividing the scale into the 2 subscales, the internal consistency scores were $\alpha$=0.777 for questions 1-4 and $\alpha$=0.834 for questions 5-8. "Intercorrelations among the 8 items were consistently statistically significant with $p$ <0.001 within each of the three studies" (Ritter et al. 2016, p. 172). The literature review also discussed the fact that the DSES scores were "strongly associated with the medical outcomes and behaviors tested at baseline, with the exception of A1C…[which was] strongly suggestive of construct validity" (Ritter et al. 2016, p.175). In particular, there were "consistently significant associations between improvements in self-efficacy and improvements in exercise, hypoglycemic symptoms, and communication with doctor…[conversely], the relatively weak associations between self-efficacy and A1C suggest divergent construct validity" (Ritter et al. 2016, p.175).

I chose the DSES for use in our project because of its strong validity and reliability, but also for the short length, which made answering questions less tedious for participants. These represented the strengths of this scale. Furthermore, the questions on the survey were directly related to the information I taught in the diabetes self-management educational class.

**Data collection procedures**

Data collection was done via Survey Monkey. Participants utilized a link that was sent to their e-mail address for the demographic data survey and the pre-class DSES survey. After the class, they received additional e-mail reminders with the link to the post-class DSES and a link to the 2 investigator-developed questions with the questions regarding attendance to the optional post-class discussion session. The data was made available to me through my SurveyMonkey account which allowed me to see data sent anonymously. To ensure participants completed the surveys in a timely manner, reminders were sent to their e-mail for pre-survey reminders (Appendix H) daily until the class took place and post-survey reminders (Appendix I) were sent after the class on the day it took place and once a week until 3 weeks thereafter. All information regarding these reminders was outlined in the consent form.

**Data Analysis Plan**

SPSS 23 was used to store and analyze the data. For assistance in analyzing the data, I worked with a statistician, Dr. Amy Cantrell from The College of Central Florida in Ocala, FL as well as Dr. Linda Briggs who is the primary advisor of this study. Data was downloaded from Survey Monkey to Excel Spreadsheet and then entered into SPSS 23 by myself. Data was double-checked for accuracy by my primary advisor for this project, Dr. Linda Briggs, to ensure that 100% of the data was properly input into SPSS 23.

- Descriptive statistics: descriptive statistics were performed on each of the demographic variables as well as the two research questions and the hypotheses. Calculation of the mean, standard deviation, minimum and maximum for the self-efficacy scale (items, total score and subscales 1 and 2) as well as the questions

about whether the participant thought the class was helpful and whether she/he would participate in a similar class again (perceived benefit items).

- Reliability and validity: A coefficient alpha was run for the 8 items on the diabetes self-efficacy scale, and the 4 items for subscale-1 and subscale-2.
- Research hypotheses: A dependent samples t-test was intended to be run to determine differences in the pre and post-test DSES scores on the self-efficacy scale (total score and subscales 1 and 2). However, due to the small sample size, a Wilcoxon Signed-Rank Test was run instead. For determination of differences in self-efficacy scores between participants who attended the optional 1-hour post-class discussion session and those who did not, a Mann-Whitney U Test was run.

## Ethical Considerations

Participation in the study was voluntary. Provisions to protect the privacy of subjects was guided by instructing participants not to include their last names in the web conference or to make-up a name. They signed into WebEx using their e-mail addresses, however, only the name participants provided was visible in the WebEx session. They were also instructed to mute their phones or to ensure their computer microphone and camera were off and to ask questions and have discussion through the chat box option available in the WebEx webinar.

Provisions to maintain the confidentiality of data was done via Survey Monkey collection which was available to myself only via my password protected Survey Monkey account and was not accessible to other participants. My Survey Monkey password was not shared with anyone. Also, Survey Monkey keeps respondents' email addresses private by not making them visible to the survey creator. Therefore, responses to surveys were anonymous. Furthermore, e-mail addresses were only used as intended and as outlined in the consent form. My e-mail account

was password protected so no one could obtain the e-mail addresses of the participants. Study codes were used to link individual participants' pre- and post-intervention surveys for analysis. The enrollment forms were kept in a locked cabinet in the office. Once data collection was complete, the e-mail addresses were erased from my e-mail history and the enrollment forms were shredded. This proposal was submitted to The George Washington University IRB for approval.

## Results

Fifty participants were recruited from the Endocrinology practice in Ocala, FL. Of those participants, 39 responded to at least one of the 4 surveys intended for completion. Out of those participants, only 15 responded to all 4 surveys. Two of those participants did not respond to all the questions in the surveys leaving missing data, therefore, only 13 participants were included in the final statistical analysis for this study.

Of the 13 participants included in the final statistical analysis, 6 (46.2%) were male and 7 (53.8%) were female. Two participants (15.4%) were between the ages of 35 to 54 and 11 (84.6%) were between the ages of 55 to 80. No participants were under the age of 35. In terms of race, 11 (84.6%) participants self-identified as being White, 1 (7.7%) self-identified as Hispanic and 1 (7.7%) self-identified as other. No participants were self-identified as being Black. In terms of educational attainment, 4 (30.8%) had a high school diploma or less, 5 (38.5%) had an Associate's degree or some college, 4 (30.8%) had a Bachelor's degree and no participant's in this group held a Master's degree. Finally, in terms of relationship status, 10 (76.9%) were married and 3 (23.1%) were not married.

To determine whether there was a statistically significant difference between self-efficacy scores before the diabetes self-management educational class and after, a paired t-test was initially intended to be used. However, due to the small sample size of less than 30 participants and an abnormal distribution, a Related-Samples Wilcoxon Signed Rank Test was used instead. For the total self-efficacy scores, the median of scores prior to the class was 7.25 and the post median was 8.0, the difference between these scores was not significant ($p$= .172). For the subscale 1 of diet and exercise, the median score for the pre-test was 7.25 and the median score for the post-test was 8.0. The difference between these scores was not significant ($p$= .238). Finally, for the subscale 2 of self-management scores, a pre-test median of 7.0 was found and the post-test median was 8.0. The difference between those scores was also not significant ($p$= .144).

To determine whether there was a statistically significant difference in self-efficacy scores between those participants who attended to 1-hour optional post-class discussion in comparison to those who did not, a Mann-Whitney U Test was utilized. Results found statistically significant results for total self-efficacy scores ($p$=.03) and subscale-2 (self-management) self-efficacy scores ($p$=.03). The results, however, were not statistically significant for subscale-1 (diet and exercise) self-efficacy scores ($p$=.093).

When determining if there was perceived benefit from the online diabetes self-management educational class, 12 of the 13 participants (92.3%) responded that yes, they did feel that this class was beneficial to the management of their diabetes and 1 participant (7.7%) responded that no, they did not feel it was beneficial. When asked if the participants would be interested in another similar class in the future, 13 (100%) of the participants responded that yes, they would be interested in attending another similar online class. Of the 13 participants, 5 (38.5%) attended the optional discussion session after the online class and 8 (61.5%) did not.

To determine reliability of the self-efficacy scale used for measuring participant's scores before and after the online diabetes class, we performed a Cronbach's alpha for the complete 8 item self-efficacy pretest which was 0.779 and the posttest was 0.875. The Cronbach's alpha for the 4 items on the subscale-1 diet and exercise scale pretest was 0.712 and posttest was 0.786. Finally, the Cronbach's alpha for the 4 items on the subscale-2 self-management scale pretest was 0.595 and posttest was 0.812. These results indicate good reliability for the complete 8-item tool and for subscale-1 diet and exercise. Reliability was not as strong for the subscale-2 pre-test data.

## Discussion

While there was improvement found between the scores on the self-efficacy scale prior to and after the diabetes self-management educational class for the total scores, subscale-1 diet and exercise scores and subscale-2 self-management scores, there was no statistically significant improvement found in any of the scores. The trend of increased scores is consistent with prior studies which have found significant improvements in self-efficacy scores in patients with type 2 diabetes after diabetes self-management educational classes (Naccashian, 2014; Sperl-Hillen et al., 2013). The lack of statistical significance in this study is likely due to the small sample size of the group. Furthermore, participants were not given an opportunity to utilize what they learned in the class in their everyday lives as the post-class survey was delivered immediately after the class. Thus, participants did not have adequate time to improve their self-efficacy. Had a second post-class survey been delivered at a later time, this may have altered results, possibly improving the opportunity for statistical significance.

However, there were statistically significant differences found in self-efficacy scores in participants who attended the optional 1-hour post-class discussion in comparison to those who did not. Furthermore, there did appear to be a perceived benefit of the online diabetes self-management

educational class as 92.3% of the participants responded that they felt the class was beneficial to their diabetes self-management behaviors and 100% of the participants were interested in participating in another similar class.

When determining the reliability of the scale used to measure self-efficacy of the participants, most of the scales including the total pre-scores, total post-scores, pre-subscale-1 and post-subscale-1 scores and the post-subscale-2 scores found good reliability in their scales. The pre-subscale-2 was the only scale that had poor reliability. This is likely due to the small sample size utilized in the study.

## Limitations

There were a few limitations to this study. The first limitation was the small sample size. It was unclear how many participants attended the diabetes self-management educational class due to the nature of the web-based platform that was used, however, only 13 participants had complete data for the analysis. The small number of analyzable records decreases the generalizability of the study findings. Furthermore, a lack of racial diversity limited generalizability as most of the participants were white and none were black. Another limitation was the short time-frame that was available for recruiting was only 4 weeks. Another limitation was the fact that only e-mail addresses were utilized to contact the participants and send reminders regarding survey completion and class date. In this population, it was unknown how often the participants checked their e-mails and reminders could very well have been missed. Furthermore, the manner in which the surveys were presented posed as another limitation as I was unable to put the pre-class demographic data form and the pre-class survey into one link and the post-class survey and the 2-additional researcher developed questions into another link allowing for 2 links instead of 4. This appeared to cause some confusion as some participants only responded to 1 to 3 of the surveys rather than all 4, resulting in

incomplete data collection. Finally, the use of this technology in this group of participants may have been too advanced as many of the participants had difficulty getting onto the platform utilized for the web conference where the class took place.

## Implications/Recommendations

Because the self-efficacy scores in this study trended toward improvement but failed to demonstrate statistical significance, I would recommend replicating this study with a larger sample size. More racial diversity is also recommended to make the results more generalizable, especially since there is a higher incidence of type 2 diabetes in ethnic minorities than in Whites. Furthermore, more studies in rural areas would help to determine if an online class would be more beneficial in reaching participants who have a geographical barrier to access to care and healthcare education.

The results of this study, while they were not statistically significant, may be grounds for further studies similar to this where an online diabetes self-management lecture-style class may be held, rather than a live class. This may help to initiate more research with this style of teaching as a means to help find evidence for ways to reduce the barrier of access to care and healthcare education in patients with geographical barriers or other obstacles to attending face-to-face chronic disease management education.

## Conclusions

This study found that there was a perceived benefit to participating in an online diabetes self-management educational class in patients with type 2 diabetes as evidenced by participants' interest in attending future sessions. Furthermore, it found that there was a trend toward improvement in self-efficacy scores which previous research has linked to proper diabetes self-management and improved glycemic control in patients with type 2 diabetes. Additional research is

needed to determine the full effect of a formal, diabetes self-management educational program for patients with type 2 diabetes using an online approach.

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## Tables

**Table 1. Defining and Identifying Variables**

| Variable Name | Variable Type and Form | Theoretical/Descriptive Definition | Operational Definition/ Specification |
|---|---|---|---|
| Self-efficacy total pre-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number based off a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from 1 (not at all confident) to 10 (totally confident) for 8 separate items. The final score will be the mean of all the scores for all 8 items and may range from 1 to 10 |
| Self-efficacy total post-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number of scores based on a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from 1 (not at all confident) to 10 (totally confident) for 8 separate items. The final score will be the mean of all the scores for all 8 items and may range from 1 to 10 |
| Self-efficacy subscale 1 pre-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number of scores based on a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from 1 (not at all confident) to 10 (totally confident) for 4 of the 8 separate items. The final score will be the mean of all the scores for items 1 through 4 and may range from 1 to 10 |
| Self-efficacy subscale 1 post-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number of scores based on a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from |

| | | | |
|---|---|---|---|
| | | | 1 (not at all confident) to 10 (totally confident) for 4 of the 8 separate items. The final score will be the mean of all the scores for items 1 through 4 and may range from 1 to 10 |
| Self-efficacy subscale 2 pre-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number of scores based on a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from 1 (not at all confident) to 10 (totally confident) for 4 of the 8 separate items. The final score will be the mean of all the scores for items 5 through 8 and may range from 1 to 10 |
| Self-efficacy subscale 2 post-test score | Dependent Interval | Self-identified perceived self -efficacy based off a Likert scale | Number of scores based on a 10-point Likert scale called the Diabetes Self-Efficacy Scale (DSES) with scores ranging from 1 (not at all confident) to 10 (totally confident) for 4 of the 8 separate items. The final score will be the mean of all the scores for items 5 through 8 and may range from 1 to 10 |
| Helpfulness of the intervention in managing diabetes | Dependent Binary | Self-identified perceived helpfulness of the online diabetes self-management educational class | 1=was helpful<br>2=was not helpful |
| Interest in participating in another online diabetes self-management educational class | Dependent Binary | Self-identified interest in taking another online diabetes self-management educational class | 1=interested<br>2=not interested |
| Online Diabetes Self-Management | Independent Binary | Online educational class consisting of one 60 minute pre-recorded | 1=has not had the class<br>2=has had the class |

| | | | |
|---|---|---|---|
| Educational Class | | diabetes self-management educational class discussing (1) the pathophysiology of type 2 diabetes (2) symptoms of hypoglycemia and hyperglycemia and how to treat or when to seek help (3) diabetic complications and how to prevent them (4) the diabetes diet including education on how to count carbohydrates (5) physical activity and exercise (6) blood glucose monitoring and its importance and (7) medications and insulin followed by up to 2 hours of discussion. | |
| Online 1-hour Post-Class Discussion Session | Covariate Binary | Optional 1-hour online discussion session that takes place just after the self-management educational class has ended to answer questions and have discussion related to the material presented in the diabetes self-management educational class. | 0=did not attend the discussion session<br>1=did attend the discussion session |
| Age | Demographic/ Explanatory/ Categorical | Participant's number of years since birth in a given range | Age range:<br>1=18 to <35<br>2=35 to <55<br>3=55 to <81 |
| Sex | Demographic/ Explanatory/ Binary | Participant's biological sex | 1=Male<br>2=Female |
| Race | Demographic/ Explanatory/ Categorical | Participant's racial or ethnic background as self-identified | 1=Black or African American<br>2=White<br>3=Hispanic<br>4=Other |

| | | | |
|---|---|---|---|
| Educational Attainment | Demographic/ Explanatory/ Categorical | The highest level of schooling the participant has completed | 1=High school graduate or less<br>2=Associate's Degree or some college<br>3=Bachelor's degree<br>4=Master's degree or higher |
| Marital status | Demographic/ Explanatory/ Categorical | Whether or not a participant is currently married to another individual by legal marriage certificate | 1=Married<br>2=Not married |

**Table 2. Demographics Table**

| Variable | Number (%) |
|---|---|
| Age | |
| • 18 to <35 | 0 (0%) |
| • 35 to <55 | 2 (15.4%) |
| • 55 to <81 | 11 (84.6%) |
| Gender | |
| • Male | 6 (46.2%) |
| • Female | 7 (53.8%) |
| Race | |
| • Black or African American | 0 (0%) |
| • White | 11 (84.6%) |
| • Hispanic | 1 (7.7%) |
| • Other | 1 (7.7%) |
| Educational Attainment | |
| • High school graduate or less | 4 (30.8%) |
| • Associate's Degree or some college | 5 (38.5%) |
| • Bachelor's degree | 4 (30.8%) |
| • Master's degree or higher | 0 (0%) |
| Marital status | |
| • Married | 10 (76.9%) |
| • Not Married | 3 (23.1%) |

## Table 3. Post-Class Questions

**Q1: Do you feel that this educational class was helpful in managing your diabetes?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 12 | 92.3 | 92.3 | 92.3 |
| | no | 1 | 7.7 | 7.7 | 100.0 |
| | Total | 13 | 100.0 | 100.0 | |

**Q2: Would you be interested in another class like this in the future dealing with other aspects of diabetes self-management?**

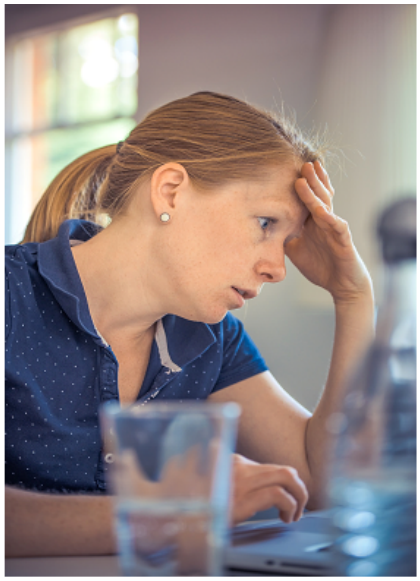
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 13 | 100.0 | 100.0 | 100.0 |

**Q3: Did you attend the optional 1-hour post-class discussion session?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 5 | 38.5 | 38.5 | 38.5 |
| | no | 8 | 61.5 | 61.5 | 100.0 |
| | Total | 13 | 100.0 | 100.0 | |

## Appendix A:

## Recruitment Flyer



**DO YOU HAVE TYPE 2 DIABETES?**

# ARE YOU FRUSTRATED

**Because you wish you had some help to properly MANAGE your diabetes at home?**

**Now enrolling for an online diabetes self-management education class discussing topics in:**

1. How diabetes affects your body
2. Diabetic Diet
3. Physical activity and exercise
4. Diabetic medications and Insulin
5. Blood sugar monitoring
6. Symptoms of high and low blood sugar and what to do

**Qualified Participants must:**

- Have been diagnosed with type 2 diabetes
- Be 18 years of age or older
- Have access to the internet and Facebook
- Can speak and read in English and adequately see 12-point font
- Not be pregnant
- Not be on dialysis
- Not have dementia

**CLASS DATE: Sunday, December 3, 2017 at 3:00pm**

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**Online diabetes Self-Management EDUCATIONAL Research Study**

- - - -

**FREE self-management education class**

- - - -

**Now Enrolling!!!**

- - - -

**Education from the comfort of your own home!**

- - - -

**No insurance required. NO cost to you!**

SAMANTHA SUGARMAN, ARNP
311 SE 29th Ct. Ocala, FL, 34474

**716-597-6585**

**Shoshana0509@gmail.com** Please CALL for more information!!!

**Appendix B:**

**Enrollment Form**

# Enrollment Form for the Online Diabetes Self-Management Educational Class Study

Name: _____

E-mail address: _____

This information will be used by myself, Samantha Sugarman, after you have reviewed the attached page which describes the study and how your participation will affect you personally. If you wish to proceed in this study, you will give this form filled out to the office staff in Dr. Ramharrack's office at 311 SE 29th Pl. Ocala, Florida. I will use your e-mail address to e-mail you instructions for joining the live webinar as well as reminders about completing the pre and post survey related to your feelings on your ability to manage your diabetes. You will also be sent a survey with a few short questions about you (your age, sex, education level and marital status) and the consent form a week before the online class. See the consent form for more specified information.

For more information about the study, please do not hesitate to call me, Samantha Sugarman, at 716-597-6585 or e-mail me at Shoshana0509@gmail.com with the e-mail's subject of DIABETES STUDY.

## Appendix C:

## GW IRB Consent Statement

### Consent Statement for Exempt Research

**Title of Study:** Effects of an Online Diabetes Self-Management Educational Class on Perceived Self-Efficacy in Patients with Type 2 Diabetes Mellitus: A Quasi-experimental Study
**IRB #:**
**Principle Investigator Name:** Linda Briggs, Samantha Sugarman
**Version date:** Summer, 2017

You are invited to participate in a research study under the direction of Samantha Sugarman of the School of Nursing, George Washington University (GWU). Taking part in this research is entirely voluntary. Further information regarding this study may be obtained by contacting Samantha Sugarman at telephone number (716) 597-6585 or e-mail at Shoshana0509@gmail.com.

The purpose of this study is to determine if an online formal diabetes self-management educational class instructed by myself (Samantha Sugarman) will improve the perceived ability to manage diabetes in the everyday lives of patients with type 2 diabetes.

If you choose to take part in this study, you will take part in a short 8 question survey regarding your feelings on your ability to manage your diabetes along with a demographic data survey which asks you to answer questions on your age, sex, race, educational attainment and marital status which is located on Survey Monkey. The link to this will be made available to you through your e-mail. The survey questions should take less than 10 minutes to complete. You then we be asked to participate in a one hour long live, lecture style diabetes self-management educational class instructed by myself, Samantha Sugarman, and have the option of participating in a question-answer/discussion group for up to 1 hour after the live online class has ended. You have the option of discussing topics reviewed in the lecture via the webinar program's chat box. You will access this class through a web address/link that will be sent to your email along with instructions on how to join the live session. The web-based program that allows you to see the slides and hear the presentation is called WebEx. In order to view and listen to the class, you will need to join on the computer through the internet. If you are having technical difficulties with audio, you will also have the option of calling in to hear the live session. After the class, you will be asked to complete the same 8 question survey with an additional 2 questions regarding class helpfulness and your desire to participate in another similar class, as well as a question on whether or not you attended the optional 1-hour discussion session. Again, the surveys will be available through Survey Monkey in which the link will be made available to you through your e-mail. The post-class survey should also take less than 10 minutes to complete.

There will be e-mail reminders sent to the e-mail you provide once a day for the first week from the day the consent form, pre-survey and demographic survey is sent to your e-mail until the Sunday that the class takes place and once a week for three weeks after the class has ended or until the total number of participants' surveys have all been submitted, whichever comes first. You will not receive any further e-mail reminders after three weeks has passed since the class took place.

To protect your privacy, you will also use an anonymous identification number that you will be asked to indicate on the pre-survey, post-survey, post-class 3 additional questions survey and demographic data survey in a clearly identified spot. This number is your 3-letter initials and month and day of birth (eg. SLS0509). This number will keep you anonymous and will be used to link the surveys for assessing more individual outcomes of the class.

The total amount of time you will spend in connection with this study is 1 hour for the class, an optional 1 hour for the post-class discussion, and 10 minutes for each survey. The pre-survey and demographic data will be available the Sunday before the class takes place. One week later, the class will take place on Sunday, January 7, 2018 at 3:00pm and optional discussion session will be available up until 5:00pm that day. You will then have once-a-week e-mail reminders up to three weeks from the end of the class or until the total number of participants' surveys have been submitted, whichever comes first. You may refuse to answer any of the questions and you may stop your participation in this study at any time.

Possible risks or discomforts you could experience during this study include: a loss of privacy if you choose to indicate your last name in the web conference (we advise you not to use your last name during the educational class sign in through WebEx). You may also lose your privacy if you use the microphone or video in the web session (we advise you not to use the microphone or camera during the educational class through WebEx). Also, possible psychological stress when answering the survey questions or participating in the discussion session after the class may occur. Furthermore, please be sure that you have a nationwide calling plan on your phone, this means that you are able to call long-distance for free which is typical for many cell phone plans if you are having technical difficulties with audio on your computer and need to use the phone for entry into the web conference. If you are calling from a pre-paid cell phone or land line, long-distance rates may affect you.

During the post-class group discussions, while we cannot guarantee the privacy of the discussion, we request that all present respect the group by not repeating what is said, outside the group.

You will not benefit directly from your participation in the study. The benefits to science and humankind that might result from this study are: results may indicate a benefit in online diabetes self-management education programs instructed by healthcare providers that may increase the desire of healthcare practitioners to provide classes similar to this to their diabetic patients.

Every effort will be made to keep your information confidential, however, this cannot be guaranteed. The surveys including demographic data will be answered through a website called SurveyMonkey.com in which the link will be made available to you in your e-mail in which results will only be made available to myself, Samantha Sugarman to see, others participating in the group will not have access to these results. The surveys, however, are anonymous and will only include your anonymous identification number to allow for more individual analysis of the results. If results of this research study are reported in journals or at scientific meetings, the people who participated in this study will not be named or identified.

The Office of Human Research of George Washington University, at telephone number (202) 994-2715, can provide further information about your rights as a research participant. If you have any questions about this study you can also contact me, Samantha Sugarman, at (716) 597-6585.

Your willingness to participate in this research study is implied if you proceed.

*Please keep a copy of this document in case you want to read it again.

**Appendix D:**

**Demographic Data Collection Tool**

## *1. What is your age?*

- 18 to 34 years
- 35 to 54 years
- 55 to 80 years

## *2. What is your sex?*

- Male
- Female

## *3. Which race/ethnicity best describes you? (Please choose only one.)*

- Black or African American
- White
- Hispanic
- Other

## *4. What is the highest level of school you have completed or the highest degree you have received?*

- High school graduate or less
- Associate's degree or some college
- Bachelor's degree
- Master's degree or higher

## *5. Which of the following best describes your current relationship status?*

- Married
- Not married

## *6. Provide your Anonymous Identification Number in the box below (3-letter initialsMONTH/DAYofBIRTH; example SLS0509):*

## Appendix E:

### Pre-Diabetes Self-Management Educational Class Survey

*(Note: This survey has been created in Survey Monkey with all words exactly as indicated below, however, I am unable to format it to fit into this word document)*

**We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.**

**Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident**

1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?
2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?
3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?
4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?
5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?
6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?
7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?

8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?

Provide your Anonymous Identification Number in the box below (3-letter initialsMONTH/DAYofBIRTH; example SLS0509):

## Appendix F:

### Post-Diabetes Self-Management Educational Class Survey

*(Note: This survey has been created in Survey Monkey with all words exactly as indicated below, however, I am unable to format it to fit into this word document)*

**We would like to know how confident you are in doing certain activities. For each of the following questions, please choose the number that corresponds to your confidence that you can do the tasks regularly at the present time.**

**Not at all confident 1 2 3 4 5 6 7 8 9 10 Totally confident**

1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?
2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?
3. How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example, snacks)?
4. How confident do you feel that you can exercise 15 to 30 minutes, 4 to 5 times a week?
5. How confident do you feel that you can do something to prevent your blood sugar level from dropping when you exercise?
6. How confident do you feel that you know what to do when your blood sugar level goes higher or lower than it should be?
7. How confident do you feel that you can judge when the changes in your illness mean you should visit the doctor?

8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?

**Please answer the following questions with a "yes" or a "no":**

9. Do you feel that this educational class was helpful in managing your diabetes?
10. Would you be interested in another class like this in the future dealing with other aspects of diabetes self-management?
11. Did you attend the optional 1-hour post-class discussion session?

Provide your Anonymous Identification Number in the box below (3-letter initialsMONTH/DAYofBIRTH; example SLS0509):

## Appendix G:

## Webinar Instructions E-mail

**E-mail instructions for Diabetes Self-Management Educational Class Webinar Log in**

At 3:00pm on Sunday, January 7, 2017, you will locate this e-mail to log into the diabetes self-management educational class, this e-mail is sent to you in the morning on that day for your review and will be sent again one hour before the class will start to remind you of the instructions.

In this e-mail, you will note a link to the online meeting asking you to join the meeting

1. **Step 1:** Once the e-mail has been opened, click on the link under the "Join WebEx meeting."
2. **Step 2:** The next screen will ask you for your name and e-mail address. Please DO NOT use your last name. You may choose to use a made-up name in this box as well. Then click the green box that says "join meeting."
3. **Step 3:** You will then need to download the application by either clicking on the tab that states to "download the application", or the link that states "run a temporary application." You will need to "run" the download.
4. **Step 4:** Once downloaded, you will be directed to a screen that will ask if you want to participate, click "yes."
5. **Step 5:** Please be sure your microphone and camera are off and your speakers are on

**To Participate in Discussion:** If you would like to ask questions or participate in discussion, please utilize the chat box in the upper right-hand corner of the screen. If you lose the video when you do this, you may click on the "participants" tab on the right side of the page where your chat box appears.

If you feel you may need extra time to set this up, please try to log into the webinar 60 minutes prior to the start of the class. I will be available at 2:00pm if you are struggling with this and will be available via e-mail at Shoshana0509@gmail.com, or by telephone at (716)597-6585. Please use the subject line "HELP WITH WEBINAR" so that I will be alerted to your e-mails right away.

Note: PLEASE be sure that you have a nationwide calling plan on your phone if you are having technical difficulties and need to use your phone to dial in, this means that you are able to call long-distance for free which is typical for many cell phone plans. If you are calling from a pre-paid cell phone or land line, long-distance rates may affect you. You do not need to call in if your speakers are producing sound in the web conference.

## Appendix H:

## Daily Pre-Survey E-mail Reminder

Dear Participant,

This is a friendly reminder to review the consent form and complete your demographic data survey and pre-diabetes educational class survey at your earliest convenience. Please disregard this e-mail if you have already submitted the survey. I thank you for your time and participation.

The links to the surveys are found below (please complete both):

**Consent form and demographic survey:** https://www.surveymonkey.com/r/75RN5NV

(Please note, once you review the consent form, by clicking next you we be directed to the demographic data survey)

**Pre-Survey:** https://www.surveymonkey.com/r/75WMHFK

Kind regards,

Samantha Sugarman MSN, RN, FNP-C

George Washington University

Department of Nursing

## Appendix I:

## Weekly Post-Survey E-mail Reminder

Dear Participant,

This is a friendly reminder to complete your post-diabetes educational class survey with the 3 additional questions at your earliest convenience. Please disregard this e-mail if you have already submitted the survey. I thank you for your time and participation.

The links to the surveys are found below (please complete both):

**Post-survey:** https://www.surveymonkey.com/r/9YJZSSZ

**2 additional questions:** https://www.surveymonkey.com/r/9YTYDNT

Kind regards,
Samantha Sugarman MSN, RN, FNP-C
George Washington University
Department of Nursing

## Appendix J:

## Letter of Permission to Recruit Patients

Dear Members of The George Washington University Institutional Review Board,

I, Frank Ramharrack, MD, hereby grant my permission for Samantha Sugarman to recruit patients, provide an online diabetes educational session for these patients, and collect demographic patient data and pre and post self-efficacy survey data from patients in my endocrinology practice at 311 SE 29th Pl. Ocala, Florida 34471 for her study: Effects of an Online Diabetes Self-Management Educational Class on Perceived Self-Efficacy in Patients with Type 2 Diabetes Mellitus, that will take place from December 11, 107 to January 5, 2018.

X_____ Date _____

## Appendix K:

## DNP Project Timeline

| Task | Start Date | End Date |
|---|---|---|
| Contact Primary Advisor | August 7, 2017 | August 19, 2017 |
| Begin IRB Application | August 20, 2017 | August 31, 2017 |
| Recruitment | December 11, 2017 | January 5, 2018 |
| Intervention and Data Collection | December 31, 2017 | January 28, 2018 |
| Data Entry | January 14, 2018 | February 11, 2018 |
| Revision of Final Draft | February 11, 2018 | February 20, 2018 |
| Submit Final Draft to Advisor | February 20, 2018 | February 20, 2018 |
| Revision of Final Paper | March 4, 2018 | March 27, 2018 |
| Submission of Final DNP Project Proposal for Review | March 27, 2018 | March 27, 2018 |
| Create Project Poster | March 1, 2018 | March 6, 2018 |
| Submit Final DNP Project Poster | April 10, 2018 | April 10, 2018 |
| Present Final DNP Project Poster | May 18, 2018 | May 18, 2018 |