THE EFFECT OF A CHRONIC DISEASE SELF-MANAGEMENT PROGRAM
ON THE DEPRESSIVE SYMPTOMS OF INDIVIDUALS OVER
THE AGE OF 60 WITH TYPE 2 DIABETES

By
Janine McDonald

A Clinical Project submitted in partial fulfillment of
the requirements for the degree of
Master of Nursing
Washington State University
College of Nursing
Intercollegiate College of Nursing
May 2006
To the Faculty of Washington State University:

The members of the Committee appointed to examine the clinical project of Janine Marie McDonald find it satisfactory and recommended that it be accepted.

C. Carbetta
Chair

Ferrin Oulette

Angleen Flowers
ACKNOWLEDGMENT

I want to express my deepest appreciation and thanks to all my committee members for making the entire process of my research study an incredibly wonderful learning experience. I would like to sincerely thank my chair, Cindy Corbett for all her many hours of help and guidance. Her vast knowledge of the research process and many contributions to my study ensured the quality and flow of concepts demanded of graduate research study. She willingly allowed me complete access to all the data she had painstakingly collected, enabling me to complete my research study in a timely, unencumbered manner. She was never too busy or too stressed to answer any of my many questions. Cindy provided me with the perfect blend of knowledge, encouragement, and motivation.

I met Angela Starkweather during a clinical rotation where she served as my preceptor. I was immediately impressed by her gentle confidence combined with her superior knowledge of the research process. She was the perfect complement to my research study and I deeply valued her contributions.

I lovingly refer to Kenn Daratha as my “taskmaster”. He spent many hours with me reviewing the statistical portion of the study and instilling in me the knowledge he deemed a requirement for all master level graduates. The time I spent with Kenn was invaluable, giving me a much needed and clearer understanding of the statistical portion of my study.

I would also like to thank my mother, father, two sisters, Katie and TC, and all their families for all their unending love and support over the past four years. They have always provided me with the encouragement to never stop trying and the knowledge they are by my side
for time and eternity.

Finally, I want to thank my beautiful daughter, Kelsey. She inspires me daily as my reason for living. I am thrilled that I have been able to instill in her my same love of knowledge and education, and the drive to never stop trying. I know she will go on to do great things with her life and accomplish what is important to her, just as I have done.
THE EFFECT OF A CHRONIC DISEASE SELF-MANAGEMENT PROGRAM
ON THE DEPRESSIVE SYMPTOMS OF INDIVIDUALS OVER
THE AGE OF 60 WITH TYPE 2 DIABETES

By Janine McDonald, M. Nurs.
Washington State University
May 2006

Abstract

Chair: Cindy Corbett

The purpose of this study was to determine if a chronic disease self-management program had an effect on the depressive symptoms of individuals over the age of 60 with type 2 diabetes. The study was a treatment control, quasi-experimental prospective design. Participants (N=81) were adults living in independent living communities. A total of 12 independent living communities were enrolled in the study: 6 for the intervention group and 6 for the control group. Depressive symptoms were measured at baseline, 2 months, 3 months, and 6 months and statistical analysis of the findings was performed.

The results of the study indicate there is no evidence that a chronic disease self-management program has any long-term effect on the depressive symptoms of individuals over the age of 60 with type 2 diabetes. The intervention group had a measurable reduction in depressive symptoms immediately after the conclusion of the study when compared to the control group. However, when depressive symptoms were again measured at 3 and 6 months, the findings indicated this improvement was not sustained over time.
The conclusion of study was that depressive symptoms in persons with type 2 diabetes are not improved by a chronic disease self-management program. Implications include the need for routine depression screening for older adults with diabetes and specifically treating depressive symptoms when indicated. For optimal results, long-term management of both glycemic control and depression is recommended to achieve better health outcomes, decrease risk of complications, and reduce health care costs.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNATURE PAGE</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>vii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>1</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>CONCEPTUAL FRAMEWORK</td>
<td>4</td>
</tr>
<tr>
<td>METHOD AND DESIGN</td>
<td>5</td>
</tr>
<tr>
<td>INTERVENTION</td>
<td>6</td>
</tr>
<tr>
<td>INSTRUMENTS</td>
<td>7</td>
</tr>
<tr>
<td>STATISTICAL ANALYSIS</td>
<td>8</td>
</tr>
<tr>
<td>RESULTS</td>
<td>9</td>
</tr>
<tr>
<td>METHODOLOGICAL LIMITATIONS</td>
<td>11</td>
</tr>
<tr>
<td>CONCLUSION</td>
<td>12</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>15</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>18</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>20</td>
</tr>
</tbody>
</table>
Abstract

**Purpose:** The purpose of this study was to determine if a chronic disease self-management program had an effect on the depressive symptoms of individuals over the age of 60 with type 2 diabetes.

**Methods:** The study was a treatment control, quasi-experimental prospective design. Participants (N=81) were adults living in independent living communities. A total of 12 independent living communities were enrolled in the study: 6 for the intervention group and 6 for the control group. Depressive symptoms were measured at baseline, 2 months, 3 months, and 6 months and statistical analysis of the findings was performed.

**Results:** The major findings of this study indicate there is no evidence a chronic disease self-management program has any long-term effect on the depressive symptoms of individuals over the age of 60 with type 2 diabetes. The intervention group had a measurable reduction in depressive symptoms immediately after the conclusion of the self-management program at 2 months when compared to the control group. However, when depressive symptoms were again measured at 3 and 6 months, findings indicated this improvement was not sustained over time.

**Conclusions:** Depressive symptoms in persons with type 2 diabetes are not improved by a chronic disease self-management program. Implications include the need for routine depression screening for older adults with diabetes and specifically treating depressive symptoms when indicated. For optimal results, long-term management of both glycemic control and depression is recommended to achieve better health outcomes, decrease risk of complications, and reduce health care cost.
Introduction

The association between depression and diabetes has been long recognized as a complex interaction of physical, socioeconomic, psychological, and genetic factors while the direct mechanism remains uncertain. Research indicates that a history of depression significantly increases the risk of developing type 2 diabetes in later years. Diabetes is considered one of the most psychologically and behaviorally demanding of the chronic diseases. A large population-based study compared reported symptoms of depression in participants with diabetes to those without diabetes. The prevalence of depression was significantly higher in the participants with diabetes. The conclusion of two recent meta-analyses was that depression and diabetes are significantly linked to uncontrolled glycemic levels in individuals. Anderson and colleagues (2001) reported that the diagnosis of diabetes doubles the odds of comorbid depression. When depression accompanies diabetes, there is evidence of poorer glycemic control, decreased physical activity, higher incidence of obesity, and the potential for more diabetes end-organ complications. Due to the fact that 95% of diabetes management is conducted by the patient, comorbid depression in diabetes can lead to poorer outcomes and increased risk of complications.

The consequences that chronic diseases have on an individual's life are well documented in the literature. The current health care system is designed for acute rather than chronic care, and patients are not being taught how to manage their own illness. To better meet the needs of persons with chronic disease, diabetes self-management models are being designed and implemented. These models support patients and their families in gaining the skills and confidence to manage their disease on a daily basis, while minimizing the impact of illness on life roles and emotions. With self-efficacy at the core of such models, most models include (1) dealing with the consequences of the disease; (2) problem solving, decision making, and patient confidence; and (3) placing patients and health care practitioners in a partnership relationship, with the health practitioner being responsible for the medical management and the patient responsible for the day-to-day management.

Chronic disease has been identified as the biggest societal threat to health and the largest cause of health care expenditure. The CDSMP was designed to meet the needs of persons with any chronic disease and seems to be especially successful in persons with diabetes. The CDSMP has been shown to
improve functional levels and clinical outcomes while reducing acute care cost for those with chronic disease.9-11 Participants in the CDSMP experienced statistically significant improvements in health behaviors and health status while decreasing health care visits and days of hospitalizations. These findings translated to substantial improvement in the quality of life for individuals with diabetes and reductions in health care costs.

Research has shown that glycemic control is an important predictor of many of the chronic microvascular and macrovascular complications of diabetes.12 Additional research is needed to establish whether an improvement in depression will positively affect glycemic control and the long-term course of diabetes.5 To evaluate the efficacy of diabetes self-management programs on glycolated hemoglobin (A1C), meta-analytic findings have concluded that self-management programs do improve A1C levels immediately after the intervention. However, within 1-3 months after the intervention ceased, the benefits declined.13 This finding emphasizes the point that continued self-management education and support are necessary for optimal long term outcomes. The CDSMP has been shown to improve glycemic control in adults with type 2 diabetes.7-9 Improving glycemic control in persons with diabetes is important because there is a significant correlation between glycemic control and the prevention of long-term microvascular and macrovascular complications of diabetes.12 Diabetes and its complications are responsible for a tremendous individual and public health burden of suffering and health care expenditure.

The increasing incidence of type 2 diabetes is projected into the future in epidemic proportions.12,14-16 For persons with the comorbidity of diabetes and depression, the disease burden is heightened. Therefore, it is imperative to improve glycemic control with effective diabetes education to reduce the existing diabetes burden. While the CDSMP has been shown to improve certain functional and physiological outcomes, an existing gap in knowledge is whether the CDSMP also impacts the depressive symptoms of persons with diabetes and depression. This becomes important when looking at the overall picture of diabetes care and the realization that all the elements affect each other, with the end result being optimal well-being and quality of life for persons with diabetes. The purpose of this analysis, which was part of a larger study, was to determine if the CDSMP reduced the depressive symptoms of persons over the age of 60 with type 2 diabetes.
Conceptual Framework

The conceptual framework used to guide this study was the Interaction Model of Client Health Behavior\textsuperscript{17}. Cox's conceptual model identifies the "physio-psychosocio-environmental factors" of each individual as qualities being unique to that person. These factors (background variables) influence interactions with health care providers, thereby producing a unique health outcome for each person.\textsuperscript{18,19} The concepts in the Interaction Model of Client Health Behavior (IMCHB) emphasize the person as a whole and the unique qualities that influence their interactions with the health care provider. The model finds an indirect relationship between background variables and health behaviors. These background variables do not directly determine health behavior, but rather are more consistently related to their outcomes. The three main elements of the IMCHB are client singularity, client-professional interaction, and health outcome.

Based on the conceptual model in Appendix 1 (Figure 1), the following research questions were developed: Does participation in a chronic disease self-management program have an effect on the depressive symptoms of persons over the age of 60 with type 2 diabetes? Do selected demographic characteristics of an individual influence their response to a chronic disease self-management program? Does an individual's baseline A1C and BMI impact an individual's response to a chronic disease self-management program?

Method and Design

Design

A treatment control, quasi-experimental prospective design was used. Residents of independent living communities were recruited from a city in northwestern Washington State. In order to avoid the sharing of information between participants living in the same community, randomization to either intervention or control groups was done by independent living community level instead of at the individual level. Residential communities were matched according to the number of residents, age of the residents, socioeconomic status, and type of community (apartment or mobile home) in an attempt to limit threats to the internal validity of this study.

A list of independent living communities appearing in a local newspaper was used as a resource for name, location, size of facility, and whether or not residents receive government rent subsidies. The
The Effect of a Chronic Disease

Independent living communities were matched based on these criteria and a coin toss determined which community would be the control versus intervention group. An attempt to match the 2 groups based on the number of residents in a given community, age of residents, and whether residents living in that community could receive rent subsidies was done. A total of 12 independent living communities were enrolled in the study; 6 for the study group and 6 for the control group. The number of participants recruited for the intervention and the control groups were 45 and 36 respectively (N = 81).

Participants for the study and control group were recruited through several means. Flyers were posted throughout the living complexes, articles appeared in newsletters, and word of mouth was encouraged. A presentation about the research opportunity was also made at either residential group meeting or upcoming event that residents were likely to attend. An explanation of the study was provided at this time by the principal investigator (PI). As an incentive for enrollment, participants were offered blood pressure, A1C, and serum lipid monitoring over the 6 month course of the study with a discussion of the results with the PI. Blood pressure, A1C, and lipids were obtained at baseline, 3 months, and 6 months.

The PI contacted and met individually with candidates in their homes and written informed consent was obtained from all participants. Height and weight were obtained. The first questionnaire was given to participants at this time, for completion at their earliest convenience, and collected within one week. The questionnaire contained the baseline data; the demographic information sheet and an instrument to measure depressive symptoms. Another appointment was then made to obtain baseline physiological markers (blood pressure, fasting lipids panel, and A1C) since fasting was required. Subsequent depressive symptom data was collected immediately after the intervention, at 2 months (6 weeks after baseline) as well as 3 and 6 months from baseline for all participants. A1C, blood pressure, and lipid panels were also obtained at 3 and 6 months.

Sample and Setting

The population studied was individuals over the age of 60 with the diagnosis of type 2 diabetes living in independent living communities. To be included in the study, participants needed be physically able to attend weekly group sessions of 2.5 hours each over a 6 week time period. Participants were also required to read, write, and understand the English language. To be included in the 2 month, 3 month, and 6 month
data collection process, persons in the intervention group had to have completed at least 4 of the 6 weekly sessions. Exclusion was based upon not meeting any of these criteria. Participants who did not attend 4 of the 6 sessions were allowed to attend future chronic disease program meetings, but their subsequent data was not included in final analyses.

The intervention of 6 weekly chronic disease workshops was presented in a common meeting area in each residential setting. Bringing the group meetings to each residential setting provided easy access and eliminated transportation barriers to and from sessions.

**Intervention**

The Chronic Disease Self-Management Program (CDSMP) is the intervention that served as the independent variable in this study. The CDSMP is structured to give participants skills and knowledge so that they can play a central role in the management of their chronic illness. Based on social learning theory, the CDSMP has a strong component of self-efficacy and includes opportunities for participants to practice using problem solving and decision making skills. The program is designed to help persons with management of their medical care, maintaining life roles, managing negative emotions, and collaborating with their health care provider and the health care system.\(^{10}\)

The dependent variable for this study was self-reported depressive symptoms as measured by the Geriatric Depression Scale (GDS). The depressive symptoms of study participants receiving the CDSMP were measured and compared to those in the control group at baseline, 2 months, 3 months, and 6 months. The control group did not initially receive the intervention but were offered the CDSMP following the completion of the formal study.

The CDSMP consists of a 6 week, small-group intervention taught from a highly structured manual by professional leaders, peer instructors, or a combination of the two. A healthcare professional and 1 peer instructor led each group during this study. Peer instructors received 20 hours of training, which is the standard to qualify as a group facilitator for the CDSMP. The teaching of the peer instructors and overseeing of the course was done by the PI, who completed the required CDSMP training course, to increase consistency of content and minimize threats to internal consistency. Participants in the group intervention met weekly at a room within their community for 6 consecutive weeks. Each session lasted 2.5
hours and the intervention group participants received a copy of the book *Living a Healthy Life with Chronic Conditions, [2nd ed.]*. Each small group was designed to have approximately 10 persons. Participants were encouraged to attend all meetings for maximal results.

**Instruments**

**Geriatric Depression Scale**

Depressive symptoms were measured using the Geriatric Depression Scale (GDS). The GDS is a self-reported, 30-item instrument developed to measure depression in the geriatric population. Depressive symptoms such as sleep difficulties, decreased energy, and decreased libido are commonly found in the nondepressed elderly population. Due to this fact, a different set of symptom descriptors was incorporated into the development of the GDS to specifically identify depression in the geriatric population. The GDS was designed with ease of administration and economy of time to minimize the fatigue, poor concentration, or short attention span also found in the older adult population.

The GDS was devised by gathering 100 questions related to depression in older persons. Based on prima facie validity rationale, the number of questions was then reduced to the 30 items that best correlated with the total score. The median correlation was 0.68 (range = 0.47 - 0.83). In a 100 subject validation study testing the Hamilton Depression Rating Score (HRS-D) and the Zung Self-Rating Depression Scale (SDS), internal consistency was found to be higher in the GDS than the other two scales. Test/retest reliability was assessed by 20 subjects completing the GDS twice, in a two week time period, with a correlation of 0.85.

Further psychometric analysis also confirmed the reliability and validity of the GDS. Internal consistency was calculated by the Cronbach alpha and the split-half reliability coefficient with a score of 0.94. The median correlation between the items was 0.56 (range = 0.32 - 0.83) while the mean interitem correlation was 0.36. The GDS showed concurrent validity (r = 0.82) with measures used to classify levels of depression by the Research Diagnostic Criteria. The GDS also had high convergent validity when compared to the HRS-D (r = 0.83) and the SDS (r = 0.84). For the study reported here, Cronbach alpha testing was performed to determine reliability. Reliability for the study was found to be 0.90 at baseline, 0.90 at time 2 months, 0.91 at time 3 months, and 0.88 at time 6 months.
The GDS is a 30 item, simple "yes" or "no" dichotomous format that measures mood quality, hopelessness, social interaction, level of energy and motivation, as well as subjective evaluation of various cognitive abilities and functions.\cite{22} The GDS is a screening tool for health care providers. A score of 10 or more positive responses indicates depression and warrants further clinical evaluation. Possible treatment by an individual's health care provider may include mental health referral and/or use of antidepressants. For the purposes of this analysis and interpretation of findings, the GDS score is also referred to as total moods score.

Demographic Questionnaire

In order to determine and describe the characteristics of the sample, demographic variables were obtained using a demographic information questionnaire designed by the PI. The questionnaire included gender, age in years, ethnic origin, BMI and A1C. Age, gender, and ethnicity were thought to be important for determining the impact of the CDSMP on depressive symptoms.\cite{4, 12, 26} BMI and A1C have also been shown to impact depressive symptoms.\cite{5, 6, 26} Therefore, these variables were used as covariates during analysis to determine their influence on depressive symptoms and whether they had an impact on participants' response to the CDSMP.

Statistical Analyses

After screening and cleaning the data set for accuracy, histogram and scatterplots were used to analyze the normality of the data. Assumptions of normality were met allowing for parametric analysis to be performed. Histogram plotting identified sample heterogeneity for this data by providing both a visual representation of the findings and a means of looking at the distribution of the percentages of people who scored 10 or above (the cut-off for further evaluation of depression) on the GDS.

To evaluate research question 1, Does participation in a chronic disease self-management program have an effect on the depressive symptoms of persons over the age of 60 with type 2 diabetes?, paired sample t test, ANOVA, and ANCOVA testing were performed. To evaluate question 2, Do selected demographic characteristics of an individual influence their response to a chronic disease self-management program?, bivariate correlations and ANCOVA testing were done. To evaluate question 3, Does an individual's baseline A1C and BMI impact an individual's response to a chronic disease self-management
program, correlation testing and ANCOVA testing were done. A significance level of 0.05 was used for this study. Both SPSS 12.0 and SAS 9.1 were used to analyze the data.

Results

Characteristics of Participants

Demographic variables of the study participants were obtained through participant completion of the demographic form. Analysis of this information provides a description of the sample being studied so that findings can be generalized to the population. Covariates being examined in this analysis and thought to be significant to the findings included gender, age in years, ethnicity, BMI, and A1C. The sample size for this study was 81, with 45 participants in the intervention group and 36 participants in the control group. Descriptive analysis of the demographic characteristics, BMI, and A1C were performed to obtain means, standard deviations, ranges, frequencies, and skewness.

The majority of the sample was female, 75.6% in the intervention group and 80.6% in the control group. This disproportionate ratio of male to female participants is typical of independent living community populations. The majority of residents were widowed females secondary to the life expectancy of females being greater than that of males. Ethnic diversity was found to be more varied in the control group when compared to the intervention group. In the intervention group, 97.8% were Caucasian and 2.2% were mixed ethnicity whereas in the control group, 77.8% were Caucasian, 2.8% were black, 2.8% Filipino, 2.8% Hispanic, 5.6% American Indian, 5.6% Soviet, and 2.8% were mixed ethnicity (p<0.01).

The age of participants in the intervention group (62 - 93 years with a mean of 78.6 years) was similar to the age of the control group (65 - 95 years with a mean of 75.9 years) (p= 0.12). Baseline BMI for the intervention group ranged from 20 - 56 with a mean of 30.68 and the control group's BMI was 20 -50 with a mean of 33.28 (p = 0.22). The baseline A1C for the intervention group had a range of 5.1 to 9.7 with a mean of 6.7. The baseline A1C for the control group ranged from 5.1 to 12.0 with a mean of 6.6. Again, there was no significant difference between groups (p = 0.67).

Impact of CDSMP on Depressive Symptoms (Research Question 1)

Baseline total mood scores of the GDS were found to be similar between the intervention and control group (p = 0.81). The intervention group (n = 45) had baseline GDS scores ranging from 0 to 25 with the
mean of 8.62. Analysis of the data revealed 18 individuals in the intervention group with GDS scores 10 or greater, indicating potential pre-existing depression (36%). The control group (n =36) had baseline GDS scores ranging from 0 to 23 with a mean of 8.29. The number of individuals in the control group with GDS scores 10 or greater was 12 (33%). These findings of homogeneity between the two groups allowed for the assumption of group equivalency. For the ANOVA results, standardized residuals were computed and found to be approximately normally distributed, consistent with the assumption for parametric analysis.

Further examination of the mean depressive symptom scores over time with dependent t tests demonstrate a decrease in the intervention group directly after the chronic disease program (2 months) but this reduction was not sustained. (See Appendix B, Table 2). When Bonferroni’s correction was done for a conservative interpretation of the data, no significant effect was found. Bonferroni’s correction was done to decrease the risk of a chance finding from baseline, a common Type 1 error in research when multiple t tests are performed. By increasing the level of significance to .0166, there is a control for the possible escalation of the significance of the findings. Using this level of significance, the null hypotheses that the COSMP had no impact on the depressive symptoms of participants was accepted.

Subsequent analyses confirmed that the COSMP had little influence on depressive symptoms over time. Findings of ANOVA testing revealed results similar to the t test. Findings indicated there was a significant time effect (p =0.016) but no group effect (p = 0.24) when comparing intervention and control groups. The time period revealing the most significant change was the total mood scores between baseline and 2 months, with differences existing in the intervention group primarily. At baseline, there was only a small difference between the total mood score of the intervention group (mean =8.07) compared to the control group (mean = 9.00). From baseline to 2 months, immediately after the COSMP was completed, results indicated that there was a significant reduction in the intervention group’s total mood scores (mean = 6.07) when compared to the control (mean = 9.32) during this same time period. Again, this effect disappeared with comparison on mean scores at 3 and 6 months. No other significant differences occurred between these time periods for either the control or intervention group (See Appendix B, Table 2).
Influence of Demographic Variables on Response to CDSMP (Research Question 2)

Review of the literature identifies gender, age, and ethnicity as demographic variables that may have an impact on the relationship between depression and diabetes. Results of the demographic data for this study demonstrated that more females than males participated and that the control group was more ethnically diverse. Divaricated correlations were done between total depressive symptoms at baseline as measured by the GDS to both age and then gender. No significant correlations were found. ANCOVA testing was also done to determine if gender, age, and ethnicity had any impact on response to CDSMP. While the literature may suggest differences in depressive symptoms based on gender, age, and ethnicity, this study found none of these covariates were significant. Results of ANCOVA testing revealed the following levels of significance; age ($p = 0.70$), gender ($p = 0.24$), and ethnicity ($p = 0.83$).

Effect of A1C and BMI on Depressive Symptoms (Research Question 3)

Correlation and ANCOVA testing revealed no significant association between A1C and depressive symptoms for any time period. ANCOVA testing revealed results consistent with prior findings. There was a time difference, with the change in depressive symptoms of the intervention group between baseline and 2 month appearing to account for this finding (See Appendix B, Table 2), but there was no group difference. Thus, despite evidence in the literature of the impact of A1C and BMI on depressive symptoms, these factors did not significantly impact depressive symptoms in this study.

Methodological Limitations

Limitations to this study included the inability to randomize participants individually. Randomization of the sample increases the likelihood that participants with various levels of extraneous characteristics are included and dispersed throughout both groups in the study. The intervention variable, the chronic disease program, was presented in a group meeting site at each independent living community. It was decided by the PI that participants may share information and course content among themselves and possibly affect the outcome of the study if individually randomized. To minimize the effect of this type of contamination, participants were randomized by independent living community.

Analysis of the demographic data identified a difference in ethnicity between groups, with the control being more ethnically diverse than the intervention. No other differences between groups were identified.
However, it is possible that other differences may have existed and affected the study findings but were not identified.

Another limitation to this study was the fact that convenience sampling was performed, which may not be representative of the population. In addition, self-reported questionnaires were used in this study. Problems inherent in this method of seeking information include human error, underreporting of symptoms, lower response rate, question misinterpretation, and general lack of control by the researcher including knowledge of who actually completed the questionnaire (i.e. the participant or family member or friend).

Conclusion

The major findings of this study indicate there is no evidence that a chronic disease self-management program has a long-term effect on the depressive symptoms of individuals over the age of 60 with type 2 diabetes. The comorbidity of diabetes and depression is well established in the literature. Depressive symptoms have a direct effect on poor glucose control by influencing an individual’s ability to adhere to a self-care regimen. Depressive symptoms have also been found to be significantly associated with lower adherence to dietary recommendations and exercise programs, poorer physical functioning, and higher diabetes symptom reporting among individuals with diabetes. More direct and aggressive management of depression among individuals with diabetes has been found to improve both physical and mental health.

For optimal realization of benefit for depressive care, it has been suggested that treatment for depression be sustained beyond the acute-care phase. Evaluating the impact of sustained follow-up care for depression and the resulting effect on glycemic control is a priority for future research.

A recent meta-analysis of group-based training for self-management strategies in persons with type 2 diabetes acknowledges their effectiveness in reducing A1C levels, improving fasting blood glucose levels, and increasing diabetes knowledge. While adoption of self-management skills is necessary to effectively manage diabetes and improve quality of life, these programs alone do not directly address or manage depressive symptoms. The above findings are consistent with the results of this research study. The CDSMP appeared to improve the depression symptoms of individuals immediately after the intervention at 2 months. However, this effect did not remain significant when the more rigorous Bonferonni’s testing was
done. In addition, no significant effect was found at the 3 month and 6 month evaluation (1 and 3 months after completion of the CDSMP).

Despite the evidence that treatment of depression is associated with improved mood, functioning, and quality of life, 2 out of 3 depressed individuals with diabetes remain untreated. Thus, there is an urgent need for practitioners to become educated in the assessment and treatment of depression among individuals with diabetes. Diabetes and its complications are responsible for both tremendous individual burden and the public health burden of suffering. Sadly, there is no immediate relief in sight for this epidemic. The projections into the future of those expected to be diagnosed with diabetes will again double in the year 2030. The current health care system is already burdened with the increased cost of chronic care associated with the aging population of "baby boomers" entering their elder years. Effective diabetes education has been shown to be an integral part of comprehensive diabetes care that improves glycemic control, thereby reducing the incidence of microvascular and macrovascular complications. However, evidence also suggests that ongoing support and education are required to sustain these improvements. Chronic disease management programs, such as the CDSMP, have been implemented to provide such support. Unfortunately, the results of this study indicate that the CDSMP does not significantly impact long-term depressive symptoms in older adults with diabetes. Comorbid depression is associated with poorer glycemic control and health outcomes and higher health care cost in persons with diabetes. Suggested treatment for depression and diabetes include the combination of cognitive behavior therapy and supportive diabetes education or the use of serotonin selective reuptake inhibitors.

The significance of this study and implications for further research include the identification of means to improve quality of life issues for those with chronic disease as well as achieving long-term reduction in health care cost. This can be done through providing both chronic disease self-management education, as well as treating the comorbid symptoms of depression. When a patient is diagnosed with type 2 diabetes, the responsibility of the health care provider does not end with providing medical treatment and self-management education. Knowing the increased incidence of diabetes and depression, the health care provider should also screen each and every patient for depressive symptoms. The GDS scale is an
excellent screening tool specifically designed for the geriatric population, whereas the Hamilton Depression Rating Score (HRS-D)\textsuperscript{23} and Zung Self-Rating Depression Scale (SDS)\textsuperscript{24} can be used in younger individuals. Screening individuals with diabetes for depressive symptoms should be recommended as a routine part of health care services.
References


Appendix A
Background Variables
- Age
- Gender
- Ethnicity
- BMI
- A1C

Affective Response
- Depressive symptoms

Clinical Health Indicators
- Depressive Symptoms

Figure 1  Interaction Model of Client Health Behavior
Appendix B
Mean Depressive Symptoms Over Time

<table>
<thead>
<tr>
<th>Time PerIODS</th>
<th>Compared</th>
<th>Intervention Group Means Scores</th>
<th>Control Group Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td>7.80 - 6.07</td>
<td>7.92 - 8.19</td>
</tr>
<tr>
<td>&amp; 2 months</td>
<td></td>
<td>(p = 0.05)</td>
<td>(p = 0.70)</td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td>7.80 - 8.10</td>
<td>7.92 - 9.16</td>
</tr>
<tr>
<td>&amp; 3 months</td>
<td></td>
<td>(p = 0.94)</td>
<td>(p = 0.15)</td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td>7.80 - 8.81</td>
<td>7.92 - 9.04</td>
</tr>
<tr>
<td>&amp; 6 months</td>
<td></td>
<td>(p = 0.19)</td>
<td>(p = 0.22)</td>
</tr>
</tbody>
</table>

Table 2