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**The Relationships Among Depression,  
Self-Care Agency, Self Efficacy, and  
Diabetes Self-Care Management**

**Besher A Gharaibeh**  
Chair, Department of Adult Health, Faculty of Nursing  
University of Science and Technology  
Jordan

**Byron J. Gajewski**  
Professor, Department of Biostatistics  
School of Medicine, University of Kansas Medical Center  
USA

**Diane K. Boyle**  
Professor and Wyoming Excellence Chair in Nursing  
Fay W. Whitney School of Nursing, University of Wyoming  
USA

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Athens Institute for Education and Research  
8 Valaoritou Street, Kolonaki, 10671 Athens, Greece  
Tel: + 30 210 3634210 Fax: + 30 210 3634209 Email:  
info@atiner.gr URL: [www.atiner.gr](http://www.atiner.gr)  
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## **The Relationships Among Depression, Self-Care Agency, Self Efficacy, and Diabetes Self-Care Management<sup>1</sup>**

**Besher A Gharaibeh**

**Byron J. Gajewski**

**Diane K. Boyle**

### **Abstract**

**Aim:** To examine relationships among depression, diabetes knowledge, self-care agency, self efficacy, and diabetes self-care management based on a modification of the Diabetes Self-Care Management Model.

**Background:** The coexistence of diabetes and depression is associated with negative outcomes such poor diabetes self-care management. Complex relationships exist between diabetes knowledge, self efficacy, self-care agency, depression, and diabetes self-care management. No study has examined the relationships between all these factors in the same study.

**Methods:** A cross-sectional, correlational model testing design was used. Participants (n=78) completed questionnaires containing measures for the model variables. Multiple regression analyses tested the hypothesized conceptual model relationships.

**Results:** The mean CES-D score was  $20.5 \pm 11.4$  (range 21.7 to 95.7). Depression had a direct negative relationship with self-care agency and self efficacy, but the relationship between depression and diabetes self-care management was not direct. Self-care agency and self efficacy completely mediated the effect of depression on diabetes self-care management. Self efficacy completely mediated the effect of self-care agency on diabetes self-care management.

**Conclusion:** Effective treatment programs for persons managed with insulin likely should include not only screening and treatment of depression, but also skills training to enhance patient self-care agency and self efficacy alongside diabetes self-care management.

**Keywords:** Diabetes, diabetes self-care management, depression, self efficacy, self-care agency

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## **Introduction**

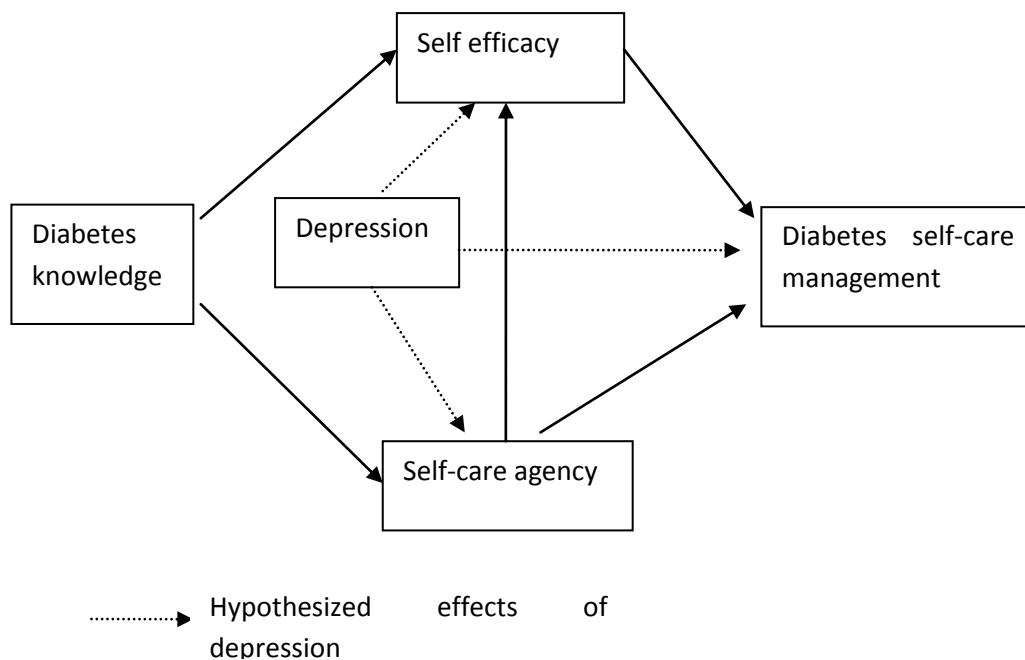
The coexistence of diabetes and depression is associated with significant morbidity, mortality, diminished quality of life, and increased health care costs (Egede and Ellis 2010, Egede and Hernández-Tejada 2013). Meta-analyses have demonstrated that depression is associated with hyperglycemia in persons with type 1 and type 2 diabetes and is significantly associated with the presence of and increased severity of a variety of diabetes complications such as diabetic retinopathy, nephropathy, neuropathy, macrovascular complications, and sexual dysfunction (De Groot et al. 2001, Lustman et al. 2000). Depression also has been associated with less adherence to different aspects of diabetes self-care management (Egede and Ellis 2008, 2010, Sacco et al. 2005), which is considered a cornerstone in delaying or preventing diabetes complications (American Diabetes Association - ADA 2012). Therefore, additional investigation of the mechanisms by which depression affects diabetes outcomes is of utmost importance for improving the effectiveness of diabetes treatment (Egede and Hernández-Tejada 2013). Our research aim was to examine relationships among depression, diabetes knowledge, self-care agency, self efficacy, and diabetes self-care management based on a modification of the Diabetes Self-Care Management Model.

## **Literature Review**

Diabetes self-care management (DSCM) is "the exercise of self-care- the actual performance of self-care actions by individuals to manage their diabetes" (Sousa and Zauszniewski 2005: 64). DSCM has complex relationships with diabetes knowledge (knowledge of disease, healthy eating, being active, blood glucose monitoring, and taking medication), self-care agency (capabilities to perform self-care activities), and self efficacy (belief in personal capabilities to perform an action and in the results of performing the action) (Sousa et al. 2004, Sousa et al. 2005). Atak et al. (2008) reported that diabetes knowledge affected only some areas of DSCM such as diet, physical activity, and managing acute complications. They concluded the effect of diabetes knowledge on DSCM is limited. In other words, diabetes education, regardless of education method, is essential but not sufficient alone to affect DSCM (Hass et al. 2012, Sigurdardottir 2005). Sousa et al. (2004) found that diabetes knowledge had no direct effect on DSCM, but did directly affect self-care agency and self efficacy. In turn, self-care agency and self efficacy directly affected DSCM. Self efficacy partially mediated the effect of self-care agency on DSCM, i.e., self-care agency has a direct effect on DSCM as well as having an indirect effect on DSCM through self efficacy. In further testing, Sousa et al. (2005) also found that self-care agency and self efficacy directly affected DSCM, but did not directly affect metabolic control (HbA1c). DSCM directly affected glycemic control, but there was no mediation effect of DSCM on the relationship between self-care agency and self efficacy on glycemic

control. Sousa et al. (2005) concluded that to achieve glycemic control the diabetic person must perform self-care activities; beliefs or capabilities for self-care alone are not enough to achieve that control. In a study of people with type 2 diabetes, Heisler et al. (2005) obtained similar findings and concluded that factors beyond knowledge are associated with self efficacy and DSCM. Likewise, Gallegos et al. (2006) reported that self-care agency in people with type 2 diabetes significantly affected DSCM, but not HbA1c. DSCM affected HbA1c.

**Figure 1.** *Study Conceptual Model for Proposed Relationships of Depression on Self-Care Agency, Self Efficacy, and Diabetes Self-Care Management*



Depression has been found to impact self efficacy and DSCM (Cherrington et al. 2010, Egede 2005), but not diabetes knowledge (De Groot et al. 2001). Further, Cherrington et al. (2010) found that self efficacy mediated the effect of depression on glycemic control in adults with diabetes, however the effect was not completely accounted for. Although no study was found that addressed the relationship between depression and diabetes self-care agency, Egede and Ellis (2008) found that self-care ability – a concept included within self-care agency – was significantly lower in depressed persons with diabetes.

Studies have addressed the relationships between depression, diabetes knowledge, self efficacy, self-care agency, and DSCM, but we found no study that addressed the relationships between all these factors in the same study. Furthermore, the studies about these relationships generally were not guided by a model or theory. Our study aim was to examine the relationship between

depression and diabetes knowledge, self-care agency, self efficacy, and DSCM based on a modification of Sousa and colleagues (Sousa et al. 2004) Diabetes Self-Care Management Model (Figure 1). The modification was the addition of depression and it was placed within the model based on previous research. We hypothesized that:

- H1. Depression has a direct negative effect on self-care agency, self efficacy, and DSCM.
- H2. Self efficacy mediates the relationship between depression and DSCM.
- H3. Self-care agency mediates the relationship between depression and DSCM.
- H4. Self efficacy partially mediates the relationship between self-care agency and DSCM.
- H5. Diabetes knowledge, depression, self-care agency, and self efficacy all together affect DSCM.

## **Methods**

### ***Design***

We used a cross-sectional correlation model testing design to examine the relationships within the study conceptual framework. The study was approved by the University of Kansas Medical Center Institutional Review Board.

### ***Participants and Procedures***

Adult participants were recruited from three clinics and two community sites in a Midwestern metropolitan area in the United States. Inclusion criteria were: 18 years or older; medical diagnosis of either type 1 or type 2 diabetes; minimum diabetes duration of 6 months; taking insulin; and ability to understand, speak, and write in English. The study was limited to those taking insulin in order to obtain participants who required more complex capabilities to perform specific self-care activities for management of diabetes. Also, depression is higher among those who take insulin (Li et al. 2008). Individuals who were pregnant, not managed by insulin, or had cognitive impairments were excluded from the study.

A staff member at each study site screened potential participants for study inclusion and exclusion criteria. Persons who fit the criteria were informed about the study by the staff person and invited to participate. Those who agreed to participate were given the study questionnaire packet with a cover letter summarizing the study, the participant's rights, and the researchers' contact information. Return of the questionnaire implied consent. A ten dollar compensation was offered to those who returned the completed questionnaires.

***Measures***

The study questionnaire packet contained measures for each of the conceptual framework variables and demographic questions. Depression was assessed by the validated and widely used Center for Epidemiological Studies Depression Scale (CES-D) (Radloff 1977), which is designed to measure depressive symptomatology in the general population. Scores can range from 0 to 60; higher scores indicate greater frequency of depressive symptoms. A score of 16 or more has been used frequently to distinguish between depressed and non-depressed persons (Egede and Ellis 2008). Coefficient alpha for the CES-D in the current sample was 0.83.

The Diabetes Knowledge Test (DKT) (Fitzgerald et al.1998), developed by the Michigan Diabetes Research and Training Center, was used to measure general knowledge of diabetes and includes insulin-use items. Scores range 0 to 100; higher scores indicate higher diabetes knowledge. Reliability and validity of the DKT has been established (Fitzgerald et al. 1998, Sousa et al. 2009). Coefficient alpha for the DKT in the current sample was 0.85.

Self efficacy was measured by the Diabetes Self Efficacy Scale (DSES) (Sousa et al. 2009). The DSES is based on Bandura's self-efficacy theory (Bandura 1977), the American Diabetes Association (ADA) standards of diabetes care (ADA 2008), and the American Association of Diabetes Educators (AADE) self-care behaviors (Funnell et al. 2008). Higher scores, on a possible range of 0 to 300, indicate higher diabetes self efficacy. The DSES has support for its validity and reliability (Sousa et al. 2009). Coefficient alpha for the DSES in the current sample was 0.95.

The Appraisal of Self care Agency Scale-Revised (ASAS-R) (Sousa et al. 2008), based on Orem's self-care theory (Orem 1995), was used to measure self-care agency. Scores can range 24 to 120; higher scores indicate higher self-care agency. Sousa and colleagues established support for reliability and validity of the ASAS-R (Sousa et al. 2008). Coefficient alpha for the ASAS-R in the current sample was 0.75.

Last, diabetes self-care management was measured with the Diabetes Self-Management Scale (DSMS) (Sousa et al. 2009). The DSMS is based on Orem's self-care theory (Funnell et al. 2008), the 2008 ADA standards of diabetes care (ADA 2008), and the AADE self-care behaviors (Funnell et al. 2008). Higher scores, on a possible range of 0 to 200, indicate higher diabetes self-care management. Reliability and validity of the DSMS was assessed and supported by Sousa and colleagues (Sousa et al. 2009). Coefficient alpha for the DSMS in the current sample was 0.95.

***Statistical Analyses***

SPSS version 20.0 was used for all analyses. Summary statistics were used to describe socio-demographic characteristics of the sample and of the model variables. Multiple regression methodology was chosen in order to test the model mediation, moderation, and other effects as hypothesized, controlling for appropriate demographic variables. Race/ethnicity was dummy coded as White and non-White and education was dummy coded as high school or lower and

above high school. Statistical assumptions for multiple regression analyses were assessed and met. Statistical significance was defined as  $p \leq .05$ .

Mediation effects were assessed using the method of Baron and Kenny (1986). A mediation effect means that the causal variable (e.g., variable X) affects the outcome variable (e.g., variable Y) through two pathways: (1) direct effect of variable X on variable Y, and (2) indirect effect through which the causal relationship is controlled by another variable, the mediator (e.g., variable M). Statistically, if the impact of X on Y remains significant when the mediator M is considered, the mediation is partial, and if the impact of X on Y becomes insignificant when the mediator M is considered, the mediation is full or complete.

## Results

### *Participant Characteristics*

A total of 80 participants returned complete questionnaires. Two were eliminated from the study because they were not being managed by insulin, leaving a total of 78 participants in the study. The typical participant was a 47 year-old Caucasian (52.6%) male (56.4%) who was married (47.4%) and had at least a high school education (59.0%). Just over half of participants were persons with type 2 diabetes (55.1%). The mean years of having diabetes was  $11.9 \pm 10.3$  and ranged from 1 to 41 years. High cholesterol level (43.6%) and high blood pressure (38.5%) were the two most reported co-morbidities. Exactly half of participants reported taking insulin only and the other half reported taking insulin plus oral antihyperglycemic agents.

The mean depression score (CES-D) for the entire sample was  $20.5 \pm 11.4$  (range 1.0 to 46.0); 61.5% of participants scored 16 or above, which is indicative of likely depression. The mean diabetes knowledge score was  $60.4 \pm 22.4$  (range 21.7 to 95.7). Mean self-efficacy score was  $214.8 \pm 38.4$  (range 131.0 to 293.0) and mean self-care agency scores were  $85.7 \pm 12.5$  (range 59.0 to 120.0). Mean diabetes self-care management score for the sample was  $129.9 \pm 33.2$  (range 53.0 to 192).

### *Inter-Relationships of Model Variables and Demographic Variables*

Zero-order correlations were significant and moderately negative between depression and diabetes knowledge ( $r = -0.34, p \leq 0.01$ ), self-care agency ( $r = -0.48, p \leq 0.01$ ), self efficacy ( $r = -0.42, p \leq 0.01$ ) and DSCM ( $r = -0.42, p \leq 0.01$ ). In regard to DSCM, significant and moderate to strong positive correlations existed between DSCM and self-care agency ( $r = 0.63, p \leq 0.01$ ), self-efficacy ( $r = 0.80, p \leq 0.01$ ), and years of having diabetes ( $r = 0.36, p \leq 0.01$ ). Point biserial correlations demonstrate that taking insulin injections plus oral antihyperglycemic agents was associated significantly with lower DSCM vs. participants who were taking insulin injections only ( $r_{pb} = -0.25, p \leq 0.05$ ). Similarly, having type 2 diabetes was associated with lower DSCM than



having type 1 diabetes ( $r_{pb} = -0.31, p \leq 0.01$ ). Race and education level were not significantly correlated with DSCM.

To determine appropriate demographic characteristics to use as control variables in the mediation and model testing, multiple regression analyses were conducted to test the effect of demographic variables (age, gender, race, type of diabetes, years of having diabetes, type of medication, and level of education) on each of the model variables of depression, self-care agency, self efficacy, and DSCM. Type 2 diabetes and being non-white were significantly predictive of higher depression, as measured by the CES-D (Table 1). Years of having diabetes was the only significant predictor of higher DSCM. No demographic variables were significantly predictive of self-care agency and self efficacy.

**Table 1.** Regression Analyses of Demographic Variables with Model Variables

Demographic variable	$\beta$ CES-D	$\beta$ SCA	$\beta$ SE	$\beta$ DSCM
Age	-0.05	0.018	-0.14	-0.04
Gender <i>1=Male</i> <i>2=Female</i>	0.95	3.41	-2.38	4.65
Race <i>1=White</i> <i>2=non-White</i>	6.58*	-1.71	-5.61	-8.82
Type of diabetes <i>1=Type1</i> <i>2= Type2</i>	8.25*	-6.30	-6.29	-10.12
Years of having diabetes	-0.16	0.227	0.61	1.11*
Type of medication <i>1=Insulin only</i> <i>2=Insulin and oral antihyperglycemic agents</i>	-5.14	3.69	-10.47	-6.85
Level of education <i>1= High school or lower</i> <i>2=Above high school</i>	0.60	4.29	17.33	3.80

\*Beta ( $\beta$ ) significant at  $\leq 0.05$ .

CES-D = Depression; DK = Diabetes Knowledge; SCA = Self-Care Agency; SE = Self Efficacy; DSCM= Diabetes Self Care Management

Source: Authors' estimations.

### ***Hypothesis Testing***

**H1: Depression has a direct negative effect on self-care agency, self efficacy, and DSCM.**

Separate multiple regression analyses demonstrated that depression significantly and negatively affected self-care agency ( $\beta = -0.53, p < 0.01$ ), self efficacy ( $\beta = -1.43, p < 0.01$ ), and DSCM ( $\beta = -1.01, p < 0.01$ ).

**H2: Self efficacy mediates the relationship between depression and DSCM.**

To test for a mediation effect of self-efficacy between the relationship of depression and DSCM – where depression is the independent variable, self

efficacy is mediator, and DSCM is the outcome -first, a regression analysis tested the effect of depression on DSCM controlling for years of having diabetes. Depression significantly and negatively affected DSCM ( $\beta = 1.01, p < 0.01$ ). Second, regression assessed the effect of depression on self efficacy, controlling for education. Depression significantly and negatively affected self efficacy ( $\beta = -1.43, p < 0.01$ ). Last, regression analysis tested the effect of depression and DSCM when controlling for the mediator of self efficacy and years of having diabetes. The effect of the mediator self efficacy on DSCM was significant ( $\beta = 0.638, p < 0.01$ ) and the effect of depression on DSCM became insignificant ( $\beta = -0.128, p > 0.05$ ). Thus, self efficacy mediated the effect of depression on DSCM controlling for years of having diabetes. In other words, the effect of depression on DSCM is completely dependent and controlled by the level of self efficacy (Table 2).

**Table 2.** Hierarchical Multiple Regression Analysis for Mediation Effects of Self Efficacy and Self-Care Agency

<b>Self Efficacy as Mediator for the Effect of Depression on DSCM</b>						
<i>Source of variation</i>	<i>Outcome Variable</i>	<i>Step</i>	<i>R</i>	<i>R<sup>2</sup></i>	<i>β</i>	<i>p</i>
<i>Depression, controlling for years of having diabetes</i>	<i>DSCM</i>	1	0.50	0.25	-1.01	<0.01
<i>Depression, controlling for level of education</i>	<i>Self efficacy</i>	2	0.42	0.18	-1.43	<0.01
<i>Depression, controlling for SE and years of having diabetes</i>	<i>DSCM</i>	3	0.84	0.71	-0.128	>0.05
<b>Self-Care Agency as Mediator for the Effect of Depression on DSCM</b>						
<i>Source of variation</i>	<i>Outcome Variable</i>	<i>Step</i>	<i>R</i>	<i>R<sup>2</sup></i>	<i>β</i>	<i>p</i>
<i>Depression, controlling for years of having diabetes</i>	<i>DSCM</i>	1	0.50	0.30	-1.01	<0.01
<i>Depression</i>	<i>Self-care agency</i>	2	0.48	0.23	-0.53	<0.01
<i>Depression, controlling for self-care agency and years of having diabetes</i>	<i>DSCM</i>	3	0.67	0.45	-0.34	>0.05
<b>Self Efficacy as Mediator for the Effect of Self-Care Agency on DSCM</b>						
<i>Source of variation</i>	<i>Outcome Variable</i>	<i>Step</i>	<i>R</i>	<i>R<sup>2</sup></i>	<i>β</i>	<i>p</i>
<i>Self-care agency, controlling for years of having diabetes</i>	<i>DSCM</i>	1	0.66	0.44	1.49	<0.01
<i>Self-care agency</i>	<i>Self efficacy</i>	2	0.64	0.41	1.97	<0.01
<i>Self-care agency, controlling for self efficacy and years of having diabetes</i>	<i>DSCM</i>	3	0.84	0.72	0.36	>0.05

DSCM = diabetes self-care management.

Source: Authors' estimations.

H3: Self-care agency mediates the relationship between depression and DSCM.

To test for a mediation effect of self-care agency between the relationship of depression and DSCM – where depression is the independent variable, self-care agency is mediator, and DSCM is the outcome – first a regression analysis assessed the effect of depression on DSCM controlling for years of having diabetes. Depression significantly affected DSCM ( $\beta = -1.17, p < 0.01$ ). Second, regression tested the effect of depression on self-care agency. Depression had a significant effect on self-care agency ( $\beta = -0.52, p < 0.01$ ). Last, regression analysis tested the effect of depression on DSCM, while controlling for the mediator of self-care agency and years of having diabetes. The effect of the mediator self-care agency on DSCM was significant ( $\beta = 1.64, p < 0.01$ ) and the effect of depression on DSCM became insignificant ( $\beta = -0.55, p > 0.01$ ). Thus, self-care agency mediated the effect of depression on DSCM, controlling for years of having diabetes (Table 2).

H4: Self efficacy partially mediates the relationship between self-care agency and DSCM.

To test for a mediation effect of self efficacy between the relationship of self-care agency and DSCM – where self-care agency is the independent variable, self efficacy is mediator, and DSCM is the outcome – first a regression analysis assessed the effect of self-care agency on DSCM controlling for years of having diabetes. Self-care agency significantly affected DSCM ( $\beta = 1.49, p < 0.01$ ). Second, regression tested the effect of self-care agency on self efficacy. Self-care agency had a significant effect on self efficacy ( $\beta = 1.97, p < 0.01$ ). Last, regression analysis tested the effect of self-care agency on DSCM, while controlling for the mediator of self efficacy and years of having diabetes. The effect of the mediator self efficacy on DSCM was significant ( $\beta = 0.58, p < 0.01$ ) and the effect of self-care agency on DSCM became insignificant ( $\beta = 0.36, p > 0.01$ ). Thus, self efficacy completely mediated the effect of self-care agency on DSCM, controlling for years of having diabetes – rather than a partial mediation as we had hypothesized (Table 2).

H5: Diabetes knowledge, depression, self-care agency, and self efficacy all together influence DSCM.

Linear combinations of diabetes knowledge, depression, self-care agency, self efficacy, and DSCM as predicted by the conceptual model were tested using hierarchical multiple regression analyses (Table 3). First, regression analysis assessed the effect of the linear combination of diabetes knowledge, depression, self-care agency, and self efficacy on DSCM, controlling for years of having diabetes. Self efficacy ( $\beta = 0.58, p < 0.01$ ) and years of having diabetes ( $\beta = 0.64, p < 0.01$ ) significantly predicted DSCM. Second, regression analysis assessed the effect of the linear combination of diabetes knowledge, depression, and self-care agency on self efficacy. Only self-care agency ( $\beta = 1.80, p < 0.01$ ) significantly affected self efficacy. Third, regression analysis assessed the effect of the linear combination of diabetes knowledge and depression on self-care agency. Both diabetes knowledge ( $\beta = 0.14, p < 0.05$ )

and depression ( $\beta = -0.58, p < 0.01$ ) significantly affected self-care agency. The model accounted for 28% of the variability in self-care agency, 43% of the variability in self-efficacy, and 72% of the variability in DSCM. Figure 2 provides a revised conceptual model based on our study findings.

**Table 3.** *Unstandardized Regression Coefficients and Increments in Explained Variance ( $R^2$ ) of the Model Variables*

Predictor Variables	Self-Care Agency	Self Efficacy	Diabetes Self-Care Management
Diabetes Knowledge	0.14**	-0.03	N/A
Depression	-0.43*	-0.53	-0.04
Self-Care Agency	N/A	1.8*	0.35
Self Efficacy	N/A	N/A	0.58*
Years of having Diabetes	N/A	N/A	0.64*
$R^2$	0.28	0.43	0.72

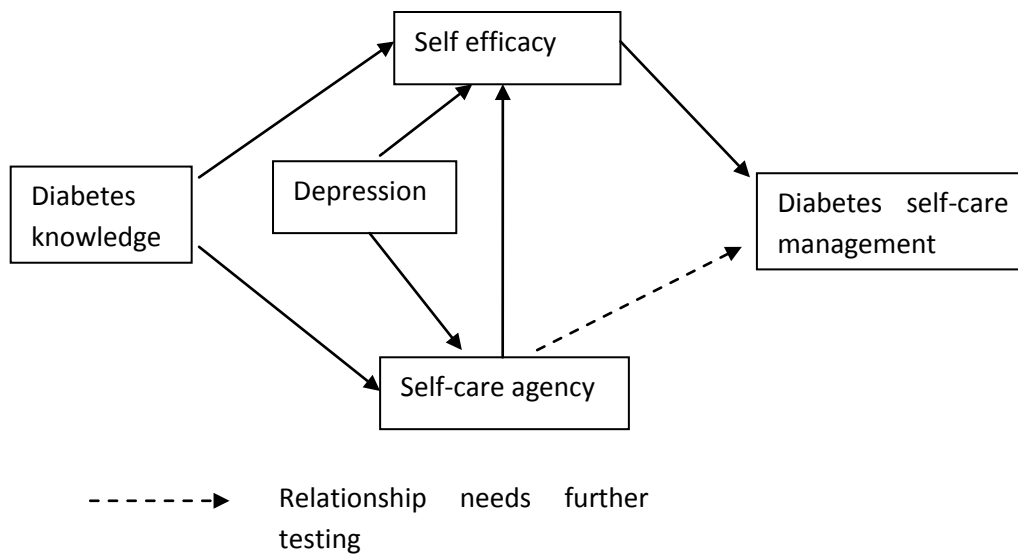
\*  $p \leq 0.01$

\*\* $p \leq 0.05$

N/A = not applicable.

Source: Authors' estimations.

**Figure 2.** *Revised Model of Relationships of Depression on Self-Care Agency, Self Efficacy, and Diabetes Self-Care Management*



Source: Sousa et al. (2004) and authors' estimations.

## Discussion

Our study added new findings about the complex relationships among depression, diabetes knowledge, self-care agency, self efficacy, and DSCM among persons who have diabetes managed by insulin. Depression was negatively correlated with diabetes knowledge, self-care agency, self efficacy, and DSCM. However when we tested the full study conceptual model, depression had a direct negative relationship with self-care agency and self efficacy, but the relationship between depression and DSCM was not direct. Self-care agency and self efficacy completely mediated the effect of depression on DSCM. Depression did not affect diabetes knowledge. Years of having diabetes also directly affected DSCM. Our findings about the relationships among the study variables supported findings of other researchers (e.g. Egede 2005, Egede and Ellis 2008, Sousa et al. 2004).

The mediation effects of self-care agency and self efficacy on the relationship between depression and DSCM had not been tested before and we found the pathways of influence on DSCM cannot be interpreted without addressing the effect of the mediators because in our study there was no direct effect of depression on DSCM. People with depression and diabetes managed by insulin have lower abilities to care for themselves; this in turn decreases the likelihood of performing diabetes self-care activities. They also have diminished beliefs in their capabilities, which in turn decrease the likelihood of performing diabetes self-care activities.

Although Sousa et al. (2004) found self efficacy partially mediated the effect of self-care agency on DSCM, we found this effect to be completely mediated and therefore warranting more exploration in future studies. Nonetheless, based on our results, this mediation effect indicates that the influence of depression on DSCM can take multiple pathways of influence: (a) through affecting self efficacy, which in turn can affect DSCM directly; (b) through affecting self-care agency, which in turn may directly affects DSCM; and (c) through affecting self-care agency, which in turn impacts self efficacy and then DSCM.

Improving diabetes care in persons with co-morbid depression is challenging. For example, a recent Diabetes Attitudes, Wishes, and Needs (DAWN) Monitoring of Individual Needs in Diabetes (MIND) study found that less than half of clinic patients who had screening scores indicating emotional problems were offered a referral (Snoek et al. 2011). The DAWN MIND researchers stated screening a patient with a questionnaire takes 5-7 minutes and discussion of the outcomes with the patient takes about 15 minutes. The extra time per patient poses challenges to clinicians in busy clinics. Nonetheless, better detection and treatment of this debilitating disorder is essential and can dramatically improve quality of life for people with diabetes (Li et al. 2009, Wua et al. 2011). Using knowledge of the model pathways, potential effective intervention programs need to be tested in research and applied to practice. Such programs can include not only screening and

treatment of depression, but also skills training to enhance patient self-care agency and self efficacy alongside DSCM.

DSCM is crucial is considered a cornerstone in delaying or preventing diabetes complications, providing higher quality of life, and lowering cost of therapy in people with diabetes (ADA 2012). However, DSCM is complex and understanding the factors that influence individuals' performance of DSCM is essential for nursing practice. Because depression, self-care agency, self efficacy account for only part of the variance in DSCM, further study is needed to identify other factors contributing to DSCM.

***Relevance to Nursing Practice, Health, and Social Policy***

Depression among people with diabetes is not uncommon and is associated with significant morbidity, mortality, diminished quality of life, and increased health care costs (Egede and Ellis 2010, Egede and Hernández-Tejada 2013). So, effective treatment of comorbid depression is considered an essential component of high quality care for persons with diabetes. Understanding the nature and pathways of influence of depression on DSCM will help clinicians provide better treatment and to limit the negative impact of diminished self-care activities. For example, our findings may help clinicians better identify the existence of depression: deterioration of DSCM might be considered as a later sign of depression, whereas decreasing self efficacy or self-care agency can be considered as earlier signs of depression. Clinicians who are aware of the pathways by which depression affects DSCM can develop better protocols for achieving DSCM. Such protocols should consider not only early screening for depression but also doing repeated assessments of depression over time by clinicians. Better detection of this debilitating disorder is essential because depression is underdiagnosed in people with diabetes (Li et al. 2009). Improved screening and treatment for depression can dramatically improve quality of life for people with diabetes (Wua et al. 2011).

A clearer understanding of the relationships among depression, self-care agency, self efficacy, and DSCM can enable the health professionals to provide more comprehensive care, rather than just focusing on patient education to achieve self care and glycemic control. Also, health care professionals can expand the elements of diabetes education to include the psychological aspects of self-care agency and self efficacy in addressing DSCM. Lastly, from a policy perspective, managing depression in people with diabetes using antidepressant medications and cognitive behavioral therapy may save up to \$2,100 per person per year (Ciechanowski et al., 2000).

***Limitations***

We acknowledge several study limitations. We used a convenience sample from clinics and community sites with high proportions of non-White clients. We also limited the sample to those managing their diabetes with insulin. The sample composition and size may limit generalizability, however, we were able to obtain a sample where a large proportion scored 16 or higher on the CES-D for the model testing. The CES-D is a self-report measure and not a confirmed clinical diagnosis.

## Conclusions

Our study findings provide a clearer understanding of the mediation effects among diabetes knowledge, depression, self-care agency, self-efficacy and DSCM, which can be useful for health professionals. A direct relationship exists between diabetes knowledge and self-care agency and diabetes knowledge and self efficacy. There is no direct relationship between depression and diabetes knowledge. Depression directly and negatively affects self-care agency and self efficacy, which in turn have direct effects on DSCM. Self efficacy mediates the relationship between self-care agency and DSCM. Self-care agency and self efficacy completely mediate the effect of depression on DSCM. Diabetes knowledge and depression have no direct effect on DSCM. Effective treatment programs likely should include not only screening and treatment of depression, but also skills training to enhance patient self-care agency and self efficacy alongside DSCM.

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