



Original Article

Using Social Cognitive Theory to Predict Medication Compliance Behavior in Patients with Depression in Southern United States in 2016 in a Cross-Sectional Study

Britney Bennett¹, Manoj Sharma^{2*}, Russell Bennett³, Anthony R. Mawson⁴, Sarah G. Buxbaum⁴, Jung Hye Sung⁴

¹Epidemiologist, STD/HIV Office, Mississippi State Department of Health, Jackson, Mississippi

²Department of Behavioral & Environmental Health, School of Public Health, Jackson State University, Jackson, Mississippi

³Department of Health Policy & Management, Jackson State University, Jackson, Mississippi

⁴Department of Epidemiology & Biostatistics, Jackson State University, Jackson, Mississippi

ARTICLE INFO

Article History:

Received: 24 May 2017

Accepted: 2 Nov. 2017

ePublished: 1 Mar. 2018

Keywords:

Cognitive theory,
Depression, Medication
adherence

*Corresponding Author:

PhD in Preventive
Medicine

E-mail:
manoj.sharma@jsums.edu

ABSTRACT

Introduction: Depression is a major public health issue. One of the concerns in depression research and practice pertains to non-compliance to prescribed medications. The purpose of the study was to predict compliance with medication use for patients with depression using social cognitive theory (SCT). Based on this study it was envisaged that recommendations for interventions to enhance compliance for medication use could be developed for patients with depression.

Methods: The study was conducted using cross sectional design (n=148) in southern United States with a convenience sample of clinic-based depression patients with a 37-item valid and reliable questionnaire. Sample size was calculated to be 148 using G*Power (five predictors with a 0.80 power at the 0.05 alpha level and an estimated effect size of 0.10 with an inflation by 10% for missing data). Social cognitive theory constructs of expectations, self-efficacy and self-efficacy in overcoming barriers, self-control, and environment were reified. Data were analyzed using multiple linear regression and multiple logistic regression analyses.

Results: Self-control for taking medication for depression (P=0.04), expectations for taking medication for depression (P=0.025), age (P<0.0001) and race (P=0.04) were significantly related to intent for taking medication for depression (Adjusted R² = 0.183). In race, Blacks had lower intent to take medication for depression.

Conclusion: Social cognitive theory is weakly predictive with low explained variance for taking medication for depression. It needs to be bolstered by newer theories like integrative model or multi-theory model of health behavior change for designing educational interventions aimed at enhancing compliance to medication for depression.

Citation: Bennett B, Sharma M, Bennett R, Mawson AR, Buxbaum SG, Sung JH. Using social cognitive theory to predict medication compliance behavior in patients with depression in southern United States in 2016 in a cross-sectional study. *J car sci* 2018; 7 (1): 1-8. doi:10.15171/jcs.2018.001.

Introduction

Depression affects approximately 350 million people worldwide, and about 14.8 million people in the United States.¹ In other words, depression affects about 3-10% of the worldwide population and about 20.3% of the United States population.² According to the World Health Organization (WHO), depression has exceeded ischemic heart disease, traffic accidents, and cerebrovascular disease in disability rates, making it the leading cause of on-going health-related disability in the world.³ Annually, approximately 25 billion dollars are paid as disability payments to mentally ill people.⁴ Depression is ranked third in workplace problems, and has an annual cost of about 70 billion dollars in medical expenses, lost productivity, and other work-related monetary losses.⁵

In addition, depression is responsible for nearly 12 billion dollars lost per year from missed workdays. Depression is reported as the primary reason for admission in nearly 15 percent of the total hospitalizations.⁶ Hospital admissions due to

depression are accountable for 21.8 billion dollars of hospital cost in the United States.⁶ Although depression is treatable, if the patient does not seek the proper medical attention or adhere to their medication for depression medications, their depressive condition can come back, worsen and eventually lead to suicide. Suicide is contemplated by more than 8 million people each year, suicide is attempted by more than 1 million people, and about 38,000 of those people are successful in their attempt to commit suicide.^{1,7} Depression claims nearly half of all suicide attempts and actual suicides in the United States.²

The above-mentioned facts are the main reasons depression has been named as a key contributor to global burden of disease.⁸ Noncompliance to treatment for depression is a major issue found in the literature. Novel ways to develop interventions to address the issue of noncompliance need to be explored through theoretical paradigms.

As of now, the definite cause of depression cannot be limited to only one particular factor; therefore clinicians

use several approaches for treatment. Exercise, light therapy, and brain stimulation therapy are alternative and complementary treatment options for depression, but the most commonly used treatments are psychotherapy and/ or medications.⁹ The severity of the depressive state, the symptoms displayed, and the personal situation faced by the individual all play a role in determining the type and length of treatment a person receives.⁹

Although depression treatment is known to be effective, the majority of the people who need treatment do not receive it. This is because many people who have been diagnosed are ashamed and do not want to be associated with the social stigma that comes along with mental illnesses.⁵ Other barriers to receiving appropriate treatment can be a result of lack of trained providers and lack of resources.⁵ Clinicians use the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a guide to diagnosis of depression.¹⁰ Unfortunately, the recognition of depression is meager; with only a third of the cases being properly identified.⁹ It is difficult to diagnose depression because so many other physical and psychiatric disorders exhibit the same symptoms as depression.

In reference to medication for depression treatment, the biggest problem is no adherence or noncompliance to the medication.¹¹ Patients do not comply with prescribed treatment due to a myriad of reasons. Medications for depression are medications used as a standard approach in treating patients in the acute phase of moderate to severe cases of depression.¹² There are several types of medication for depression such as selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), tricyclics, and monoamine oxidase inhibitors (MAOIs).¹³

No theoretical paradigms thus far have been used to assess compliance to these medications. Social cognitive theory or any other theory have not been used in the literature. These medications are prescribed to meet the need of the patient. Even though all of these drugs are known as effective treatment for depression, many patients do not fully recover because they discontinue treatment within the first three months.¹¹ More than half of the patients who discontinue their treatment experience recurrence of the depressive episode at some point in their lives.¹¹ This is due to lack of educational interventions to promote compliance based on theoretical paradigms. For this reason, many patients' depression is classified as chronic, which causes them to be placed on a long-term medication for depression treatment regimen. Once the patient has been placed on medication for depression for life, nonadherence to the medication for depression becomes a major factor in reaching the ^{desired} treatment outcomes.¹⁴ Nonadherence refers to a number of behaviors related to taking medication for depression. For example, not attending appointments, not filling prescriptions, not taking the medication for depression, not following the dosage guidelines are all considered to be acts of nonadherence.¹⁴ Nonadherence or

noncompliance for this study has been defined as not taking medication for depression as prescribed.

In efforts of dealing with compliance to medication for depression, increased clinician-patient communication that focuses on the expectations of the treatment can improve treatment compliance.¹⁵ Multifaceted interventions have been proven to be more effective than single-factor interventions in efforts of improving compliance to medication for depression.¹⁶ Interventions aimed toward unintentional nonadherence, which includes reminders, improvement of patient counseling, and simplifying the dosage, displayed a positive impact on medication for depression compliance.¹⁷ Interventions geared toward increasing the patient knowledge about depression and medication for depression and properly addressing any concerns or fears that the patient may have of taking medication for depression may improve intentional nonadherence.¹⁷ The primary research question that the study addressed was to what extent selected social cognitive theory constructs predict compliance behavior in depression patients. There is a gap in the literature as theory-based approaches have not been tested in this context.

The social cognitive theory (SCT) is a theory of human behavior based on the assumption that expectations, thoughts, and beliefs influence's ones behavior and is shaped by the individuals' social environment.^{18,19} This approach has not been tested for compliance behavior in depression patients. In this study, the SCT will be used to predict medication for depression compliance behavior in patients with depression. Personal, behavioral, and environmental factors are all thought to work collectively to influence human behavior. The SCT has a number of constructs, but only five were used to build a parsimonious model for this study: expectations for taking medication for depression (combination score of outcome expectations and outcome expectancies), self-efficacy for taking medication for depression, self-efficacy in overcoming barriers for taking medication for depression, self-control for taking medication for depression, and environment for taking medication for depression. In theory testing parsimony is very important.²⁰ The operational definitions of these constructs have been explained in the methods section.

The social cognitive theory can be applied in efforts of understanding and addressing the issues due to non-adherence to medication for depression medication. In the case of the current study, the theory will serve as a framework to identify depression patients at high risk for non-adherence to medication for depression and methods to improve behavior change. Medication for depression compliance can be one of the most difficult changes to implement because of the stigma associated with depression, the fear of becoming dependent on medication, side effects, and lack of knowledge about depression. Working closely with the patients and their families to increase the knowledge about the importance of treatment adherence is vital in decreasing the negative outcomes associated with

negative compliance behavior. Social cognitive theory has been tested with other behaviors and offers a potentially viable approach. This is a novelty in this study.

Materials and methods

The design for this study was chosen to be cross-sectional with data collected over a month in 2016. The target population for this study consisted of all mental health patients suffering from depression at some point in their lives living in a metropolitan area in Southern United States in the metropolitan area of Jackson, Mississippi. For the purpose of the study, mental health patients from one or more psychiatric practices were recruited to complete the proposed instrument on compliance to medication for depression behavior in this pilot study. Permission to conduct the surveys was obtained from the psychiatrist/ owner of the practice. The sample consisted of both men and women, who were 18 years of age or older, of any race, diagnosed with depression and prescribed medication for depression. To protect the participants all identifying information was anonymous for this study. No names or other identifiers were collected from the participants. In order to calculate the sample size, five predictors with a 0.80 power at the 0.05 alpha level and an estimated effect size of 0.10 were considered. Using G*Power, a sample size of 134 was required. This was inflated by 10% for any potential missing data thus yielding an a priori sample size of 148.

To develop the instrument, five self-report scales were designed for the social cognitive theory constructs, which is inclusive of expectations for taking medication for depression, self-efficacy for taking medication for depression, self-efficacy in overcoming barriers for taking medication for depression, self-control for taking medication for depression, and environment of taking medication for depression. A Likert scale was used to measure items on scales designated for each measured construct. Outcome expectations for taking medication for depression were measured by five items on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) as measured on items 13-17 that covered aspects such as "If you take medication for depression you will... not get depressed, enjoy life more, have better relationships, have fewer worries, and have less stress." Outcome expectancies for taking medication for depression were measured by five items on a scale of not at all important (0), slightly important (1), moderately important (2), very important (3), extremely important (4) as measured on items 18-22 that covered aspects such as "How important is it to you that you... not get depressed, enjoy life more, have better relationships, have fewer worries, and have less stress?" Outcome expectations for taking medication for depression and outcome expectancies for taking medication for depression were operationalized together as expectations for taking medication for depression by obtaining combination scores between

the corresponding items and summing all the combination scores yielding a possible range of 0-80. Self-efficacy for medication for depression (measured on items 23-25 that covered aspects such as "How sure are you that you can... take medication for depression every day, take medication for depression as instructed, take medication for depression in prescribed doses?") yielding a possible score of 0-12; self-efficacy in overcoming barriers for medication for depression (measured on items 26-31) yielding a possible score of 0-24; and self-control for taking medication for depression (measured on items 32 and 33 that covered aspects such as "How sure are you that you can... set goals to take medication for depression and reward yourself with something you like for taking medication for depression?") yielding a possible score of 0-8 were all measured by five items on a scale of (0) not at all sure, (1) slightly sure, (2) moderately, (3) very sure, (4) completely sure. Environment for taking medication for depression were measured by five items on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) as measured on items 34-36 that covered aspects such as "You can afford medication for depression when they are prescribed to you?; Medication for depression is easy for you to obtain?; and Your primary care provider can prescribe medication for depression when you need it?" yielding a possible score of 0-12.

Permission from University IRB was obtained prior to the study. A quota sample of 148 (all mental health patients suffering from depression and prescribed medication for depression) participants in selected clinics in metropolitan area of Jackson, Mississippi who gave permission were recruited to participate in the study. Inclusion criteria for participation in the study were (1) current diagnosis of depression by a health care provider, (2) prescription of medication for depression by a health care provider, (3) age over 18 years, (4) any race, (5) provision of voluntary informed consent. Exclusion criteria for this study were (1) any participant who appeared in severe distress, (2) suffering from an immediate life threatening condition, (3) who were not currently diagnosed with depression and prescribed medication for depression, and (4) who did not give voluntary informed consent. Informed consent for the participants was incorporated into the instrument along with the visibility of the IRB stamp on the first page. One hundred and forty eight participants collectively from each practice during one or more visits completed the survey.

For reliability, Cronbach's alphas were calculated to measure the internal consistency for the five subscales used in this study. The scales were 1- outcome expectations for taking medication for depression (Cronbach's alpha = 0.90), 2- outcome expectancies for taking medication for depression (Cronbach's alpha = 0.85), 3- self-efficacy for taking medication for depression (Cronbach's alpha = 0.90), 4- self-efficacy in overcoming barriers for taking medication for depression (Cronbach's alpha = 0.93), 5- self-control for taking medication for depression (Cronbach's alpha = 0.64), and 6- environment for taking medication for

depression (Cronbach's alpha = 0.80). For the entire scale the Cronbach's alpha was 0.93. All of the subscales were found to be reliable with a value above 0.70 except for self-control (0.64). This low value could be due to the fact that this was a new scale and because only two items were used. This is in the minimally acceptable range.^{20,21} The scales were not altered.

The construct structure was developed by the researchers and confirmed by the experts. In order to ascertain statistically confirmatory factor analysis (CFA) was conducted to confirm factors for the social cognitive theory constructs in relation to medication for depression compliance behavior. Both principal component and maximum likelihood methods were carried out to analyze each construct. The a priori level was an Eigenvalue greater than 1.0 and factor loadings of each item greater than 0.44.²⁰ The subscales measuring outcome expectations, outcome expectancies, self-efficacy, self-efficacy in overcoming barriers, self-control, and environment satisfied all criteria and confirmed one factor solutions.

Results

The IBM SPSS Statistical package (version 21.0) was used to obtain the descriptive statistics for the study such as means and standard deviations for metric variables and frequencies and percentages for categorical variables. The statistical analysis for the study was to develop both a multiple linear regression and multiple logistic regression models in efforts of modeling the predictors for compliance to medication for depression. The predictors used were the five constructs of social cognitive theory. For multiple linear regression the a priori criteria of probability of F to enter the predictor in the model was chosen as less than and equal to 0.05 and for removing the predictor as greater than and equal to 0.10.

The sample was made up of 148 participants. The minimum age of the study participants was 18 and the maximum age observed was 84 years. The mean age of the study sample was 44 years and the standard deviation was 14.023. In the sample, 62 (41.9) were males and remaining 86 (58.1) were females. In the sample, 106 (71.6) were Black, 39 (26.4) were White, 1 (0.7) was Asian, 1 (0.7) was American Indian, and 1 (0.7) identified as other. As for education, 22 (14.9) did not complete high school. In the sample, 51 (34.5) completed high school. 58 (39.2) had attended but not completed college. In the sample, 12 (8.1) had a Bachelor's degree, 2 (1.4) had a Master's degree, and 3 (2) had a Doctorate degree. In reference to income, the majority of the study participants 118 (79.7) made less than \$25,000. 22 (14.9) made between \$25,001- \$50,000, 6 (4.1) made between \$50,001- \$75,000, and the remaining 2 (1.4) made between \$100,001- \$125,000. These demographic characteristics have been summarized in Table 1. The minimum length of diagnosis was 1 month and the maximum length of diagnosis was 600 months (50 years). The mean length

of diagnosis was 137.28 months (11.42 years) with a standard deviation of 118.134.

Table 1. Summary of the demographic characteristics of the medication for depression compliance sample (n = 148)

Variable	N (%)
Gender	
Male	62(41.9)
Female	86(58.1)
Race	
Other	1(0.7)
White	39(26.4)
Black	106(71.6)
Asian	1(0.7)
American Indian	1(0.7)
Education	
Less than high school	22(14.9)
High school	51(34.5)
Some college	58(39.2)
Bachelor's degree	12(8.1)
Master's degree	2(1.4)
Doctorate degree	3(2)
Income	
Less than 25,000	118(79.7)
25,001 - 50,000	22(14.9)
50,001 - 75,000	6(4.1)
100,001 -125,000	2(1.4)
Age(Year)[†](18-84)	44.36(14.02)

[†]Mean (Standard Deviation)

One month was the minimum duration of taking medication for depression and 600 months (50 years) was the maximum. The mean duration of taking medication for depression was 124.43 months (10.33 years) with a standard deviation of 114.536. The minimum amount of breaks from medication was 1 time and the maximum was 20 times. The mean of breaks from medication was 3.48 times with a standard deviation of 3.515.

Approximately 87 (58.8) of the participants had never taken a break from their medication while the remaining 61 (41.2) had taken a break from their medication. The majority of the study participants 101 (68.2) intended to remain taking medication for depression life-long. For 17 (11.5) the intent for taking medication was less than 1 year, for 12 (8.1) the intent for taking medication was 1-2 years, for 3 (2) the intent for taking medication was 2-3 years, for 7 (4.7) the intent for taking medication was 3-4 years, and for 8 (5.4) the intent to take medication for 4-5 years. As for advice for lifelong treatment, 67 (45.3) had not been advised that medication would continue for life and 81 (54.7) had been advised that medication for depression would be life-long.

The means and standard deviations of the constructs of social cognitive theory have been summarized in Table 2. It is evident from the Table that the expectations score is in the middle of the range with 45.38 units, while scores for environment (9.08 units), self-efficacy (9.78 units) and self-efficacy in overcoming barriers (18.00 units) are on the higher end.

Table 3 displays the results of the multiple linear regression analysis on the intent of taking medication for depression using the social cognitive theory

constructs and the demographic variables as predictors. Self-control for taking medication for depression ($P=0.04$), expectations for taking medication for depression ($P=0.025$), age ($P<0.001$) and race ($P=0.04$) were significantly related to intent for taking medication for depression (Adjusted $R^2=.183$).

Table 2. Summary of the SCT constructs for the medication for depression compliance (n=148)

Variable	Possible Range	Observed Range	Mean (SD)
Expectations	0 - 80	0 - 80	45.38 (22.11)
Self-efficacy	0 - 12	0 - 12	9.78 (2.84)
Self-efficacy in overcoming barriers	0 - 24	0 - 24	18.00 (6.44)
Self-control	0 - 8	0 - 8	5.43 (2.26)
Environment	0-12	0 - 12	9.08 (3.13)

Table 3. Parameter estimates from the final regression model for medication for depression compliance as predicted by social cognitive theory constructs and demographic variables for intent to take medication (n = 148)

Variable	Coefficients ^y	Error ^z	Beta	t	P
Constant	4.51	0.60		7.44	<0.001
Age	0.03	0.01	0.27	3.65	<0.001
Expectations	-0.01	0.00	-0.18	-2.33	0.01
Race (black=0; others=1)	0.62	0.30	0.15	2.02	0.04
Self-control	-0.13	0.06	-0.16	-2.05	0.02
Adjusted $R^2 = 0.183$					

^yUnstandardized, ^zStandard

Table 4 displays the results of the multiple linear regression analysis on the duration of taking medication for depression using the social cognitive theory constructs and the demographic variables as predictors. For the study population sample (n = 148), self-control ($P = 0.031$) and environment ($P = 0.047$) were statistically significant predictors for duration of taking medication for depression. This model produced an adjusted R^2 value of 0.029, suggesting that 2.9% of the total variance observed in the duration of taking medication for depression was accounted for by the model.

Table 4. Parameter estimates from the final regression model for medication for depression compliance as predicted by social cognitive theory constructs and demographic variables for duration for taking medication (n = 148)

Variable	Unstandardized coefficients
Constant	118.26
Self-Control	-9.79
Environment	6.49
Adjusted $R^2 = 0.029$	

In race, Blacks had lower intent to take medication for depression. This model produced an adjusted R^2 value of 0.183, suggesting that 18.3% of the total variance observed in the intent of taking medication for depression was accounted for by the model.

Multiple logistic regression analysis was also conducted on the advice for life long treatment using the social cognitive theory constructs and the demographic variables as predictors. For the study population sample, self-control ($\chi^2 = 4.953$, $P = 0.026$) and environment ($\chi^2 = 4.820$, $P = 0.028$) were found to be statistically significant predictors, suggesting that there is a statistically significant association between advice for life long treatment and self-control and environment.

Discussion

The purpose of this study was to test social cognitive theory in predicting compliance to medication behavior among patients diagnosed with depression and who were advised medication. The chief finding from this study was that only few constructs from social cognitive theory were weakly predictive of intent among patients diagnosed with depression to take medication for depression. Only self-control for taking medication for depression ($P = 0.04$), and expectations for taking medication for depression ($P = 0.025$) were the significant constructs in predicting intent for taking medication for depression. The model was aided by age ($P < 0.0001$) and race (other than Blacks) ($P = 0.04$) to bring the predictive power to 18%. When it came to duration of medication only self-control ($P = 0.031$) and environment ($P = 0.047$) predicted 2.9% variance in the dependent variable. This is very weak. Social cognitive theory is almost 30 years old and since then several improvements have occurred in the field. This theory needs to be bolstered by constructs from newer theories such as the integrative model and multi-theory model of health behavior change.²² Following is a discussion of each construct of social cognitive theory used in this study:

Expectations and Compliance to Medication for Depression

Expectations were found to be significant though weak predictors for intent to take life-long medication for depression while it was not a significant predictor for duration or advisement. This construct can be bolstered in future studies by the construct of participatory dialogue from the multi-theory model of health behavior change^{22,23} that suggests that advantages of a behavior change must outweigh disadvantages of behavior change. Simply talking about expectations may not be sufficient. The key would be to convince the patients that taking medication for depression is far more advantageous for them than not taking it. This can be done through a two-way participatory dialogue that the health care provider can have with the patient.

Self-Efficacy and Compliance to Medication for Depression

The study results obtained from the regression models revealed that self-efficacy for taking medication for depression was not significantly associated with compliance to medication for depression. This is surprising as self-efficacy is considered the strongest

predictor of social cognitive theory.²² Perhaps future research should operationalize it as behavioral confidence as suggested in the multi-theory model of health behavior change.^{22,23} Behavioral confidence has been found to be a useful predictor in other studies of multi-theory model.^{24,25}

Self-Efficacy in Overcoming Barriers and Compliance to Medication for Depression

The study results obtained from the regression models revealed that self-efficacy in overcoming barriers for taking medication for depression was not significantly associated with compliance to medication for depression. It was concluded that self-efficacy in overcoming barriers for taking medication for depression was not a significant predictor of compliance to medication for depression.

Self-Control and Compliance to Medication for Depression

Self-control was found to be a significant though weak predictor for duration of medication and intent for taking medication. This is an important finding as it underscores that importance the patient plays in accepting or rejecting the decision whether to take medication or not. The multi-theory model of health behavior change^{22,23} also suggests a related construct that of practice for change that entails goal setting and keeping track of one's behavior.

Environment and Compliance to Medication for Depression

The study results obtained from the regression models revealed that environment for taking medication for depression was not significantly associated with compliance to medication for depression as measured by intent of duration of taking medication for depression. On the other hand, environment for taking medication for depression was significantly associated with compliance to medication for depression as measured by duration of taking medication for depression ($P = 0.047$) and advice for life long treatment ($P = 0.028$). The role of physical environment in initiation of the behavior and social environment in sustenance of the behavior is suggested by multi-theory model of health behavior change^{22,23} and both physical and social environment must be strengthened by future interventions. The construct of environments draws support from recent work on multi-theory model of health behavior change.^{24,25}

One of the limitations to this study was the cross sectional design. This design is a snap shot in time and cannot provide information on the temporal association of the variables under study. However, the theory suggests that the constructs come before the behavior and hence it can be assumed that the SCT constructs indeed were precursors of the compliance behavior.

The second limitation was the instrument used. Though face content and construct validation was done and internal consistency was acceptable. It was based on self-reported responses of depressed patients, which may have led to lack of understanding and dishonesty

(intentional or unintentional). However, for measuring attitudes, which this study was doing there is no other method that can be used and the need for the study is stronger. The compliance behavior was measured as a proxy to actual behavior by measuring the intent to take medication. Perhaps future studies can take into account actual behaviors. The length of the instrument, which was 36 items, may have been too long for some participants to concentrate and give accurate responses. Shorter surveys may have been more feasible for this population. Finally, test-retest reliability was not conducted due to practical constraints, therefore this was a limitation.

There is a definite need to conduct future studies amongst the depressed community as it pertains to medication compliance because there is an indication that there is a significant problem amongst them based on the results of this study. The number of diagnosed depressed patients and those who are prescribed medication for depression are continuously increasing and behavior trends may change over time, which also demonstrates a definite need to continue with future studies. This study involved patients from a public facility who were mostly African Americans and had a low socioeconomic status. It would be interesting to carry out a study in private practice where there may be more Caucasians and individuals with a higher socioeconomic status to conduct a subgroup analysis. There may be significant lifestyle differences between races and socioeconomic groups and a future study may help to explain the behaviors and other factors that might influence compliance to medication for depression.

The instrument was based on SCT. Future studies should develop instruments that have additional constructs that can improve the predictability of the theory. In this study test-retest reliability was not established. Future researchers must establish the test-retest reliability of all subscales.

The findings from the current study exemplify important implications for clinicians and practitioners who are working with enhancing compliance to medication for depression among patients with depression. If they plan to develop an instrument based on the social cognitive theory then they will be able to use this study as a foundation because there are no previous, instruments similar to the one developed in the current study. Future practice can build on this instrument by adding more constructs and testing it to various populations. The main finding from this study was that only few constructs from social cognitive theory were weakly predictive of the intent to take medication for depression. This theory can be improved by adding constructs from newer theories such as multi-theory model of health behavior change.^{22,23} Self-control was found to be an important construct in this study. This can be built in the patients in clinic settings by teaching them goal setting with regard to taking medication, self-rewarding their behavior of taking medication, and in combination with the construct of "practice for change" and "emotional transformation" from multi-theory model of health behavior change by keeping a self-diary,

reflecting on obstacles and modifying plan to take medication and transforming emotions to developing goals with regard to medication compliance. Another construct that was found to be significant was expectations. Simply speaking about expectations may not be sufficient. This construct can be strengthened in future studies by the construct of participatory dialogue from multi-theory model of health behavior change.^{22,23}

This would entail a two-way communication with the patients convincing them that taking medication for depression is far more advantageous for them than not taking it. The educational interventions for increasing compliance in patients can be done one-one-one by the health care provider or also in a group setting such as a psychotherapy session.

Conclusion

Social cognitive theory is weakly predictive of the intent to take medication for depression. It needs to be bolstered by newer theories like integrative model or multi-theory model of health behavior change for designing educational interventions aimed at enhancing compliance to medication for depression.

Acknowledgments

The authors wish to thank the School of Public Health at Jackson State University for its support in carrying out this research.

Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

References

1. Marcus M, Yasamy MT, Ommeren M, Chisholm D, Saxena S. Depression: a global public health concern. 2012 [cited June 2016]. Geneva: WHO Department of Mental Health and Substance Abuse. Available from: http://www.who.int/mental_health/management/depression/who_paper_depression_wfmh_2012.pdf
2. Lazarou C, Kouta C, Kapsou M, Kaite C. Overview of depression: epidemiology and implications for community nursing practice. *Br J Community Nurs* 2011; 16 (1): 41-7. doi:10.12968/bjcn.2011.16.1.41.
3. Craven MA, Bland R. Depression in primary care: current and future challenges. *Can J Psychiatry* 2013; 58 (8): 442-8. doi: 10.1177/070674371305800802.
4. Rost K. Disability from depression: the public health challenge to primary care. *Nord J Psychiatry* 2009; 63 (1):17-21. doi: 10.1080/08039480802541765.
5. Greenberg PE, Kessler RC, Birnbaum HG, Leong SA, Lowe SW, Berglund PA, et al. The economic burden of depression in the United States: how did it change between 1990 and 2000? *J Clin Psychiatry* 2003; 64 (12): 1465-75.
6. Russo CA, Hambrick MM, Owens PL. Hospital stays related to depression, 2005. *Healthcare Cost and*

- Utilization Project (HCUP) statistical briefs [Internet]. 2007 [cited 12 Jun 2016]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK56313/>
7. Han B, Crosby AE, Ortega LA, Parks SE, Compton WM, Gfroerer J. Suicidal ideation, suicide attempt, and occupations among employed adults aged 18-64 years in the United States. *Compr Psychiatry* 2016; 66: 176-86. doi: 10.1016/j.comppsy.2016.02.001.
 8. Centers for Disease Control and Prevention Staff. Depression [Internet]. March 30, 2016 [cited June 6, 2016]. USA: Centers for Disease Control & Prevention. Available from: <http://www.cdc.gov/mentalhealth/basics/mental-illness/depression.htm>.
 9. Avasthi A, Ghosh A. Depression in primary care: challenges & controversies. *Indian J Med Res* 2014; 139(2):188-190.
 10. American Psychological Association. Diagnostic and statistical manual of mental disorders. 5th ed. Washington: American Psychiatric Publishing. 2013.
 11. Madsen JW, McQuaid JR, Craighead WE. Working with reactant patients: are we prescribing nonadherence? *Depress Anxiety* 2009; 26 (2): 129-34. doi: 10.1002/da.20523.
 12. van Servellen G, Heise BA, Ellis R. Factors associated with antidepressant medication adherence and adherence-enhancement programmes: a systematic literature review. *Ment Health Fam Med* 2011; 8 (4):255-71.
 13. National Alliance on Mental Illness. The impact and cost of mental illness: The case of depression [Internet]. 2015 [cited June 16, 2016]. United States: NAMI. Available from: <http://www2.nami.org/Temp/late.cfm?Section=Donate&template=/ContentManagement/ContentDisplay.cfm&ContentID=42733>.
 14. Rivero-Santana A, Perestelo-Perez L, Perez-Ramos J, Serrano-Aguilar P, De Las Cuevas C. Sociodemographic and clinical predictors of compliance with antidepressants for depressive disorders: systematic review of observational studies. *Patient Prefer Adherence* 2013; 7: 151-69. doi: 10.2147/PPA.S39382.
 15. Demyttenaere K. Factor's underlying antidepressant nonadherence: questions and answers [Internet]. September 1, 2009 [cited June 16, 2016]. Available from: <http://primarypsychiatry.com/factors-underlying-antidepressant-nonadherence-questions-and-answers/>.
 16. Chong WW, Aslani P, Chen TF. Health care providers' perspectives of medication adherence in the treatment of depression: a qualitative study. *Soc Psychiatry Psychiatr Epidemiol* 2013; 48 (10):1657-66. doi: 10.1007/s00127-012-0625-3.
 17. Hugtenburg JG, Timmers L, Elders PJ, Vervloet M, van Dijk L. Definitions, variants, and causes of nonadherence with medication: a challenge for tailored interventions. *Patient Prefer Adherence* 2013; 7:675-82. doi: 10.2147/PPA.S29549.
 18. Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs, NJ: Prentice Hall; 1986.
 19. Bandura A. Health promotion by social cognitive means. *Health Educ Behav* 2004; 31 (2): 143-64. doi: 10.1177/1090198104263660.
 20. Sharma M, Petosa RL. Measurement and evaluation for health educators. Jones & Bartlett Publishers, 2012.
 21. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods* 2007; 39 (2):175-91.

22. Sharma M. Theoretical foundations of health education and health promotion. 3rd ed. Burlington, MA: Jones and Bartlett.2017.
23. Sharma M. Multi-theory model (MTM) for health behavior change Webmed Central Behavior 2015; 6 (9): WMC004982.
24. Nahar VK, Sharma M, Catalano HP, Ickes MJ, Johnson P, Ford MA. Testing multi-theory model in predicting initiation and sustenance of physical activity behavior among college students. Health Promot Perspect 2016; 6 (2): 58-65. doi: 10.15171/hpp.2016.11.
25. Sharma M, Catalan, HP, Naha, VK, Lingam V, Johnson P, Ford MA. Using multi-theory model of health Behavior change to predict portion size consumption among college students. Health Promot Perspect 2016; 6 (3): 137-44. doi: 10.15171/hpp. 2016.22.