The effect of self-efficacy and outcome expectation on medication adherence behaviour

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Abstract

Medication adherence still ranks as a big challenge for clinicians and health workers. Based on a social learning theoretical framework, this study explores the adoption of patient adherence, medication adherence as a catalyst for improving the health and quality of life of individuals in Nigeria. Structural Equation Modelling technique was used to analyze the empirical data obtained. SLT variables including self-efficacy and outcome expectation were tested against medication adherence behavior. The constructs are related and positively correlated except definition which is contrary to previous researches. The research discusses these findings while also highlighting the implications for practice and policy.

Introduction

Medication adherence still ranks as a big challenge for clinicians and health workers.[1] This work provides a health-behavior theory-based approach to the study of medication adherence. Theories assist in the design of behavior change interventions in various ways: by promoting an understanding of health behavior, directing research and facilitating the transferability of an intervention from one health issue, geographical area or health care setting to another.[2,3] Adherence to medications has been defined as the process by which patients take their medication as prescribed, described by three quantifiable phases: initiation, implementation, and discontinuation.[4] Adherence to medical regimen is a complex behavioral issue especially to long term therapy in outpatient setting, hence, a theory will help to understand and conceptualize the problem. Theories also assist in the development of coherent interventions, thus, increasing transferability.

This study is focused not only on the adoption of specific behaviors, namely, patient adherence, but also the persistence in patient adherence as a catalyst for improving the health and quality of life of individuals in resource-poor regions, such as sub-Saharan Africa (SSA). Adopting the Social Learning Theory[5] to conceptualize a research model, this study extends the work of Okuboyejo et al.[6] Social learning (SLT) is a general theory that offers an explanation on the acquisition, maintenance, and change in criminal and deviant behavior. Social Learning Theory explains conforming or deviant behavior, abstinence, use and abuse of drugs as socially influenced behavior acquired and sustained through a learning process in which four main sets of variables operate. A sizable number of previous researches support SLT's postulations about the strong correlations between SLT variables and crime, delinquency, adolescent smoking and drug use.[7-12] For example, SLT was used to generate psychosocial predictors of regimen adherence among persons with insulin-dependent diabetes mellitus (IDDM).[13] The study revealed measures of expectancies and environmental support were reliably related to several adherence behaviors. A modified version of the Social Learning Theory of Personality (SLT) was used in an exploratory study on food behavior.[14] Participants who believed they were in control of their destinies (internally-controlled) scored higher on reported nutritious food behavior than those who believed outcomes were due to outside forces (externally-controlled). In Okuboyejo et al.[6] the SLT of medication adherence was explored. This theory was investigated in line with the SLT of Akers and Lee,[5] and identified differential association (direct and indirect interaction with others), definitions, differential reinforcement and observational learning as the constructs. The findings from the research were consistent with reports in literature, hence, validating the appropriateness and suitability of the theory for adherence research.

Materials and Methods

Research design

Health behavior change generally involves 3 essential constructs: patient's readiness for change, perceived importance of change, and confidence in one's ability to change (self-efficacy).[15] Self-efficacy and outcome expectancy have been investigated for restorative care activities,[16] mathematical performance,[17] teacher's orientation towards management,[18] the implementation of instruction innovation,[19] the use of web-based information systems,[20] and among stroke survivors.[21] The findings from these studies provided support for the relationship between self-efficacy, outcome expectation and behavior change. Self-efficacy for treatment adherence was identified as an important correlate of medication adherence in the treatment of HIV and other medical conditions.[22] People are more likely to engage in certain behaviors when they believe they can execute those behaviors successfully (self-confidence). Outcome expectation refers to the expected consequences of one's own behavior.[23,24] Several research works have also provided strong supports for the relationship between self-efficacy and outcome expectations.[25-28] Therefore, in this work, we posit that confidence in one's ability to perform an action (self-efficacy) and the expectations that the behavior will have a desirable result (outcome expectations) are important mediators of performance of medication adherence behavior. Figure 1 represents the research model while Table 1 gives the meanings of the variables.

Research methodology

A cross-sectional survey was used for this study. Data were collected by adopting quantitative methods using a questionnaire. The study population was adult Nigerians who were on any form of medication in outpatient settings. Our intention is to understand the adherence behavior of individuals on medications in outpatient setting. The study sample was a combination of random and convenience sample selected from major cities in the southwest region of Nigeria. This is beneficial in generalizing the study results. The survey instrument was adapted after that of Ronald Akers[5] in the study of substance use among adolescents in Boys Town. The questions were rephrased to reflect the dependent and independent variables of medication adherence. Paper-based questionnaire and semi-structured interviews were used. Study participants were informed of their rights, benefits and risks by means of an informed consent letter, their right of confidentiality and that at no time should they disclose any information with which they felt uncomfortable. To maintain confidentiality, there was no identifying information on any questionnaire. The survey items were also translated to *Yoruba* for the benefit of those who could not read in English by a native speaker. The data collected were entered into Microsoft Excel 2007 exported into Partial Least Square (PLS) analysis software SmartPLS 2.0 M3.

Six hundred copies of the questionnaire were distributed; four hundred and sixty copies were completed and returned. Ten cases were dropped because of incomplete responses for each of the measurement items. Ten cases were dropped because the respondents indicated they were not taking any form of medication. This left four hundred and forty (440) copies of the questionnaire for the statistical analysis, which represented a seventy-three per cent (73%) valid return rate. Twenty copies had a response rate of eighty per cent (80%); had instances of missing values. Mean substitution was used to generate the replacement values for the missing data of the construct.[29]

Results

The formative model was assessed based on the indicator weights and variance inflation factor (VIF for multicollinearity). The indicator weights were estimated from the PLS Algorithm technique and significance measured by means of bootstrapping. A two-tailed t-test with 1.96, and 2.576 critical values of **t** at significant levels (P-value) 0.05, and 0.01 respectively was considered. The T-values of all the constructs were statistically significant at a minimum of 0.05 level (P<0.05, P<0.01). The estimated VIF values are all less than 3.3, with condition indices ranging from 9 to 28 and are within the acceptable range for both parameters indicating the absence of multicollinearity. The coefficient of determination (R^2) of the structural model was measured as 12.5% while MASE predicts only 20.3% of the variation in OE. These R^2 values are considered average from literature[30,31] and are represented in Table 2.

The Effect Size (f^2) was estimated by means of Cohen's f^2. The significance of the R^2 was measured using the following formula:[32]

$$f^2 = \frac{R^2}{1 - R^2}$$

The effect of all exogenous variables on the endogenous variable *medication adherence behavior* (MAB) is small, ($f^2 = 0.145$); while the effect of all exogenous variables on the endogenous variable *outcome expectation (OE)* is medium ($f^2 = 0.254$). All path coefficients as shown in Table 3 below have positive correlation except for the path between definition (DFF) and medical adherence behavior (MAB).

All path coefficients are significant at 0.05 (P<0.05) except for path between OL and MAB is significant at 0.1 (P<0.1); paths between MASE and MAB, OE and MAB are not significant; and there is an indirect linear relationship between MASE and MAB via OE. The SEM technique was used to assess the structural model; this tested the
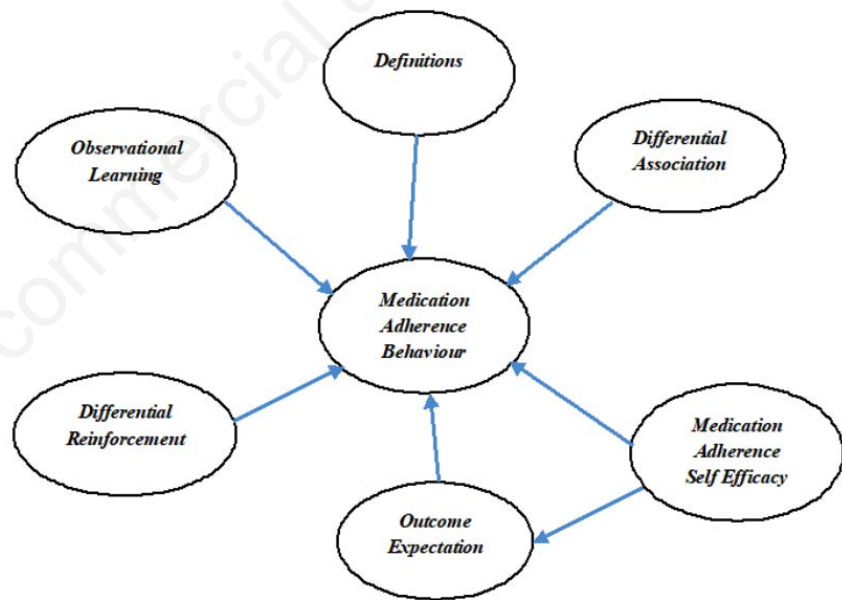

Figure 1. Research Model.

Table 1. Constructs from theory and definitions.

Variable	Definition
Differential Association	Individuals learn the values, attitudes, techniques, and motives for behavior through interaction with others.
Definitions	An individual's own orientations, justifications, excuses and other attitudes that define the commission of an act.
Differential Reinforcement	It refers to the balance of anticipated or actual rewards and punishments that follow or are consequences of an individual's behavior.
Observational Learning	It refers to the engagement in behavior after the direct or indirect observation of similar behavior by others.
Self-Efficacy	People are more likely to engage in certain behaviors when they believe they can execute those behaviors successfully.
Outcome Expectation	Outcome Expectation refers to the expected consequences of one's own behavior.

effects among the seven (7) latent constructs (variables). Differential association (P<0.01), definition (β=-0.2302, P<0.01), differential reinforcement (β=0.183, P<0.05), and observational learning (β=0.1017, P<0.1) all had direct effects on medication adherence behavior at various levels; medication adherence self-efficacy (MASE) (β=0.0244, P>0.1, P>0.05, P>0.01, P>0.001) and outcome expectation (β=0.0022, P>0.1, P>0.05, P>0.01, P>0.001) had no direct effect on medication adherence behavior. MASE has a direct effect on outcome expectation (β=0.4505, P<0.001) with very strong support for the relationship between the two variables. Figure 2 represents the structural equation model with path coefficients calculated from the PLS-Algorithm technique.

Discussion

SLT is made up of differential association, differential reinforcement, observational learning and definitions. These constructs were tested against medication adherence behavior. The constructs are related and positively correlated except definition which is contrary to previous researches. Differential association was found to be a strong and significant predictor of medication adherence behavior, consistent with existing literature.[5,33,34] The measure of differential association is friend/peer association, which loaded strongest on differential association. To improve medication adherence behavior, patients should be exposed to close peers and friends who are perceived as adherent. The more they relate with them and get exposed to their normative beliefs, this behavior is learned and over time, this behavior becomes a way of life for them and even exerts influence on their relationship with friends. Definitions are one's own orientations, rationalizations, justifications, excuses, and other attitudes that define the commission of an act as relatively more right or wrong, good or bad, desirable or undesirable, justified or unjustified, appropriate or inappropriate. Specific definitions orient the person to acts or series of acts and to define given situations as providing opportunity or lack of opportunity for commission of crime. Findings from this work suggest that definitions will negatively affect medication adherence behavior. The more an individual's definitions, beliefs and rationalizations increases, the less the rate of medication adherence and *vice versa*. These findings suggest individuals should be made to understand the importance and need for adherence to their medication.

Differential reinforcement is a significant predictor of medication adherence behavior. The magnitude of the impact is quite low, but significance level indicates it as an important predictor. The hypothesis posits that the greater the value, frequency, and probability of reward for medication adherence, the greater the likelihood of medication adherence. To ensure completeness of medication, patients should be reinforced (rewarded) for successfully completing their medications. The question is *How do we know patients who completed their medication?* Medication bottles or containers could be fit with electronic caps and counters that keep a log of times it was opened, and number of drugs used. Moreover, this is not all encompassing, as the bottles could be opened without taking the medication. Health care personnel should endeavor to measure health outcomes over a period to determine the extent of adherence. Patients who adhered should be rewarded for such acts. Rewards can be in form of free medication or treatment at the patient's next visit. When patients are rewarded, there is the likelihood of improved adherence to medication. The direct/indirect observation of non-adherence behavior by others will influence a patient's rate of medication non-adherence. Observational learning refers to the engagement in behavior after the direct or indirect (*e.g.* in media depictions) observation of similar behavior by others. Findings show that a greater percentage of outpatients do not learn medication adherence behavior by observing others.

There is no support for the relationship between outcome expectation and medication adherence behavior contrary to literature.[26,35] Also, the relationship between outcome expectation and medication adherence behavior was not supported in this
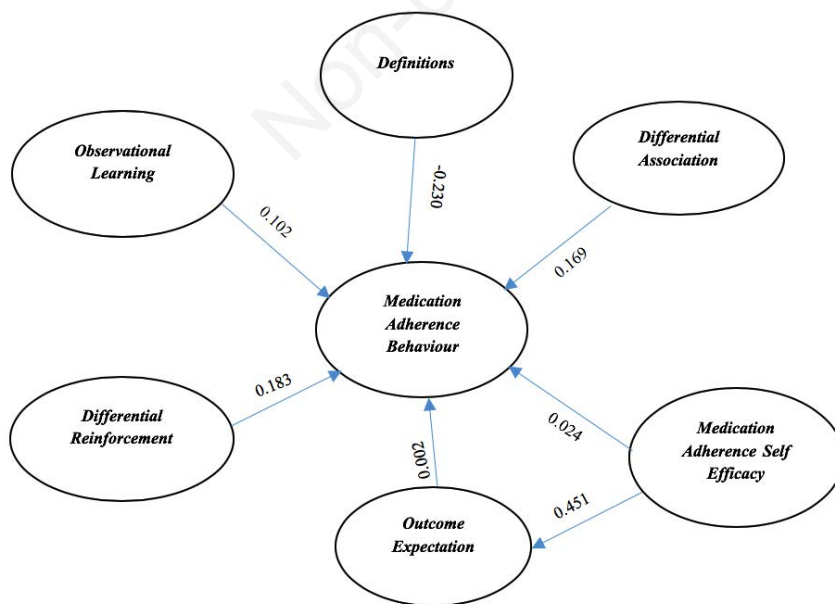

Figure 2. Path Analysis of the Research Model from PLS-Algorithm.

Table 2. Coefficient of determination (R2) of the structural model latent variables.

	R^2	Redundancy
DA	0	0
DFF	0	0
DR	0	0
MAB	0.1254	0.0078
MASE	0	0
OE	0.203	0.1146
OL	0	0

Table 3. Path coefficients of structural model latent variables.

	MAB	OE
DA	0.1689	0
DFF	-0.2302	0
DR	0.183	0
MAB	0	0
MASE	0.0244	0.4505
OE	0.0022	0
OL	0.1017	0

study contrary to literature. People are more likely to engage in certain behaviors when they believe they can execute those behaviors successfully (self-confidence). The perceived self-efficacy plays an important role in influencing individuals' motivation and behavior.[36–38] For our study, we infer that in outpatient settings, self-efficacy does not influence medication adherence behavior. This construct may be significant in controlled settings and randomized trials. However, in line with other works in literature, medication adherence self-efficacy was found to be a strong predictor of outcome expectation. Thus, there is an indirect relationship between medication adherence self-efficacy and medication adherence behavior.

Conclusions

Definitions will negatively affect medication adherence behavior. Individuals should be made to understand the importance and need for adherence to prescribed medication. Health care providers should improve provider-patient relationship. A good relationship will endear patients to their providers facilitating effective and efficient communication with feedback. Feedback suggests how well a patient understands what has been passed across. A thorough understanding of an illness or disease will build the patient's perception of such illness. A positive or negative perception will determine if such patient will adhere. The benefits, usefulness and health conditions that may arise because of medication adherence/non-adherence should be thoroughly taught. Outcome expectation may not be a predictor of medication adherence behavior in outpatient setting. Expected consequences of adherence behavior may not in any way motivate an individual to engage in that behavior without a prior understanding of medication adherence behavior. We suggest that patients be enlightened and educated on the need for medication adherence. Our findings highlight the importance of medication adherence self-efficacy and outcome expectation in medication adherence behavior learning and acquisition. Low self-efficacy will lead to a decline in an individual's differential association, differential reinforcement, imitation and definition. A decline in these social parameters will further lead to a decline in medication adherence self-efficacy. Since an individual's successful performance in other measured variables is a function of his level of self-efficacy and outcome expectation, there is a need to invest in programs and activities to boost

medication-adherence self-efficacy and outcome expectation.

There is a need to also re-educate and sensitize the society at large on the implications of medication adherence. This could also be achieved through media sensitization, hospital/agencies sensitization and using ubiquitous technology devices such as mobile phones. The idea behind some of these types of programs is that by providing positive experiences and role models for non-adherent individuals, they are exposed to conventional norms and values that might diminish future deviant behavior. These approaches will work to cause behavioral change among the populace, and improving overall quality of life.

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