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Structural Equation Modelling of Self-Medication Awareness among Undergraduate Students of Federal University of Technology, Akure

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Abstract

Every day, individuals of all levels of education engage in self-medication, which was defined as the practice of managing one's health without consulting a skilled health professional. The study examined the level of consciousness among undergraduate students regarding the impacts and consequences of self-medication and identified the factors that influenced this attitude. A cross-sectional review was conducted, and data were collected from 390 undergraduates in Federal University of Technology, Akure using a self-administered electronic questionnaire. Both descriptive and inferential statistics were applied on the dataset with the use of AMOS and SPSS statistical packages. The structural equation model analysis showed that the level of awareness of undergraduate students had a significant effect on the consequences of self-medication. It was discovered that the students were well-informed of the negative consequences of self-medication, however, factors such as poverty, lack of trust in the available medical facility, and relative knowledge of drugs and drug use influenced their attitude of self-medication. Thus, the study concluded that it was necessary to increase the level of responsiveness among undergraduate students regarding the adverse effects of self-medication and address the conditions that caused their act of self-medication.

Keywords: Self-medication, Knowledge, Students, Consequences

1. Introduction

Self-medication as defined by the World Health Organization (WHO) is "the selection and use of medicines by individuals (or a member of the individual's family) to treat self-recognized or self-diagnosed conditions or symptoms" (Kumar *et al*., 2015, Asekun-Olarinmoye *et al*., 2019). It is the personal treatment of familiar health problems with pharmaceuticals that are specifically planned and categorized for use without medical supervision or direction and are deemed safe and effective for such practice. This comprises the treatment of common health problems with self-administered or pharmacist-recommended medications, without professional supervision (Ruiz, 2010). WHO also identified that the responsible practice of self-medication gives the advantage of preventing and treating various mild health conditions that do not need primary medical consultation, however, inappropriate use can lead to several health consequences (Mannasaheb, *et al*., 2021).

Youth are particularly susceptible to self-medication. To be specific, undergraduates are more probable to self-administered drugs due to their educational attainment in addition to internet access to medication information. Self-medication, the practice of individuals treating their own ailments without professional medical guidance, is a widespread phenomenon among undergraduate students. It involves the habit of using over-the-counter medications or

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prescribed drugs for personal-treatment purposes (James *et al*., 2020, Amaral *et al*., 2024). Students in Sokoto State were found to involve in personal-medication for ailments like high temperature, called fever, headache, body pain, cough/flu and diarrhoea, with analgesics, antimalarial, antibiotics, anti-flu, and antidiarrheal being the most frequently used medications (Musa *et al*., 2016).

According to a study by Omolase *et al*., (2012), the perceived simplicity of a health condition, financial constraints, and a lack of access to health care services were the primary reasons why respondents indulge in self-medication. People engaged in self-medication because, in addition to alleviating common health issues, it saves time and money, especially for those with few or no other options Tan *et al*, (2019). The act of personal-medication must be on accurate medical evidence; else, irrational drug usage can waste resources, cause an increase in pathogen level of activeness, and pose grave health risks. Self-medication has gained popularity due to factors such as convenience, cost-saving, and perceived minor illnesses. A study by Sholabi *et al*. (2021), where the prevalence, knowledge and perception of self-medication habit among undergraduate healthcare scholars was investigated. The research shows that the prevalence of self-medication or personal-medication amongst the selected healthcare scholars was reasonably high, whereas almost half demonstrated good understanding and insight of self-treatment acts. Gender and the course of study of the respondent were the major independent predictors of good knowledge of self-treatment, inspiration for self-medication habit was mainly seen from the perception of treating minor illnesses. This normally underscores a necessity for relevant advocacy and incorporation of features of responsible self-treatment habit during official training of these future healthcare specialists. Similarly, nationwide policy on medicine admission should be reinforced, with strong procedures in place to implement it, this may be essential in order to prevent the widespread about negative impacts of self-treatment habit among the public generally.

Similarly, Banda *et al*. (2021) used transverse study to investigate self-medication among medical students at Copperbelt University, Zambia. The research showed that personal-medication was found to be predominant among medical undergraduates from Copperbelt University. Painkillers and antibiotics stood out as the most common categories of drugs that were used for self-medication. The year of study, that is, students' level was also established to be an independent predictor for self-treatment habit. The study suggested that further study should also be carried out to evaluate the habit of other undergraduate students other than medical students, as well as in the general populace.

In a study by Oyediran, *et al*., 2019, on "awareness of risks associated with self-medication among patients attending General Out-patient Department of a tertiary hospital in South Western Nigeria", it was discovered that age group 21-30 had the highest number among the patients that visited the hospital and this is majorly the age bracket of undergraduate students. In order to determine if the students who are engaged in self-treatment or self-medication are informed of the dangers associated with this habit, it is essential to investigate the level of awareness; effects and consequences; and the factors influencing the act of self-treatment amongst students and provide the Institution with valuable insights that will be useful in preventing undergraduates from engaging in harmful self-medication practices.

2. Material and Methods

2.1 Population for the Study

All undergraduate scholars of Federal University of Technology, Akure are the target population of this study. According to records kept by the School's Student Union, there were15,000 students at Federal University of Technology, Akure between 2022 and 2024.

2.2 Data Collection

A validated electronic structured questionnaire containing a total of 22 close-ended questions about awareness of self-medication practices was used in this study. The questionnaire had three sections. Sections A was on participant's sociodemographic characteristics such as gender, age category, educational level, religion, ethnicity, and distance between place of residence and school health centre. Section B enclosed six questions on knowledge of consequences of self-medication, while section C contained 10 questions on factors influencing the practice of self-medication. The study questionnaire was adapted from various similar studies conducted previously and pre-tested on a sample of 30 participants, all uncertainties in the questions or responses were removed before its application (Alshammari, 2021). The survey was carried out for a period of one month.

2.3 Sample and Sampling Method

The researchers utilized a formula by Taro Yamane (Sekaran, 2003). It is typically used to determine the size of a sample when there is a large number of them. The Taro Yamane formula,

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

where; n = sample size, N= Total population of the area under study, e = Error of precision

Therefore, $n = \frac{15000}{1+15000(0.05)^2}$

Hence, using the Taro Yamane formula, the sample size for the study will be 390.
Hypotheses were put to the test with the help of inferential statistics. In particular, the study used the Binary Logistics Regression Analysis and Structural Equation Modelling. For data analysis, SPSS version 20 and AMOS version 21 will be used.

2.4 Binary Logistics Regression Analysis

Binary Logistics Regression is a statistical method used majorly to model association between a binary dependent variable (Y) and more than one independent variables (X). The multiple logistic regression model is expressed as;

$$Logit\ p(y = 1) = B_0 + B_1X_1 + \cdots B_kX_k \quad (2)$$

where, $y\ is\ the\ dependent\ variable$, B_0 is the intercept term, B_i is the coefficient of the dependent variables *X*, X_i *are the dependent variables and* $i\ is\ from\ 1\ to\ k$

2.5 Structural Equation Modelling

Structural Equation Modelling (SEM) is a method that enables researchers to evaluate complex associations between covariates. According to Kline (2016), SEM is "a statistical technique that combines aspects of both factor analysis and regression analysis to provide a flexible method for modelling relationships among variables". SEM is a multivariate technique that is

used to model both experiential and hidden variables. Experiential variables are measured directly, while the hidden variables are not measured directly but are inferred from the experiential variables. The concept of SEM simplifies difficult relationships between variables by using a path model or analysis for explaining effects resulting from experiential and hidden variables (Kang and Ahn, 2021; Lam and Maguire, 2012). The method clearly determines the association between cause-and-effect variables. SEM aims to simplify a confirmatory factor analysis (CFA) model to evaluate the association between latent variables and how they affect each other. It summarizes a linear structural association into a measurement model and a structural model (Ampofo and Aidoo, 2022; Lee and Song, 2010). SEM permits investigators to test multifaceted theories and models by estimating the relations amongst latent variables and observed variables simultaneously (Aladeniyi and Oyejola, 2016).

2.5.1 Steps in Structural Equation Modelling

SEM comprises of trying the measurement model, trying the structural model, estimating the model parameters and evaluating the model fit. Model acceptable directories are used to evaluate how well the model fits the dataset. Several directories are commonly used to appraise the fitness of the model to the data, these include the chi-square test, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR). If CFI values ≥ .90 and RMSEA < .05, we consider the model as adequate.

(1) Measurement model

$$\underbrace{X}_{q\,x\,1} = \underbrace{\Lambda_x}_{q\,x\,n}\ \underbrace{\xi}_{n\,x\,1} + \underbrace{\delta}_{q\,x1} \tag{3}$$

$$\underbrace{Y}_{p\,x\,1} = \underbrace{\Lambda_y}_{p\,x\,m}\ \underbrace{\eta}_{m\,x\,1} + \underbrace{\varepsilon}_{p\,x1} \tag{4}$$

$$E(\delta) = 0$$

(2) Structural model

$$\underbrace{\eta}_{m\,x\,1} = \underbrace{\beta}_{m\,x\,m}\ \underbrace{\eta}_{m\,x1} + \underbrace{\Gamma}_{m\,x\,n}\ \underbrace{\xi}_{n\,x1} + \underbrace{\zeta}_{m\,x1} \tag{5}$$

$$\Sigma(\phi)_{(m+n)(m+n)} = \begin{bmatrix} (1-\beta)^{-1}(\Gamma\phi\Gamma^T + \psi)(1-\beta)^{-1^T} & (1-\beta)^{-1}\Gamma\phi \\ \Gamma^T D^T\phi & \phi \end{bmatrix}$$

where X is a q × 1 vector of observable indicators of the independent latent variables ξ; Y is a p × 1 vector of observable indicators of the dependent latent variables η; η is a m × 1 vector of dependent (endogenous) latent variables; ξ is a n × 1 vector of independent (exogenous) latent variables; ζ is a m × 1 vector of latent (structural) errors; ε is a p × 1 vector of measurement errors for Y; δ is a q × 1 vector of measurement errors for X; Λ_y is a $p \times m$ matrix of coefficients relating Y to η; Λ_x is a $q \times n$ matrix of coefficients relating X to ξ; Γ is a $m \times n$ matrix of coefficients for the latent exogenous variables; B is a $m \times m$ matrix of coefficients for the latent endogenous variables.

$$\text{RMSEA} = \sqrt{\frac{\max(\chi_k^2 - df_k, 0)}{df_k(N-1)}} \tag{6}$$

$$CFI = \frac{\max(\chi_0^2 - df_0, 0) - max(\chi_k^2 - df_k, 0)}{\max(\chi_0^2 - df_0, 0)} \tag{7}$$

where (χ_0^2, df_0) and (χ_k^2, df_k) stand for the chi-square test statistic for the baseline model and fitted model, respectively, with their corresponding degrees of freedom.

3. Results

The data for this study was generated from the self-studied electronic questionnaires returned by only 390 students of FUTA.

3.1 Socio-Demographic Features of the Respondents

Table 1 presents the socio-demographic features of respondents. The study reveals that a bulk (67.7%) of the students were between the age group 21-25 years old, 16.4% were between age group 16-20 years, 15.1% were between age group 26-30 years while 27.1% were above 25 years old. The study also shows that the majority (37.1%) of the respondents were 500 level students, 20.3% were 400 level students, 15.1% were 300 level students, 13.8% were 200 level students, 10.8% were 100 level students while 3.0 were PDS/UABS students at the period of the study. The study further shows that the majority (76.3%) of the students were Christians, 22.8% of the students were Muslims while 0.9% were other religion.

Table 1: Socio-demographic features of the students

Variables	Frequency	Percentage (%)
Age group (years)		
16-20	38	16.4
21-25	157	67.7
26-30	35	15.1
Above 30 years	2	0.9
Level		
PDS/UABS	7	3.0
100	25	10.8
200	32	13.8
300	35	15.1
400	47	20.3
500	86	37.1
Religion		
Christianity	177	76.3
Islam	53	22.8
Others	2	0.9
Ethnic group		
Yoruba	193	83.2
Igbo	25	10.8
Hausa	14	6.0
Distance		
Far distance	109	47.0
Near distance	123	53.0
Knowledge of consequence of self-medication		
Yes	196	84.5
No	11	4.7

The study also shows that the majority (53.0%) of the respondents lived near the school health facility while 47.7% lived far from the school health facility. The knowledge of the consequence of self-medication of the respondents shows that majority 84.5% have knowledge of the consequences of self-medication while 4.7% do not have knowledge of the consequence of self-medication.

3.2 Level of Consciousness of the Consequences of Self-Medication or Self-Treatment

Table 2 shows the rate of consciousness of the meaning of self-treatment among the respondents. The study shows that majority 173 (74.6%) have knowledge about the definition of personal or self-medication as the act of usage of medications not recommended by certified medical personnel, 6 (2.6%) described it as the usage of medicines recommended by health official to treat self-identified illnesses, 6 (2.6%) described it as the usage of medications acquired over-the-counter subsequent to a doctor's recommendation, 33 (14.2) described it as the usage of home-prepared remedies and herbs to treat an ailment, while 4 (1.7%) described it as the usage of medications approved by a home-based or outside a health facility physician.

Table 2: Rate of consciousness of the consequences of self-medication

Variables	Frequency	Percentage (%)
The use of drugs not prescribed by authorized medical personnel	173	74.6
The use of medicines prescribed by health personnel to treat self-diagnosed conditions	6	2.6
The use of drugs purchased over-the-counter following a doctor's prescription	6	2.6
The use of home-made drugs and herbs to treat ailment	33	14.2
The use of drugs prescribed by a doctor at home/outside a health facility	4	1.7

3.3 Conditions Influencing the Practice of Self-Medication among Respondents

Table 3 presents the factors influencing the practice of self-medication among respondents. It shows that 52 (22.4%) of the respondents strongly agreed that relative knowledge about drugs and drug use influences the practice of self-medication, 59.5% of them agreed to this, while 9.1% of the respondents both disagreed and strongly disagreed respectively that relative knowledge about drugs and drug use impacts the act of personal or self-medication. In the same vain, 69 (29.7%), strongly agreed that simplicity of the diseases impact the habit of self-medication or treatment, 115 (49.6%) of them agreed to this, 22 (9.5%) disagreed, while 26 (11.2%) strongly disagreed that simplicity of the diseases encourage the act of self-medication or treatment. Likewise, 46 (19.8%), strongly agreed that the influence of media encourages the practice of personal or self-medication, 105 (45.3%) agreed to this statement, 39 (16.8%) disagreed and 42 (18.1%) strongly disagreed that the influence of media stimulates the practice of self-medication. Also, 50 (21.6%) strongly agreed that positive experience of traditional medicine influences the practice of self-medication, 138 (59.5%) agreed to the statement while, 22 (9.5%) disagreed and strongly disagreed respectively that positive experience of traditional

medicine influences the practice of self-medication. 67 (28.9%) strongly agreed that using own and self-experience is a condition that affect the habit of personal-medication, 135 (58.2%) agreed to the report, while 10 (4.3%) and 20 (8.6%) disagreed and strongly disagreed respectively with the statement. 47 (20.3%) strongly agreed that the long distance of the hospital to home influences the practice of self-medication, 113 (48.7%) agreed to it, whereas, 38 (16.4%) disagreed and 34 (16.4%) strongly disagreed that the long distance of the hospital to home also influences the practice of self-medication. More so, 101 (43.5%) strongly agreed that poverty influences the habit of personal-medication, 87 (37.5%) agreed to this fact, while 16 (6.9%) and 28 (12.1%) disagreed and strongly disagreed that poverty influences the act of self-medication. However, the responses on belief in own knowledge is similar to the responses obtained on using own and self-experience. 82 (35.3%) strongly agreed that absence of adequate information on the bad consequences of personal-medication encourages this habit, 93 (40.1%) agreed to the report, while 23 (9.9%) and 34 (14.7%) disagreed and strongly disagreed that lack of passable information on the disadvantages of self-medication enhances it. Furthermore, 88 (37.9%) strongly agreed that lack of trust for the university health facility stimulates the habit of un-prescribed medication, while 85 (36.6%) agreed to this statement, 29 (12.5%) and 30 (12.9%) disagreed and strongly disagreed that lack of trust for the university medical facility affects the practice of personal-medication.

Table 3: Factors influencing the practice of self-medication among the students

Response	**SA no (%)**	**A no (%)**	**D no (%)**	**SD no (%)**
Relative knowledge about drugs and drug use	52 (22.4)	138 (59.5)	21 (9.1)	21 (9.1)
The simplicity of the diseases	69 (29.7)	115 (49.6)	22 (9.5)	26 (11.2)
The influence of media	46 (19.8)	105 (45.3)	39 (16.8)	42 (18.1)
Positive experience of traditional medicine	50 (21.6)	138 (59.5)	22 (9.5)	22 (9.5)
Using own and self-experience	67 (28.9)	135 (58.2)	10 (4.3)	20 (8.6)
A long distance of the hospital to home	47 (20.3)	113 (48.7)	38 (16.4)	34 (16.4)
Poverty	101 (43.5)	87 (37.5)	16 (6.9)	28 (12.1)
Belief in own knowledge	62 (26.7)	123 (53.0)	18 (7.8)	29 (12.5)
Lack of adequate information on the consequences of self-medication	82 (35.3)	93 (40.1)	23 (9.9)	34 (14.7)
Lack of trust for the university medical facility	88 (37.9)	85 (36.6)	29 (12.5)	30 (12.9)

3.4 Relationship between Socio-Demographic Factors and Level of Awareness of Self-Medication

Table 4 presents the bivariate study on the association between level of awareness of self-medication and the socio-demographic factors of the students. The outcome shows that age, level, religion, ethics group and distance do not have significant relationship with the level of awareness of self-medication. However, the odds ratio can still provide insight into the relationship that exist between the variables of a Model (Bollen, 2014; Kline, 2016; Muthen, 2010; Skinner, 2017; Wang and Wang, 2019). For the proposed Model, the odd ratio shows that respondents between the ages 21-25 are less likely to have less knowledge of self-medication than those who are aged 26-30 years and 30 years above. Based on the academic level of the students, respondents in 100 level are 4 times more likely to have less knowledge of the consequences of un-prescribed medication.

Table 4: Binary logistic regression model to determine respondent's level of awareness

Variables	Coefficient (β)	OR	p-value
Age			
16-20			
21-25	19.381	0.00383	0.999
26-30	19.763	0.00261	0.999
Above 30 years	18.879	0.00632	0.999
Level			
PDS/UABS			
100	1.563	4.774	0.587
200	-0.792	0.453	0.351
300	-1.078	0.340	0.761
400	-0.240	0.787	0.722
500	-0.265	0.768	0.546
Religion			
Christianity			
Islam	-21.554	0.0435	0.546
Others	-20.871	0.0862	0.999
Ethnic Group			
Yoruba			
Igbo	-18.564	0.0086	0.999
Hausa	-20.871	0.0862	0.999
Distance			
Far distance			
Near distance	-0.398	0.672	0.483

*P<0.05 **P<0.01

This might be because of the level of exposure to drugs and lack of exposition to the harmful effect of self-medication. Furthermore, the result indicates that students whose places of residence are near to the university health facility are about 0.6 more likely to have adequate knowledge of self-medication.

3.5 Structural Equation Modelling

Structural equation modelling analysis was conducted to define the associations between the level of awareness of undergraduate students on the effects and consequences of self-medication. Figure 1 which is the path diagram of the proposed Model shows the relationship among the variables with an acceptable fit value (RMSEA < 0.05).

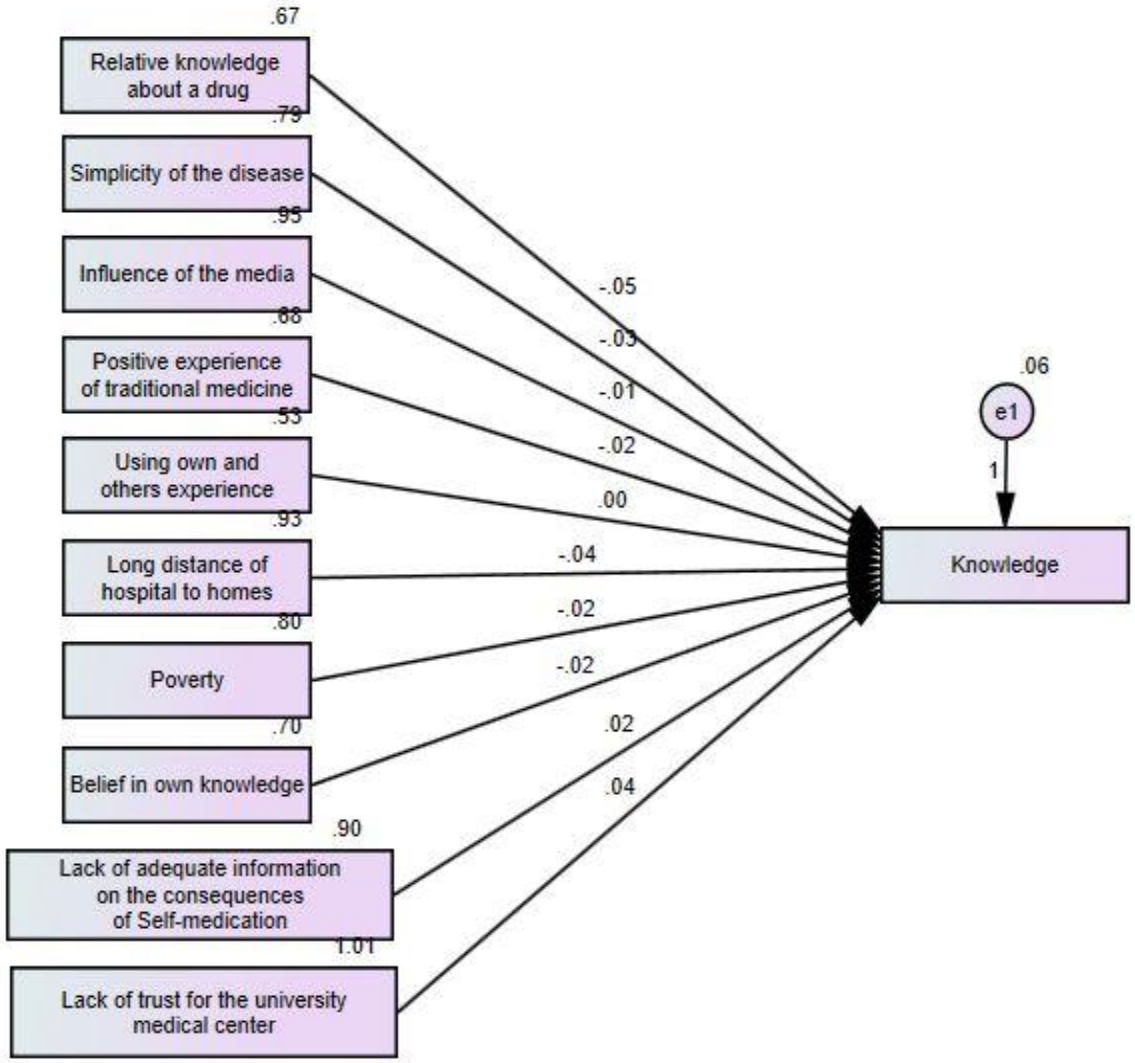

Figure 1: Proposed Model: Path diagram for the Standardized Coefficients

3.5.1 CFA Parameter Estimates of the Proposed Model

The values of the standardized coefficients, the associated standard error, the critical ratio and the p-value of each indicator variable and the latent factor (knowledge) are presented in Table 5.

Table 5: CFA Parameter Estimates for the Proposed Model

Variables	**Estimate**	**S.E.**	**C.R.**	**P**
Knowledge < Influence of the media	-0.013	0.016	-0.830	0.407
Knowledge < Positive experience of traditional medicine	-0.016	0.019	-0.829	0.407
Knowledge < Long distance of hospital to homes	-0.044	0.016	-2.733	0.006
Knowledge < Poverty	-0.020	0.017	-1.132	0.257
Knowledge < Belief in own knowledge	-0.020	0.019	-1.067	0.250
Knowledge < Lack of adequate information on the consequences of Self-medication	0.019	0.016	1.150	0.250
Knowledge < Lack of trust for the university medical centre	0.035	0.016	2.261	0.024
Knowledge < Simplicity of the disease	-0.29	0.018	-1.165	0.098
Knowledge < Relative knowledge about a drug	-0.048	0.019	-2.520	0.012
Knowledge < Using own and others experience	-0.003	0.021	-0.124	0.902

Table 5 shows that only three indicator variables are significantly related to the latent factor, knowledge of self-medication at 5% level of significance. The variables are: distance of hospital to respondent homes, lack of trust for the university medical centre and relative knowledge of a particular drug.

3.5.2 Fit Indices of the Proposed Model

The chi-square goodness-of-fit test of the model with other baseline fit indices are as shown in Table 6.

Table 6: Summary of Fit Indices for the proposed Model

GOF index	GOF criterion	Value	Decision
Chi square	The smaller value of Chi-Square, the better the result.	*p<0.05*	*Good Fit*
RMSEA	RMSEA < 0.05 indicates a good fit 0.05 < RMSEA ≤ 0.08 indicates a poor fit	*p<0.05*	*Good Fit*
AGFI	AGFI ≥ 0.90 reveals a good fit	*0.994*	*Good Fit*

Table 6 reveals the result of the goodness of fit test for the proposed model. The Chi-square test statistic is significant at 0.05, which suggests that the model fit the data. The RMSEA is significant at 0.05 showing a good fit. The AGFI is greater than 0.9 which reveals that the model is a good fit. Based on the result, the proposed model in Figure 1 is adequate for the data. From the model, it was discovered that the level of awareness of self-medication among undergraduate students has an effect and a relationship on the consequences of self-medication.

4. Discussion

Majority of participants (74.6%) are aware of the consequences of using un-prescribed drugs by certified medical personnel. A small percentage of participants are aware of the consequences of using medications approved by health personnel to treat self-identified illnesses (2.6%) or drugs acquired over-the-counter after a doctor's recommendation (2.6%). A significant percentage of participants (14.2%) are aware of the consequences of using home-based drugs and herbs to treat illnesses. Only a small percentage of participants (1.7%) are aware of the consequences of using drugs recommended by a doctor at home or outside a health facility.

Furthermore, the factor that most strongly influences the practice of personal-medication amongst the students is poverty, with 43.5% of participants strongly agreeing that poverty influences self-medication. Lack of trust for the available medical facility is also a significant factor, with 37.9% of participants strongly agreeing to this fact. Other factors that strongly influence self-medication include the absence of adequate information on the negative effects of self-medication (35.3% strongly agreeing), using own and self-experience (28.9% strongly agreeing), and simplicity of the diseases (29.7% strongly agreeing). According to the result of the goodness of fit test for the proposed Model using SEM, the Chi-square test statistic is significant at $p<0.05$, that is the model fit the data adequately. The RMSEA is also significant at $p<0.05$, indicating a good fit. The AGFI value of 0.994 is larger than 0.90 which reflects that the model is adequate. Based on these results, the estimated model is a good model. Therefore, the level of awareness which is knowledge, significantly has an effect and a relationship on the consequences of self-medication, as supported by the good fit of the model for undergraduate students in FUTA. The finding also suggests that poverty, long distance of the hospital to home influence the habit of self-medication, this is in agreement with research by Omolase *et al* (2012) that financial constraints, and absence or even a non-existence of access to health care services were the primary reasons why respondents engage in self-medication. This study is also consistent with other research work from other countries with respect to high level of awareness among undergraduate students and good model fit of the data used (Tohan, *et al*., 2024, Mannasaheb, *et al*., 2021, Alshammari, *et al*., 2021).

5. Conclusion

Overall, the findings suggest that it is essential to increase the consciousness and education about the consequences of self-medication among undergraduate students particularly at the Federal University of Technology, Akure, Nigeria. This could involve providing adequate information about the dangers of self-medication, promoting the usage of authorized medical personnel for diagnosis and treatment, and addressing factors such as poverty that may influence the act of personal-medication. By doing so, it may be possible to lessen the negative consequences of unguided medication and promote better health outcomes for undergraduate students.

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Conflict of interest

Authors hereby affirm that there is no conflicts of interest among them.

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