Understanding Physical Activity Behavior of Type 2 Diabetics Using the Theory of Planned Behavior and Structural Equation Modeling

D.O. Omondi, M.K. Walingo, G.M. Mbagaya, and L.O.A. Othuon

***Abstract*—**Understanding patient factors related to physical activity behavior is important in the management of Type 2 Diabetes. This study applied the Theory of Planned Behavior model to understand physical activity behavior among sampled Type 2 diabetics in Kenya. The study was conducted within the diabetic clinic at Kisii Level 5 Hospital and adopted sequential mixed methods design beginning with qualitative phase and ending with quantitative phase. Qualitative data was analyzed using grounded theory analysis method. Structural equation modeling using maximum likelihood was used to analyze quantitative data. The common fit indices revealed that the theory of planned behavior fitted the data acceptably well among the Type 2 diabetes and within physical activity behavior {$\chi^2 = 213$, $df = 84$, n=230, $p = .061$, $\chi^2/df = 2.53$; $TLI = .97$; $CFI = .96$; $RMSEA\ (90CI) = .073(.029, .08)$}. This theory proved to be useful in understanding physical activity behavior among Type 2 diabetics.

***Keywords*—**Physical activity, Theory of Planned Behavior, Type 2 diabetes, Kenya.

I. Introduction

PHYSICAL activity plays a key role in the management of Type 2 diabetes [1]. Physical activity decreases insulin resistance [2]; reduces the rate of blood glucose; increases the number of receptors, the sensitivity and level of insulin by the tissues [3] and can aid in both prevention and management of Type 2 diabetes. There seems to be growing evidence that majority of adults with Type 2 diabetes are not physically active enough to achieve health benefit [4], [5] and reasons for participating in less physical activities are not yet fully exhausted. Currently diabetic education and communication processes in most clinics in Kenya ignore patients' related factors when promoting physical activity and again promotion programs are also not quite strong. These approaches have failed to yield positive results and are thought to leave out psychosocial factors during primary level of health care delivery. Physical activity promotion interventions need to be theoretically driven [4] supported by the fact that important choices affecting the health and well-being of people with diabetes could be made by themselves and not by their physician or any other health professional [6]. Quite often patients need to make a series of choices on the kinds of daily activities to do in order to regulate their blood glucose levels and overall health. An understanding of their physical activity behavior, in addition to their intrinsic and extrinsic factors related to the behavior was required to help identify areas of concern to focus on during behavior change communications. This study applied the Theory of Planned Behavior (TPB) [6] as a model within which patients' perceptions and beliefs regarding physical activity behavior could be measured and empirically tested. This theory explains that behavioral intentions (explicit decisions) are influenced by attitude, subjective norm and perceived behavioral control and that intention is a single predictor of behavior. This theory has been used in the developed world to explain a wide range of behaviors and drive interventions for the Type 2 diabetes populations [7]. However, due to the limited literature for studies conducted in the Sub-Saharan Africa, the situation could be different from the usual outcomes. In this study we hypothesized that the Theory of Planned Behavior fits the data on physical activity acceptably well among Type 2 diabetics.

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II. Materials and Methods

A. Setting

The study was conducted at Kisii Level 5 Hospital. This is a provincial referral hospital and the second largest in Nyanza Province in Kenya. The hospital was started in 1916 by the colonial government to treat natives and injured soldiers. It grew over time to a district hospital and in 2007 the hospital was elevated to level 5 in the Hospital categories. The hospital operates within cost sharing principles in order to generate enough funds for improved service delivery. The hospital attends to approximately 16, 000 out patients per month with a limited number of staff. All the departments are affected.

The diabetic clinic in the Hospital is currently hosted within the blood transfusion premises. This clinic is operated by the one consultant doctor, five doctors, six clinical officers, four nurses and one nutritionist. Until the period of data collection diabetic patients attended the clinic every Tuesdays and Fridays. During each clinic day, the patients arrive at 8.30 am and are tagged with numbers as they come in. As they wait to begin the clinical processes, a session of education is conducted by a chosen health professional for the day. The patients then go through the normal processes beginning with screening of blood to determine sugar level. This is followed by medical prescription made by the doctor or clinical officer in charge. After medical prescription, the patients undergo counseling process conducted by the nurse in charge then proceed to collect drug supplies from the pharmacy. Within the premise there is a wide waiting bay with a capacity of a 100 patients. There is also television screen showing normal television programs but once in a while showing films related to diabetes and other diseases including HIV and AIDS and their related impact. There are a number of posters related to diabetic condition, most of which show severe outcomes of Type 1 and Type 2 diabetes.

B. Study Design, Population and Sampling

The study adopted sequential mixed methods design beginning with qualitative phase and ending with quantitative phase for a period of three months. This is a three-phase approach where we first gathered qualitative data using Focus Group Discussions and analyzed it using grounded theory approach (phase 1) and then went further to develop an instrument based on the qualitative analysis results (phase 2) subsequently administering the questionnaire to a representative sample of population [8]. Mixed methods approaches are now being emphasized in social and human sciences in diverse fields such as occupational therapy [9] and have gained popularity in the field of social science research.

About 230 Type 2 diabetes patients out of a population of 400 regular patients were recruited for the study using random number table. The minimum sample size required for this study was 217 patients. This sample size was generated using Creative Research System's [10] formula when the population is finite: $SS= \{Z^2*(P)*(1-P)\} \div C^2$; where: SS=Sample size; Z=1.96 (for 95 percent level of confidence); P=0.5 (the worst percentage that can ever pick a choice); C=0.045 (confident intervals); $SS= \{(1.96)^2 *(0.5)*(1-0.5)\} \div (0.045)^2 =474$ patients. The population was approximated to be about 400 patients, hence the New $SS=SS\div \{1+ (SS-1) \div Pop\} = 474\div \{1+ (474-1) \div 400\} =217$ patients (Plus 15 percent non-response). In addition, we also justified the sample size based on the minimum target sample size needed for structural equation modeling which sets a lower limit to 200 patients [11].

C. Data Collection Instruments

Physical activity questionnaire was designed based on qualitative findings from a preliminary Focus Group Discussions with the patients. Quantitative measurement of key concepts adopted the indirect measurement techniques initially developed by Ajzen [7] but modified to be used within physical activity behavior domain. A seven point likert scale was used to measure attitude, subjective norm, perceived behavioral control and intention in a continuum ranging from *totally disagree/not all/extremely unlikely=1; Moderately disagree/not all/extremely unlikely=2; Slightly disagree/not all/extremely unlikely=3; Undecided=4; Slightly agree/very much/extremely likely=5; Moderately agree/ very much /extremely likely=6; to Totally agree/ very much /extremely likely=7.* Physical activity behavior was measured on the frequency of engagement in "moderate to heavy for at least 30 minutes daily" (Digging/ploughing, slashing, climbing staircase, cycling, jogging, running, dancing, hill climbing, fetching water from a stream and playing football with grand children), "light/walking for at least 60 minutes daily" (Cooking, washing, sweeping compound, walking normally, herding cattle, hawking and fencing) and "sedentary lifestyle" (Watching football on television, reading and/or writing and selling in a shop) categories as identified during the qualitative phase. Indirect measures of attitude, subjective norm and perceived behavioural control were computed within each physical activity sub-category.

D. Ethical Considerations

This study was presented and approved by Maseno University School of Graduate Studies board and the National Council for Science and Technology (NCST). NCST is a national body in Kenya in-charge of research authorization. Permission was also granted by the institution within which the research was conducted. All the participants signed informed consent forms before participating in the research process. They were also assured that the information obtained from them will be treated with confidence. All documents related to the patients and intended to be used in the study remained under the custody of the principal researcher and could not be accessed by any unauthorized person except supervisors. To ensure minimal disruption of the usual diabetic activity at the centre within the setting, the research assistants were advised to interview patients and allow them to continue with other processes whenever they were called upon. The interview process would then continue after patients had gone through all the processes.

E. Data Analysis

Grounded theory analysis was used to analyse qualitative data obtained from FGDs in order to identify items to include in the physical activity questionnaire. During this analysis three phases of coding including open, axial and selective coding [12] were followed. Structural Equation Modeling (SEM) in AMOS 7 using Maximum Likelihood (ML) estimation was used to test the hypothesis during the quantitative phase. Presentations were made in tables and figures. Cronbach' s alpha was used to determine internal consistency of questions measuring the same concept. Exploratory factor analysis in SPSS version 15.0 was applied in testing for the dimensionality of the questions measuring the same concepts (Table III). Means and standard deviations were used to assess any irregularites in the answering of questions. Skew and kurtosis tests were used to assess for the normality of data obtained. Pearson correlations were used to assess the associations between observed variables for each model. The overall model fit was evaluated using chi-squaire (CMIN) and relative chi-square (CMIN/df), comparative fit index (CFI), the standardized root-mean-square error of approximation (RMSEA), Hoelter's critical N, the Tucker-Lewis-Index (TLI) and Bollestine-stine bootsrap. During analysis model categories were presented. The first model category was measurement model meant to reveal the actual measurements based on variances and standardized regression weights. The second model was structural model meant to advance the theory under investigation. CFI and TLI values greater than 0.90 was considered satisfactory [13]. RMSEA less than 0.08 was also be considered satisfactory [14]. Relative chi-square was considered fit within 3:1 range [15]. Hoelter's critical N was considered low if less than 75 cases and bootsrap samples were set at 200 [13].

III. FINDINGS

A. Reliability and Validity of Physical Activity Questionnaire

The questionnaire was subjected into pretest for *reliability* and *validity*. Cronbach's alpha for all the items measuring each concept ranged between α=0.5 to α=.87 (Pre-test; n=44, main survey; n=230) except for physical activity behavior, which indicated an acceptable internal consistency. Reliability for physical activity behaviour could be low due to varied activity patterns exhibited among the patients. Factor analysis was used to determine construct validity where all the measurement items for each concept in the physical activity questionnaire were subjected to *KMO and Bartlett's test of sphericity* which process Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test. The value of KMO was greater than 0.5 for all the measurement items and Bartlett's test was also significant ($p<0.0001$) indicating adequate sample size. The average communalities that each factor could explain (variance explained) for concept measurement items ranged from 0.5 to 0.8 (n=230) which was acceptable [16]. All items with communalities less than 0.5 were excluded during modeling. This was necessary to help identify factors which could be fitted into structural equation modeling.

B. Structural Equation Modeling

Measurement model was specified based on the relationships of the concepts in the traditional Theory of Planned Behavior. Both item measurements analysis and measurement model analysis were performed using observed endogenous and unobserved exogenous variables. These variables are presented in Table I and displayed in a measurement model in Fig. 1.

TABLE 1
ENDOGENOUS AND EXOGENOUS VARIABLES IN THE TPB MODEL

Endogenous Variables (Observed)	***Exogenous Variables (Unobserved)***
Attitude towards sedentary lifestyle [Attitude-1 (A1)]	Attitude
Attitude towards moderate to heavy activities [Attitude-2 (A2)]	e1
Attitude towards light/walking activities [Attitude-3 (A3)]	e2
Subjective norm towards sedentary lifestyle [Subjective norm-1 (SN1)]	e3
Subjective norm towards moderate to heavy activities [Subjective norm-2 (SN2)]	Subjective norm
Subjective norm towards light/walking active [Subjective norm-3(SN3)]	e4
Perceived Behavioural Control towards sedentary lifestyle [PCB-1 (PC1)]	e5
Perceived Behavioural Control towards moderate to heavy activities [PCB-2 (PC2)]	e6
Behavioural Control towards light/walking active [PCB-3 (PC3)]	Perceived Behavioral Control (PCB)
Intention towards sedentary lifestyle [Intention (IN1)]	e7
Intention towards moderate to heavy activities [Intention (IN2)]	e8
Intention towards light/walking activities [Intention (IN3)]	e9
Sedentary lifestyle [Activity class-1(PA1)]	Intention
Moderate to heavy activity in a week [Activity class-2 (PA2)]	e10
Light/walking activity in a week [Activity class-3 (PA3)]	e11
	e12
	Physical Activity Behavior
	e13
	e14
	e15
	Other 1
	Other 2

e= error; other=other factors

Table I displays all the variables included in the specified measurement model (Fig.1) in attempt to test the extent to which the model fits the data. Cases were subjected to both univariate and multivariate screening to test for the normality of the data for each variable observed before fitting the model (Table II).

TABLE II
MEASUREMENT LEVEL DESCRIPTIVE STATISTICS, UNIVARIATE AND MULTIVARIATE NORMALITY FOR TPB MODEL APPLIED TO PHYSICAL ACTIVITY

n=230 *Variable*	*min*	*max*	*mean*	*s.d*	*skew*	*c.r.*	*kurtosis*	*c.r.*
PC1	1.000	49.000	22.10	16.850	.500	3.098	-1.345	-4.164
PC2	1.000	49.000	16.03	14.671	1.266	7.836	.121	.374
PC3	1.000	49.000	16.27	14.884	1.298	8.034	.066	.203
PA3	4.000	8.000	6.83	.707	-.938	-5.809	1.671	5.174
PA2	3.000	8.000	6.59	.984	-1.056	-6.540	1.019	3.154
PA1	1.000	8.000	5.33	2.420	-.825	-5.105	-.854	-2.644
SN1	118.000	294.000	248.98	51.129	-.736	-4.556	-.779	-2.411
SN2	110.000	294.000	258.01	49.926	-1.146	-7.098	.034	.104
SN3	103.000	294.000	258.48	50.246	-1.139	-7.050	.026	.081
IN3	2.000	7.000	6.79	.563	-4.279	-26.494	26.275	81.339
IN2	1.000	7.000	6.75	.665	-4.214	-26.092	25.878	80.111
IN1	4.000	7.000	6.74	.628	-2.706	-16.752	7.261	22.479
A1	56.000	245.000	248.98	51.129	-1.170	-7.247	1.070	3.311
A2	58.000	245.000	221.89	34.755	-2.063	-12.774	5.613	17.375
A3	53.000	245.000	219.60	32.503	-2.023	-12.522	7.103	21.990
Multivariate							144.985	48.683

The means and standard deviations for all the measures indicate that no item measurement was made outside the expected range. All these measures were subjected to skewness test based on the recommended ±2 range for normal distribution. Measures of physical activity behavior were normally distributed. Measures of intention were all negatively skewed. Measures of perceived behavioral control and subjective norm were normally distributed, while measures of attitude were negatively skewed except for attitude-1 which appeared to be normally distributed. On the overall data violated normality assumption based on skewness. Kurtosis also indicated that all measures were within the ±2 range for normal distribution except for measures of intention, attitude-2 and attitude-3 measures. Item level measurements were performed due to the difference in the measurement scales. The model was recursive with a *df*=84. Standardized regression weights for the endogenous variables are displayed in the measurement model (Fig. 1). It appears items defining attitude, subjective norm, perceived behavioral control, intention and physical behavior had very high regression weights close to 1.00. The squared multiple correlation indicated that predictors of subscales accounted for >90 percent except for perceived behavioral control (PCB-1) for sedentary activity where the predictors accounted for 58.5 percent of the variance of PCB-1 itself. Correlations between observed variables in the model were strong ($p<0.001$) and positive except PCB-3 which registered lower but significant positive correlation coefficient ($p<0.01$). Modification indices suggested specifying relationships among items within and between the scales, which suggest multicollinearity.

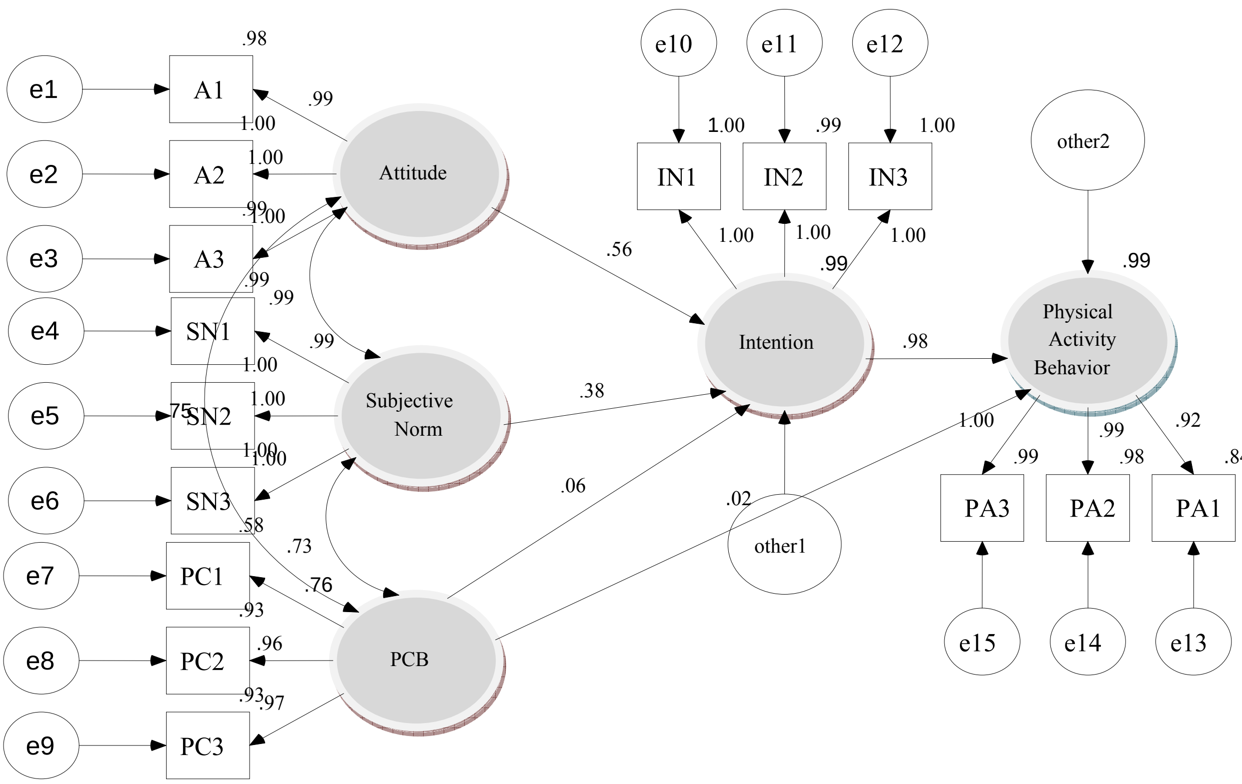

Fig. 1 Theory of planned behaviour measurement model applied to physical activity behavior

Finally the goodness of fit statistics were statistically non-significant at the .05 level (χ^2 = 213, *df* = 84, *p* = .061, χ^2/df = 2.53). The relative chi-square was under the recommended 3:1 range indicating acceptable fit after significant modification indices were uncorrelated. Other fit indices (*TLI* = .97; *CFI* =.96; *RMSEA (90CI)* = .073(.029, .08) also demonstrated a good model fit. Hoelter's critical N values suggest that the model would have been accepted at the .05 significance level with 167 cases and the upper limit of *N* for the .01 significance level is 192. No Modification Index was above the customary cutoff value of 4.00. Because the data violated the normality assumption, bootstrapped chi-square values were also calculated and the model fits better in 200 bootstrapped samples. The Bollen-Stine *p* = 0.065 provided further reassurance about the model fit. It was then necessary to advance the theory of planned behavior using the structural model (Fig. 2). Standardized regression weights indicates that attitude was a better predictor of intention (β=0.56, p<0.01, n=230), followed subjective norm (β=0.38 p<0.05, n=230) while perceived behavioral control poorly (β=0.06 p>0.05, n=230) predicted intention. Intention in turn strongly predicted physical activity behavior (β=0.99 p<0.001, n=230). This implies that when attitude goes up 1 standard deviation, intention goes up by 0.56 standard deviations. In addition when subjective norm goes up by 1 standard deviation, intention goes up by 0.38 standard deviations. Again, when perceived behavioral control goes up by 1 standard deviation, intention goes up by 0.06 standard deviations. Finally, when intention goes up by 1 standard deviation, physical activity behavior goes up by 0.98 standard deviations. Intention predictors put together accounted for 99 percent of the variance on intention leaving only 1 percent for other factors. Finally, intention and perceived behavioral control also explained 99 percent of the variance on physical activity behavior leaving only 1 percent for other factors.

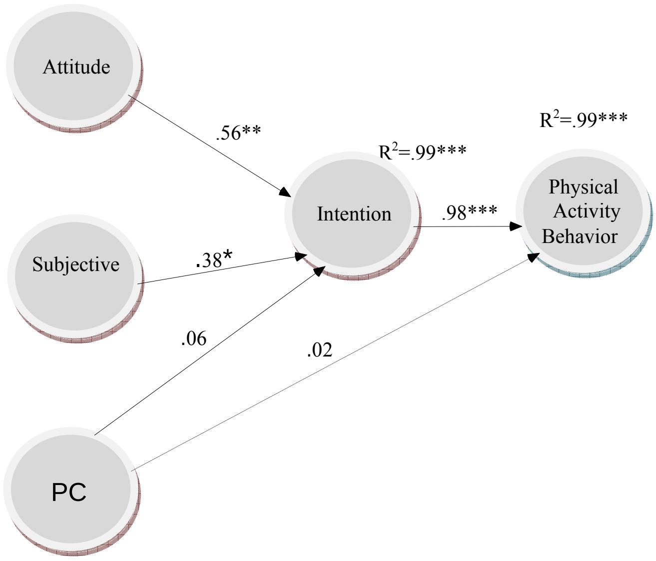

Fig. 2 Theory of planned behavior structural model applied to physical activity behaviour

IV. Discussion

A. Role of the TBP Model in Understanding Physical Activity Behavior

This research sought to identify the intrinsic psychosocial factors underlying physical activity behavior among a sample of Type 2 diabetic patients. The study has found that Type 2 diabetic patients held fairly favorable attitudes toward physical activity behavior, perceived positive social pressure to do so and poorly felt to be in control of the behavior. This result is in congruent with Omondi *et al.* [17] where the prediction of each of these factors to intention varied significantly in a similar pattern within dietary practice. Attitude was the most powerful determinant of physical activity behavior (β=0.56, p<0.01). An intention to perform behavior is influenced by attitudes towards the action, including the individual's positive or negative beliefs and evaluations of the outcome of the behavior [18]. Subjective norm/social pressure also predicted intention to engage in adequate physical activity or reduce time spent leading sedentary life (β=0.38, p<0.05) and implies that norms including the perceived expectations of significant others (e.g. family, doctors, nurses or work colleagues) with regard to physical activity behaviour; and the motivation for a person to comply with others' wishes [7] have significant influence on intention to engage in exercise. Perceived behavioral control (β=0.06, p>0.05) insignificantly predicted intention suggesting less control over factors that interfere with physical activity behavior (β=0.02, p>0.05). Intention highly predicted physical activity behavior (β=0.98, p<0.001). High prediction power of intention is consisted with the finding of other authors where a person's intention to perform a particular behavior was both the immediate determinant and the single best predictor of that behavior [19]. The authors argue that other variables besides those described above can only influence the behavior if such variables influence attitudes or subjective norms [18].

This research has highlighted the relative importance of the TPB constructs upon behavioral intention and subsequently physical activity behavior. These relationships should be considered when designing educational programs to promote physical activity among diabetic patients. For instance, in order to increase Type 2 diabetic patients' motivation/intention to engage in adequate physical activity or reduce sedentary lifestyle, their attitude is the most important followed by subjective norm or social pressure and then perceived behavioral control. In the physical activity behavior model, intention had a strong prediction for physical activity behavior calling for both a motivational and a structural educational approach [20]. Furthermore, because perceived control was not statistically a strong predictor intention, its effect might reflect lack of confidence in patience ability to increase physical activity levels or reduce sedentary lifestyle and might call for reduction in structural barriers as a focus for intervention.

B. Study Limitations

This study ignored the contribution of demographic, cultural and economic factors, other than being controlled during the analysis. However, there were indications that these factors grouped together significantly varied among subjects. Age and gender may be significant determinants of health related behavior (in this context, physical activity) just the same way as psychosocial factors [21]. The contribution of these demographic factors may have been established by comparing the models fitness indices across gender and different age categories. However, the sample size could not allow for smaller groupings of participants by gender and age category. Doing this would mean that we deal with a sample size less than 200 for either males or females, however, we needed a minimum 200 patients for each category in order to fit a model using structural equation modeling technique [11]. Additional factors that needed attention but excluded during this study are economic status and religion. Physical activity may be influenced by individuals' economic status and their religious or cultural practices. These factors need to be put into consideration when developing theoretical models.

V. Conclusion

The theory of planned behavior fitted that data acceptably well among the Type 2 diabetes and within physical activity behavior {χ^2= 213, *df* = 84, n=230, *p* = .061, χ^2/df = 2.53; *TLI* = .97; *CFI* =.96; *RMSEA (90CI)* = .073(.029, .08)} based on the fit indices used. This indicates a better prediction power of physical activity behavior among the patients. However, results indicated that both attitude and subjective norms turned to be the most powerful predictor of intention to follow activity recommendations. Although perceived behavioral control accounted for some percentage of the variance in intention the variance was insignificantly different from zero. This implies that the patients had poor control over physical activity behaviour.

APPENDIX

TABLE III
ROTATED COMPONENTS MATRIX FOR PHYSICAL ACTIVITY QUESTIONNAIRE

n=230	Components	
	1	2
Physical activity behavior measures		
Frequency of engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week (Activity class-2).	.599	
Frequency of engaging in at least 1 hour of light physical activities such as washing, normal walking, cooking, sweeping, watering flours, among others in a week (Activity class-3).	.731	
Frequency of sitting down watching television, sleeping, talking to friends, receiving money in a shop for a whole day among others in a week (Activity class-1).	.679	
Average communalinity	**0.67**	
Percent Variance explained	**45.15**	
Attitude		
Attitude-1		
Sitting down watching television, sleeping, talking to friends, and receiving money in a shop for a whole day among others in a week raises blood sugar level.	.783	
Sitting down watching television, sleeping, talking to friends, and receiving money in a shop for a whole day among others in a week interfere with blood flow.	.837	
Sitting down watching television, sleeping, talking to friends, receiving money in a shop for a whole day among others in a week increases accumulation of fluids in the body.	.613	
Sitting down watching television, sleeping, talking to friends, and receiving money in a shop for a whole day among others in a week reduces physical fitness.	.726	
Sitting down watching television, sleeping, talking to friends, and receiving money in a shop for a whole day among others in a week makes you become overweight.	.421	
Average communalinity	**0.68**	
Percent Variance explained	**47.89**	
Attitude-2		
Engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week lowers blood sugar level.	.828	
Engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week maintains blood flow.	.713	
Engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week improves physical fitness.	.760	
Engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week reduces weight.	.400	
Engaging in at least 30 minutes of moderate to heavy physical activities such as cycling, jogging, digging, gardening among others in a week prevents accumulation of fluids in the body.	.698	
Average communalinity	**0.68**	
Percent Variance explained	**48.39**	
Attitude-3		
Engaging in at least 1 hour of light physical activities such as washing, normal walking, and cooking, sweeping, watering flours, among others in a week lowers blood sugar level.	.131	.826
Engaging in at least 1 hour of light physical activities such as washing, normal walking, and cooking, sweeping, watering flours, among others in a week maintains blood flow	.875	-.223
Engaging in at least 1 hour of light physical activities such as washing, normal walking, and cooking, sweeping, watering flours, among others in a week improves physical fitness.	.764	-.265
Engaging in at least 1 hour of light physical activities such as washing, normal walking, and cooking, sweeping, watering flours, among others in a week reduces weight.	.406	.676
Engaging in at least 1 hour of light physical activities such as washing, normal walking, and cooking, sweeping, watering flours, among others in a week prevents accumulation of fluids in the body.	.754	.020
Average communalinity	**0.62**	0.21
Percent Variance explained	**48.01**	**25.20**
Subjective norm		
Subjective norm-1		
My doctor/nurse/nutritionist think that I should/should not engage in class 1 activities	.600	
My spouse think that I should/should not engage in class 1 activities	.823	
My brother/sister think that I should/should not engage in class 1 activities	.851	
My friend think I should/should not engage in class 1 activities	.924	
My children think I should/should not engage in class 1 activities	.682	

My neighbour think that I should/should not engage in class 1 activities	.802
Average communality	**0.78**
Percent Variance explained	**62.10**
Subjective norm-2	
My doctor/nurse/nutritionist think I should/should not engage in class 2 activities	.710
My spouse think that I should/should not engage in class 2 activities	.845
My brother/sister think I should/should not engage in class 2 activities	.911
My friend think I should/should not engage in class 2 activities	.886
My children think I should/should not engage in class 2 activities	.866
My neighbour think I should/should not engage in class 2 activities	.735
Average communality	**0.83**
Percent Variance explained	**68.72**
Subjective norm-3	
My doctor/nurse/nutritionist think I should/should not engage in class 3 activities	.745
My spouse think I should/should not engage in class 3 activities	.876
My brother/sister think I should/should not engage in class 3 activities	.940
My friend think I should/should not engage in class 3 activities	.849
My children think I should/should not engage in class 3 activities	.932
My neighbour think I should/should not engage in class 3 activities	.721
Average communality	**0.84**
Percent Variance explained	**71.9**
Perceived behavioral control	
Control belief strength	
How often do you encounter factors that prevent you from reducing time spent in class 1 activities? (PCB-1)	.705
How often do you encounter factors that prevent you from increasing time spent in doing class 2 activities? (PCB-2)	.919
How often do you encounter factors that prevent you from increasing time spent in doing class 3 activities? (PCB-3)	.905
Average communality	**0.84**
Percent Variance explained	**72.2**

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