Physical Activity Prescription among Healthcare Professionals in Hospital Setting: In the Application of the Theory of Planned Behavior

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Abstract

Introduction: Regular physical activity can achieve parallel or greater effects on non-communicable diseases (NCDs) than those achieved with drugs. (Fiuza-Luces et al 2013). The healthcare setting has been recognized as an appropriate and promising venue for prescribing physical activity (Jacobson et al; 2005). Aim of the study: To assess physical activity prescription behavior (PAPB) of Ethiopian healthcare professionals and determine if the theory of planned behavior explain this behavior. Methods: A cross-sectional survey design was used to assess healthcare professionals' physical activity counseling and prescription behavior for non-communicable diseases (NCDs) in hospital setting. The survey includes self-reported physical activity prescription behavior, and the tenets of theory of planned behavior (attitude(ATT), subjective norm (SUN), perceived behavioral control (PBC), and intention (INT) to prescribe physical activity).The structural equation modeling was employed for the theory of planned behavior. Amos and SPSS software were applied. Results: A total of 442 healthcare professionals from 7 government hospitals in Addis Ababa city participated in the study. From these hospitals 387 healthcare professionals (physicians=135,34.9%, nurses= 218,56.3% and physiotherapist=34,8.8%) completed the questionnaire. 21.4% of healthcare professionals very frequently provide verbal prescription, 5.4 % provide written prescription of physical activity for the purpose of treating and preventing NCDs. The fit of the TPB model was well fit (RMSEA=0.072, CFI=.926, TLI=.910, GFI=.902). The PBC (β=.25, p< .05) and INT (β =.17, p<.05) explained physical activity prescription behavior and PBC (β=.39, p<.05), ATT(β=.16, p<.05) explained intention to prescribe physical activity. Conclusion: HCPs's physical activity prescription practice was low. The findings of this study were supported the theory and the TPB have the predictive utility in describing and predicting physical activity prescription behavior among healthcare professionals in hospital setting. The TPB confirmed to be a useful theoretical framework that should be used for understanding healthcare professionals' physical activity prescription behavior in hospital setting. The present study found that perceived behavioral control was the strongest predictor of intention followed by attitude and subjective norm. Also not only for intention it was a strong predictor followed by intention for physical activity prescription behavior and had a direct effects on healthcare professionals' PAP behavior Recommendation: Interventions/strategies focused on improving healthcare professionals' perceived ability to provide physical activity prescription and the willingness or motivation of healthcare professionals to prescribe physical activity for their patients are important.

Key Words: Physical activity prescription, structural equation modeling, non-communicable diseases and theory of planned behavior.

1. Introduction

The rapidly growing burden of non-communicable diseases (NCDs) in low- and middle-income countries is accelerated by the negative effects of globalization, rapid unplanned urbanization and increasingly sedentary

lives (WHO; 2010). NCDs also affect developing countries like Ethiopia. According to World Health Organization (WHO;2011) estimation that 34% of death is because of non-communicable diseases from the total death, with a national cardiovascular disease prevalence of 15%, cancer and chronic obstructive pulmonary disease prevalence of 4% each, and diabetes mellitus prevalence of 2%. Physical inactivity, or sedentary is considered a major risk factor for a number of adverse health outcomes including obesity, hypertension, cardiovascular disease, diabetes mellitus and all cause mortality (Tudor-Locke and Myers;2001). Physical inactivity is associated with the development of major NCDs such as type 2 diabetes, coronary heart disease, breast cancer and colon cancer (Lee et al., 2012). According to NCDs country profile (WHO; 2011) report that physical inactivity in Ethiopia as a risk factor for non-communicable disease accounts 17.9%.

Levels of physical inactivity are rising in many countries with major implications for the general health of people worldwide and for the prevalence of NCDs *(WHO, 2009)*. Physical activity counseling and prescription have been discussed extensively for the last decade as a means for preventing or treating NCDs predominantly in healthcare settings. Studies show that the majority of patients listen to their physicians with regard to lifestyle behavior guidance, such as diet and physical activity. Still, commitment to follow physical activity advice, provide physical activity recommendation and the motivation to comply with physical activity interventions are major challenges faced by the patient and the healthcare provider (Daley, 2008). The hospital setting may be a key to achieve the goal of establishing PA as a regular treatment modality for many of the lifestyle related risk factors and disorders **(Börjesson, 2013).** For people with chronic conditions such as coronary heart disease, diabetes, osteoporosis, arthritis and cancer, the healthcare setting is an important vehicle for promoting physical activity. Strategies for promoting physical activity can involve a range of health care professionals **(Milton K, Smith B, Bull , 2014).**
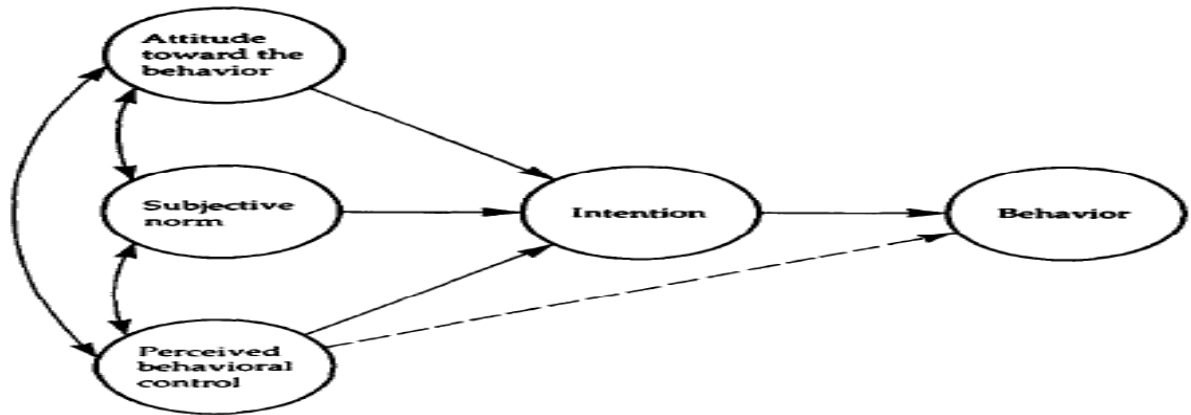
The Theory of Planned Behavior is useful to predict physical activity behavior among healthcare professionals. Future studies should use this theory to design, assess, evaluate and predict physical activity prescription behavior and its socio-cognitive determinants (Bardus and Suggs, 2012). Information about healthcare professionals' PA prescription behavior from developing countries especially in Africa is lacking. In Ethiopia, these practices are unknown. Furthermore, the utility of the TPB to explain healthcare professionals PA prescription behavior remains unknown. Studies are needed to better understand physical activity prescription behavior among Ethiopian healthcare professionals and the usefulness of the TPB.

1.1 Theoretical Framework of Study
The theoretical framework for understanding healthcare professionals' physical activity prescription behavior comes from Icek Ajzen's (1991) Theory of Planned Behavior (TPB). According to the theory, an individual's intention to perform a particular behavior is the major factor of actual behavior (Ajzen, 1998). Intentions are an indicator of an individual's effort to try to accomplish a goal. Individuals' intention considers three factors. The first factor is how favorable or unfavorable they feel about performing the behavior (also called the attitude towards performing the behavior), the second factor the perceived social pressure to perform the behavior, and lastly the individuals' perception of control over the behavior. Generally, a more favorable attitude, higher social pressure, and higher perception of control would result in a greater intention to perform the identified behavior (Ajzen, 1998).

The theory of planned behavior is one of the most comprehensive and validated theories in the health and exercise behavior research for understanding and predicting exercise behavior, and thus, it has guided much of the exercise behavior research (Biddle and Nigg , 2000, Godin and Kok, 1996). The theory of planned behavior is the most important theory to predict/explain the given behavior. Regarding to this a study reports that TPB explain healthcare professionals' (physicians, nurses, pharmacist, and other clinicians) behavior including

prescription, referral, counselling, pain management, providing care to patient and guideline adherence (Godin

et al., 2008).
Figure 1. The Theory of Planned Behaviour (Ajzen, 1991).

Therefore, the overall aim of this study was to test the theory of planned behavior and investigate its predictive utility of healthcare professionals' physical activity prescription behavior in hospital setting.

2. Methods and Materials

A cross-sectional survey design was used to assess Addis Ababa's, healthcare professionals' physical activity counseling and prescription behavior for non-communicable diseases in hospital setting from November 2017 to January 2018.

Sample and Sampling Procedure: Participants had to meet the following criteria to include in the study: a registered medical doctors, nurses and physiotherapist, male or female, currently working in the sample hospitals, volunteer and any age. Hospitals that give services related to: cardiovascular diseases, diabetic type 2 and chronic respiratory diseases. The sample size was determined by using the formula for estimating a single population proportion. Sample size was calculated by taking the proportion of physical activity prescription/counseling which is 50% on healthcare professionals for chronic disease with 95% confidence level, 5 % margin of error to get an optimum sample size that allowed the study to look into various aspects. Based on the above assumptions, the formula is as follows (Krejcie and Morgan, 1970):

$s = X^2NP (1-P) \div d^2 (N-1) + X^2P (1-P)$

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841) --------------- 1.96 x1.96 =3.8416

N = the population size

 P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

Based on this formula the maximum sample size was 384, assume 85% would be return rate, then add 15%, the total sample have been 442.

Measures and Data Collection Instruments: Healthcare professionals psychosocial physical activity prescription behavior were measured by questionnaires adapted from a validated theory of planned behavior (TPB) questionnaire (Galaviz et al; 2014 and Ajezen;2006). The questionnaire had four scales, each measuring one construct of the TPB, with answers anchored on a six-point scale. Physicians' attitude toward physical activity prescription was measured with four items, subjective norm was measured with three items, perceived behavioral control was measured with five items, and intention to prescribe physical activity was measured with three items. The mean of these items for each scale was used as an indicator of each construct. An average internal consistency of α=.87 for the four scales has been previously reported (Ramsay et al, 2010 as cited in Galaviz et al, 20 15) and the α=.80 (Galaviz et al, 20

15). The internal consistency for the attitude scale was α = 0.95, for subjective norm α = 0.60, for perceived behavioral control α = 0.71, and for intention α = 0.95 (Galaviz et al, 20 15).

Statistical Analysis and Considerations: Data examination is necessary in an initial step in any analysis that the researchers often overlook, the researchers should evaluate the impact of the missing data, identify the outliers and tests for the assumption underlying most structural equation modeling techniques (Hair et al, 2010). The preliminary analysis of our study shows that: our sample reasonably confirm that what could be expected regarding to outliers, and missing data in cases and variables. Regarding to normality, our study indicates that all variables approximately normally distributed, the kurtosis and skewness value of the variables that found between the range of (-1.96 to +1.96), the correlation between the predictor variables had not too high correlation. After having evaluated the data the relationship among the TPB tenets were run by using structural equation modeling (SEM) techniques. Structural equation modeling was employed to test the fit of the TPB model using the maximum likelihood method was used to fit the theory model. Path analysis by using Amos software was performed to test the causal relationships among the variables, within the revised modified TPB model.

The overall model fit was evaluated by using Goodness of Fit Index (GFI), Root-mean square error of approximation (RMSEA), Tucker-Lewis index (TLI), Comparative Fit Index (CFI), Root mean square residual (RMR). For this study, RMSEA and SRMR between .05-.08 were considered as accepted model fit criteria (Browne and Cudeck, 993 as cited in Hu and Bentler, 1999). TLI, CFI and GFI >.90 were considered as accepted model fit (Bentler, 1989). The statistical significance was set at $\acute{α}$ = .05. The data analyses were conducted with the statistical package for social science version 20 (IBM,) and Amos version 20 for window.

3. Results
Table 1: Healthcare Professionals Sample Characteristics

Variables	Statistical proportions
Demographic variables	**Mean, SD**
Age (n, SD)	(32, 6.5)
Male (n, %)	(177,45.7)
Women (n, %	(210,54.3)
Healthcare providers profession/department (n, %)	
Physicians (Medical Doctors)	(135,34.9)
Nurses	(218,56.3)
Physiotherapist	(34,8.8)
Physical activity prescription behavior(Mean, SD	
Provide physical activity verbal prescription	(2.57,1.57)
Provide physical activity written Prescription	(1.92, 1.3)
Theory planned behavior constructs(Mean, SD	
Attitude	(4.69, .8)
Subjective norm	(4.16, .86)
Perceived behavioral control	(4.2, .8)
Intention	(3.9, .89)

A total of 442 healthcare professionals from 7 government hospitals in Addis Ababa city participated in the study. From these hospitals 387 healthcare professionals (physicians=135,34.9%，nurses= 218,56.3% and physiotherapist=34,8.8%) completed the questionnaire. 21.4 % of healthcare professionals reported that they very frequently provide verbal physical activity prescription for their patients and 5.4 % indicates that they very frequently provide written physical activity prescription for their patients. Generally, healthcare professionals

had a positive attitude, subjective norm (experienced social pressure) and had relatively moderate perceived behavioral control (perceived their ability to prescribe physical activity but relatively low intention to prescribe physical activity for their patients.

Based on the fit indices and guidelines set for this study GFI >.90, RMSEA and RMR between .05 to.08, CFI >.90, TLI >.90. The fit of the TPB model was well fit. The RMSEA = .072 and RMR = .076 indicates that the predicted theory of planned behavior model was consistent with the observed model. The CFI =.926 and TLI = .91 values obtained indicates that the proposed model was better than the null model.

Table 3: Model fit test result

Model Fit Criterion	Model Fit Result	Decision
Goodness of Fit Index (GFI >.90)	.902	Accepted
Root mean square residual (RMR, .05-.08)	.076	Accepted
Root-mean square error of approximation (RMSEA between .05-.08)	.072	Accepted
Tucker-Lewis index (TLI>.90)	.910	Accepted
Comparative Fit Index (CFI>.90)	.926	Accepted

The factor loading for each constructs from the confirmatory factor analysis (CFA) loaded satisfactorily onto their corresponding latent variables (factor loading ranging from .65 to .97). This value indicates that relatively high factor loading, this loading size confirm that indicators are strongly related to their associated constructs. The model measurement of validity and reliability of AVE, CR and Cronbach's alpha shows that very well fit. The value found that (AVE above .5, CR above .7 and Cronbach's alpha above .8) indicates the model have good validity and reliability(see Table: 4)

Table: 4 Model Measurement validity and reliability test results

Scales	AVE	CR	Cronbach's alpha	Criteria	Decision
SBP	.63	.70	.833	**AVE** should be above .5, **CR** above .7 and between .6 and.7 is accepted. **Cronbach's alpha** should be above .7	Accepted
ATT	.60	.76	.856		Accepted
INT	.58	.76	.815		Accepted
PAP	.78	.64	.872		Accepted
PBC	.52	.78	.840		Accepted

The structural equation model variables estimates from path analysis indicates that the perceived behavioral control (perceived their ability to prescribe physical activity (PBC) was the strongest predictor of intention (β=.39, p<.05), followed by attitude (β=.16, p<.05). Subjective norm (experienced social pressure)(β=.10, p<.05) have relatively a low significant impact on intention to prescribe physical activity. Regarding to physical activity prescription behavior, perceived behavioral control (β=.25, p< .05) and intention to prescribe physical activity for their patients, INT)(β =.17, p<.05) explained physical activity prescription behavior. Here INT and PBC were significant predictors of physical activity prescription behavior (see from the path diagram with a standardized parameter estimates is presented in Figure 1.)
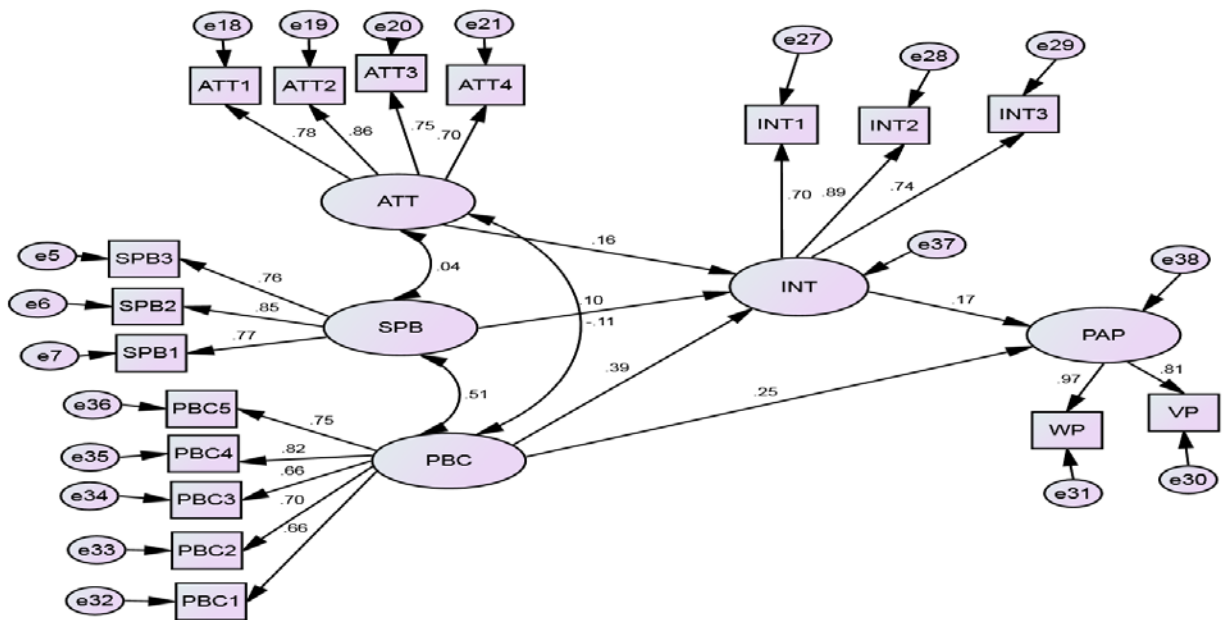
Figure 1: Structural equation model for healthcare professional's physical activity prescription behavior with standardized parameters.

4. Discussion

The TPB can explain healthcare professional's physical activity prescription behavior; all the theory tenets were supported. The results indicate that perceived their ability to prescribe physical activity (PBC) was the main factor for the behavior of healthcare professionals' intention to prescribe physical activity. PBC and Intention to prescribe physical activity (INT) were the predictors of healthcare professional's physical activity prescription behavior. From these PBC was the strongest factor to predict this behavior. Their physical activity prescription rates (verbal and written prescription) were low.

Similar study from Mexico, the study of physical activity promotion in Mexican health care setting (Galaviz K.I. et al, 2015) 33% reported that they always provide *verbal physical activity prescription*, 6% indicated that they always provide *written physical activity prescription*. In our study 21.4% of Ethiopian, particularly Addis Ababa's healthcare professionals reported that they provide verbal physical activity prescription very frequently to their patients and 5.4% of healthcare professionals reported that they provide written physical activity prescription very frequently to their patients. In other study which is physical activity counseling and prescription among Canadian primary care physicians investigate that most physicians (69.8%) reported using verbal counseling to promote physical activity, whereas only 15.8% used written prescriptions for a physical activity promotion program.

The study indicates there was no a significant correlation between their PAL and PAPB (rho=.061, p=.231). When we see other studies the result shows that opposite, healthcare providers own physical activity level influence their physical activity prescription behavior. In other words a significant relation was found between physical activity counseling and healthcare professionals' physical activity level (Milton, Smith and Bull, 2014 and Johansen et al., 2003).

In this study we found that the perceived behavioral control (perceived their ability to prescribe physical activity (PBC) was the strongest predictor of intention (β=.39, p<.05), followed by attitude (β=.16, p<.05). Subjective norm (experienced social pressure)(β=.10, p<.05) have relatively a low significant impact on intention to prescribe physical activity. According to (Galaviz et al, 2015), completely standardized parameter

estimates indicate that subjective norm was the strongest predictor of intention to prescribe PA (b = 0.73, p < 0.05) followed by attitude (β = 0.16, p < 0.05). Perceived behavioral control was not a significant predictor of intention (β = 0.04, p > 0.05). Our study results supported by the theory, "the stronger the intention to engage in a behavior, the more likely should be its performance, the more favorable the attitude and subjective norm toward the behavior, and the greater the perceived behavioral control, the stronger the intention to perform the behaviour"(Ajzen, 1991).

Regarding healthcare professionals' physical activity prescription behavior, we found that perceived behavioral control was a significant predictor followed by intention (PBC, β=.25, p< .05) and INT, β =.17, p<.05). And intention was positively predicted by attitude, subjective norm and perceived behavioral control. In one study from Nederland (Sassen et al, 2011) which is health care professionals' intention and behavior to encourage physical activity in patients with cardiovascular risk factors reported that TPB variables accounted for (β=0.41 p<0.001) of the variance in intention. Intention was, in turn, predicted by attitude (β=0.44, p< 0.001), subjective norm (β=0.201%, p<0.001), and perceived behavioral control (β=0.134, p<0.001).

Some limitations should mention to this study. Findings are relevant to government hospitals in Addis Ababa Administrative city. This study is the first study in Ethiopia and interpreted with careful and consider as a starting point for other similar future researches.

5. Conclusion

Ethiopian, specifically Addis Ababa's HCPs have a positive attitude towards counseling/prescribing PA for non-communicable diseases in hospital setting, have experience of social pressures to prescribe/counsel PA, have relatively low intention to prescribe/counsel PA and have modest perceived ability to counsel/prescribe PA .

This study investigated the use of the theory of planned behavior for predicting the healthcare professionals' physical activity prescription behavior. The findings support the predictive utility of TPB in describing and predicting physical activity prescription behavior among Ethiopian healthcare professionals in hospital setting. The TPB confirmed to be a useful theoretical framework that should be used for understanding of healthcare professionals' physical activity prescription behavior in hospital setting. In particular, our study found that perceived behavioral control was the strongest predictor of intention followed by attitude and subjective norm. Also not only for intention it was a strong predictor followed by intention for physical activity prescription behavior and had direct effects on healthcare professionals' PAP behavior.

Generally, Ethiopian, particularly Addis Ababa's healthcare professionals have a positive attitude towards prescribe physical activity to their patients, experience social pressure to prescribe physical activity, and healthcare professionals' intention to prescribe PA to their patients was relatively low but significant. However, Ethiopian, particularly Addis Ababa's HCPs perceive a medium level of ability to prescribe physical activity. But their physical activity prescription rates were low. Because, healthcare professionals' perceived ability to prescribe physical activity, intention to prescribe PA and healthcare professionals' physical activity levels affect this behavior. Strategies which aimed to improve those factors are needed. The problem of low physical activity prescription rate from healthcare professionals in hospital setting requires immediate action and our study investigated the area of improvement which could strengthen efforts conducted in Ethiopian hospital setting

6. Recommendation

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