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Mediating Effects of Self-Efficacy in the Transtheoretical Model among Hospital Male staff of Ardebil University of Medical Sciences in 2014

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ABSTRACT: Health behaviors such as tobacco use account for approximately 50% of all premature mortality. So to prevent burden of disease due to excessive use of tobacco, we have to use of health education models. One of the most effective models is transtheoretical model. This study examined the moderating and mediating effects of self-efficacy on the relationships between predicting variables and the outcome variable. Cross-sectional data were collected from 200 smokers at four hospitals in Ardebil city in 2014. The instruments included decisional balance scale, self-efficacy scale, processes of change scale and stages of change. Ordinal regression revealed that self-efficacy was a predictor of stage of change (β=-0.54, P=0.001) and mediated the relationships of decisional balance with stage of change (β=-0.39, P=0.001) and relationship of experimental process of change and stage of change (β=0.053, P=0.001). pros of smoking cessation (β=-0.62) and self-efficacy were the strongest predictor of stage of change respectively.

Key Words: Self-Efficacy, Smoke Cessation, Transtheoretical Model.

INTRODUCTION

Cigarette smoking and exposure to secondhand smoke kill an estimated 50,000 people in the Islamic republic of Iran each year. For every smoker who dies from a smoking-attributable disease, another 20 persons live with a serious smoking-related disease. Cigarettes will cost $2.5 billion annually in medical in Iran and lost productivity each year. Despite progress in reducing tobacco use, 11.09 percent of 15 to 64 years population in iran still smoke (*Mahmood et al.,* 2013). These statistics reflect a legacy of millions of lives that prematurely lost from tobacco use, reflecting a tragic public health history. Over the past two decades, the public health and medical communities have made substantial progress in combating cigarette smoking. However, despite overall progress, the burden of tobacco-related illness has clearly shifted toward blue-collar and service sector workers, whose cigarette smoking and exposure to environmental tobacco smoke, as well as to many other occupational health and safety hazards, is considerably more frequent than white collar workers (Casey Chosewood *et al.,* 2012).

Healthcare professionals are required to find the most convenient approach to provide healthy behaviours for individuals. In this research, the Transtheoretical Model use for smoking cessation is discussed. The Transtheoretical Model (TTM) has been presented as an integrative and comprehensive model of behaviour change. The TTM has concentrated on five stages of change (precontemplation, contemplation, preparation, action; and maintenance), 10 processes of change (focuses on activities and events that create successful modification of smoking), decisional balance (the pros and cons of changing), and self-efficacy (the self-confidence of individual regarding smoking cessation). Stages of change lie at the heart of the TTM. Processes of change, decisional balance and self-efficacy work best at each stage to reduce resistance, facilitate progress, and prevent relapse (Prochaska *et al.,* 2008).

Bennett contended that determining the mechanisms of how, why, and when individuals adopt or abstain from certain behavior requires information regarding mediator variables to provide a clear picture of the process of behavior change. Mediator variables are a third variable that modifies the relationship between two types of variables, that is the independent and dependent variable. A mediator variable requires the following three conditions to be met: (1) an independent variable should significantly predict a mediator variable; (2) the mediator variable should significantly predict a dependent variable; and (3) when associations identified in the prior two steps are controlled, a previously significant association between the independent and dependent variables becomes either less significant or not significant (OkKyung *et al.,* 2009).

Researchers revealed that increasing in self-efficacy or decreasing of temptation was associated with decreasing in smoking rate among adolescents (Erolsaime 2008) while in other research self-efficacy was the only predictor of stage of change in smoking cessation (Farmanbar *et al.,* 2012). Therefore, exploring the roles of self-efficacy in smoking cessation behavior will provide valuable information in tailoring smoking cessation programs.

Self-efficacy has been determined as a key mediator in Previous researches that predicts behavior change (Farmanbar *et al.,* 2012, Chang *et al.,* 2005). Using TTM, other researches determined that self-efficacy mediated the relationship between processes of change and stages of change of smoking behavior Among Adolescent Male Smokers in Korea. However, the mediating effects of self-efficacy in TTM with smoking behavior change have not been previously explored in hospital male staff in our country.

The purpose of this study was to explore relationships between TTM variables and to examine the mediating effects of self-efficacy on the relationships between predictor variables (decisional balance and processes of change) and the outcome variable (stages of change). This study provide more information in the development of effective intervention strategies for smoking cessation programs.

METHOD

A. Design and sample

Prior to beginning data collection, permission was obtained from the Institutional Review Board at the Ardebil university of medical sciences (ARUMS).in the current study a 2-stage sample design was conducted. The first stage involved determining sample size, so stage of change Questionnaire were distributed to 834 staff from four Ardebil hospitals, of which 590 questionnaires were returned (response rate of 70.74%). Among them, 220 (37.28%) staff were identified as current or former smokers and met the study criteria.

Stage 2 : Among staff who met the study criteria 200 person voluntarily enrolled in this study. Eventually the study conducted with distributing of Transtheoretical Model tools among this population.

According to Transtheoretical Model Inclusion criteria was to have smoked at least one cigarette during the past 30 days and nonesmokers who quit smoking within six month ago.

B. Instruments

The instruments used in the study included questions relating to the general characteristics of the staff and their parents, stages of change, processes of change, decisional balance, self-efficacy tools. A preliminary questionnaire was developed through a literature review and was pilot tested with 40 male staff. The pilot test results indicated that no parts of the instruments needed revision. Content validity was assessed by consultation with an expert in the field of health promotion related to smoking and confirmed that the items were relevant and adequately measured each dimension.

C. Stages of change

The stages of change for smoking were assessed with the 5-question algorithm developed by procheska and diclemente (1992). This question sequence requires participants to indicate whether they are currently smoking, and if not, how long they have been off cigarettes. As well, two question about intention to quit smoking are asked of current smokers, with the first pertaining to the time frame of the next six months, and the second inquiring about intentions for the next 30 days. Finally respondents are asked whether they have had a quit attempt of at least 24 hours duration in the previous year. All stages of change questions with the exception of the time since quitting cigarettes, are offered in a yes/no response format (DiClemente *et al.,* 1991).

D. Processes of Change Scale

The Processes of Change scale was developed to better understand how shifts in behavior, experiences, and attitudes related to smoking occur over time. Instructions for this questionnaire are: The following experiences can affect the smoking habits of some people. Think of any similar experiences you may be currently having or have had in the last month. Then rate the frequency of this event on the following 5-point scale, and the Likert-type scale ranges from 0=never to 5=repeatedly in the past month for each item. The measure assesses ten key processes: consciousness raising, dramatic relief, self-evaluation, environmental reevaluation, helping relationships, social liberation, stimulus control, reinforcement management, counter-conditioning, and self-liberation. The first five make up the experiential processes, and the latter five make up the behavioral processes, of particular interest in the proposed study. In the present study, internal consistency for 10 subscales was variable, ranging from r=0.40 to r= 0.80 (Prochaska *et al.,* 1988).

E. Decisional Balance Scale

In this study Short form of the Decisional Balance Scale (DBS) is used. DBS is based on the concept of decision-making described by Janis and Mann (1977), thereby the individual compares the potential gains of a behavior against the losses. The smoking version of the DBS includes four categories of potential pros and cons, or positive and negative perceptions, for smoking:

1) gains or losses for self
2) gains or losses for significant others
3) self-approval or self-disapproval
4) approval or disapproval of others

are asked to rate how important each item is in their decision to smoke on a 5-point Likert-type scale in which 1 = not at all and 5 = extremely. Internal consistency measured by Cronbach's alpha coefficient is .87 for pro items and .90 for con items, and both sets of items show strong predictive validity for future smoking behavior (Velicer *et al.,* 1985).

F. Temptation to Use and Abstinence Self-Efficacy Scales

In this study Short form of the Temptation to Smoke and Abstinence Self-Efficacy Scales are used. This scale composed of 9 items reflecting situations that commonly lead people to smoke. These situations correspond to three subsets of addiction relapse situations: positive/social situations, negative/affective, and habit/addictive .The Temptation to Smoke scale asks individual to rate feelings of temptation to smoke in each situation from 1=not at all tempted to 5=extremely tempted. The positive/social subscale for temptation had an internal consistency reliability alpha of 0.84. The negative/affect subscale for temptation had an alpha of 0.92, and the habit/addictive for temptation scale had an alpha of 0.80 (Velicer *et al.,* 1990).

G. Procedure

Approval for the study was obtained from the research board of the Ardebil medical sciences university, before the questionnaires were Distributed. Questionnaires were Distributed to hospital staff after obtaining approval for the study from the hospitals managers. Verbal consent was obtained prior to data collection from the staff who agreed to participate in the study. The survey was conducted anonymously, and took approximately 50 minutes to complete.

H. Data analysis

Descriptive statistics were used to assess general and smoking-related characteristics of the study participants. Spearman correlation analysis was performed to illustrate relationships between variables. Ordinal Regression analyses were performed to test the mediating effects of self-efficacy and decisional Balance in smoking cessation based on Transtheoretical Model. Multiple regression analyses were used to determine mediating effect of self-efficacy on the relationship between processes of change and Decision balance with stages of change of smoking behavior. Data were screened for data-entry accuracy and to assure that the assumptions of the statistical tests had been met. Differences with a probability of less than 0.05 were considered to be statistically significant. SPSS (v.21.0) was used for the analyses.

RESULTS

Initial analysis showed that the mean age of the participants were 38.4years old.92%of the investigated sample were married.22.5% of them were post graduate.22.5% of participant reported up than 400 US$ monthly income. 38.5% of them have started smoking at teens period and 13% 0f them have started smoking at childish period (less than 12 years). 49% of the subjects had one of the family numbers who smoke. Based on smoking stage of change 37% of Participants were in precontemplation stage, 29.5% in contemplation stage, 16.5% in preparation stage, 6% in action stage and 11% in Maintenance stage (Table 1). Stages of change was not significant with any demographic characteristics.

Table 1 : General Characteristics of the Study Participants (n=200).

Variable	Value	n	Percentage (%)
Education	License and low	155	77.5
	Postgraduate	45	22.5
Marriage	Single	16	8
	married	184	92
Income	300 – 350 US$	55	27.5
	350 - 400 US$	100	50
	Up than 400US$	45	22.5
Age of first smoking	0 – 12	26	13
	13 – 18	77	38.5
	19 – 40	93	46.5
	Up than 40	4	2
Family smoking	None	102	51
	Parent	50	25
	Grand father&mother	15	7.5
	Brother or sister	21	10.5
	All of family	12	6
Stage of change	Precontemplation	74	37
	Contemplation	59	29.5
	Preparation	33	16.5
	Action	12	6
	Maintenance	22	11

Correlation matrix of Transtheoretical Model constructs

Correlation analysis results indicated that stages of change were significantly correlated with experiential processes and self-efficacy ($p< 0.01$). Experiential processes correlate with cons of smoking ($p< 0.01$). Behavioral processes was significantly associated with cons of smoking and self-efficacy (Table 2).

Table 2: Correlation Matrix of Stages of Change, Processes of Change, Decisional Balance and Self-efficacy.

Variable	Stage of change	Experiential processes	Behavioral processes	Cons of smoking	Pros of smoking
Processes of change	0. 068**				
Experiential processes	0. 026**				
Behavioral processes		0.001**			
Decisional balance	-.055**				
Cons of smoking	-.020**	0.001**	0.001**		
Pros of smoking		-0.051*	-0.036**	-0.026	
Self-efficacy	-.062**	0.050**	0.001**	0.023**	0.001**

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Multiple regression analyses of the mediating effects of self-efficacy

The linear regression analyses conducted to determine the mediating effects of self-efficacy on the relationship between Experimental processes and stages of change demonstrated that Experimental processes were a significant predictor of self-efficacy in the first equation (β=0.62, p<0.001), and Experimental processes were a significant predictor of stages of change in the second equation (β=0.53, p<.001). In the third equation, both the mediator (self-efficacy) and the predictor (Experimental processes) were significantly associated with stages of change. The decreased standardized beta coefficients of Experimental processes between equations 2 (β=0.53) and 3 (β=0.44) verified the action of the mediating effects of self-efficacy on the relationship between Experimental processes and stages of change. Therefore, when influence of self-efficacy was eliminated, an association between Experimental processes and stages of change became less significant in the third equation compared to that of the second equation (Fig. 1). The mediating effects of self-efficacy on the relationship between decisional balance and stages of change were also confirmed (Fig. 2).

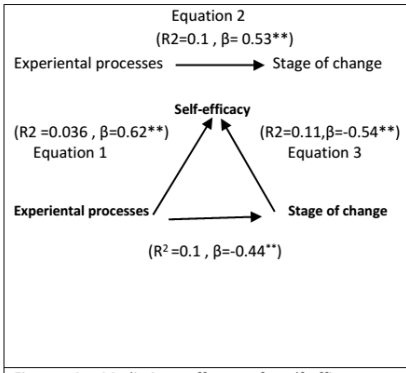

Figure 1. Mediating effects of self-efficacy on the relationships between behavioral processes and stages of change. (**p<0.01).

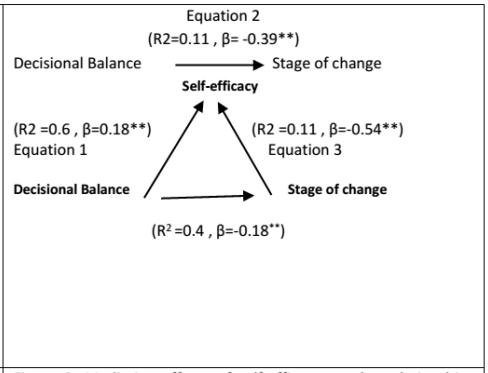

Figure 2. Mediating effects of self-efficacy on the relationships between decisional balance and stages of change. (**p<0.01)

Table 3: TTM constructs prediction in smoking cessation in Ardebil University of Medical Sciences Hospital Employees 2014.

Ordinal Regression		β	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[soc = 1]	.000	.000	.024	1	.001	-1.000	1.000
	[soc = 2]	1.000	.000	2.000	1	.001	.000	3.014
	[soc = 3]	2.000	.000	7.000	1	.007	.000	4.073
	[soc = 4]	2.000	.000	11.000	1	.001	1.000	4.000
Locati	EXP	0.53	.020	10.000	1	.001	.027	.000
	BP	.027	.025	1.000	1	.001	-.021	.075
	DB	-0.18	.030	1.000	1	.001	.000	.019
	Proscons	-0.62	0.29	1.000	1	0.03	-0.30	-0.70
		0.09	0.13	1.000	1	0.001	0.001	0.12
	SELFE	-0.54	.018	11.000	1	.001	-.094	-.025

Note: the reduced efficacy score (increased craving scores) also reduced the possibility of positive progressing in stage of change

Predictive power of TTM constructs in smoking cessation in Ardebil University of Medical Sciences Hospital Employees based on ordinal regression

Ordinal regression analysis were used to determining of Predictive power of TTM constructs in smoking cessation in Ardebil Medical Sciences University Hospital Employees and revealed that Experimental processes of change, Self-efficacy, Behavioral processes of change were strongest predictor of smoking cessation respectively (Table 3).

CONCLUSIONS

The study results revealed that self-efficacy was a predictor of stage of change (β =-0.54, P=0.001) and mediated the relationships of decisional balance with stage of change (β =-0.39, P=0.001) and relationship of experimental process of change and stage of change (β=0.053, P=0.001).pros of smoking cessation(β =-0.62) and self-efficacy were the strongest predictor of stage of change respectively. Future studies should explore the effect of smoke ceccation interventions based on Transtheoretical model.

DISCUSSION

This study was conducted to define the mediating effects of self-efficacy in TTM Among Ardebil Medical Sciences University Hospital Employees. Study demonstrated that the majority of people was in earlier stage of change and had no desire to quit smoking. The current study results were consistent with previous studies that Saime erol & Semra erdogan conducted in that high school students were in earlier stages [5]. Another Study which conducted by linda et-al among Jordanian university students consistent with current study (Linda and Walish 2006) as well study results revealed that decisional balance, self-efficacy and processes of change significantly correlate with stage of change. The current study results were consistent with previous studies that used TTM in testing of smoking cessation among Korean young students (OkKyung and Jae (2009) while farmanbar *et al* in predictors of smoking cessation based on transtheoretical model among smokers in Pars-Khazar factory of Rasht in 2012 found that only processes of change correlate with stage of change (Farmanbar *et al.,* 2012). The current study found that pros of smoking and Self-efficacy and experimental processes of change, Behavioral processes of change strongly predicts stage of change respectively. Therefore, it is assumed that this TTM constructs can lead to positive progress in smoking cessation stages. Wagner, Burg, & Sirois found that within the framework of TTM, Behavioral processes of change was associated with advancing stages among adult smokers (Wagner *et al.,* 2004). The study results revealed the mediating effects of self-efficacy on the relationship between experimental processes and stages of change, and between decisional balance and stages of change. The current study found partial mediation of self-efficacy in that behavioral processes and decisional balance remained significant when influences of self-efficacy were eliminated in the third equations. The current study results were consistent with previous studies that used TTM in explaining smoking behavior targeting the Korean tinagers. Experiential processes were significantly associated with stages of change, or this was strongly mediated by self-efficacy, in the current study. It appeared that self-efficacy was more closely related to emotional coping than behavioral coping .while Experiential processes were not significantly associated with stages of change in Korean study.

The results of the current study suggest that self-efficacy should be included in smoking cessation programs so as to stimulate benefits (pros) of and to diminish costs (cons) of smoking cessation and to emphasize use of experimental coping strategies in various tempting situations. The use of decisional balance and experimental processes through enhanced self-efficacy will improve the adoption and maintenance of smoking cessation. This study tried to explore the relationships among TTM variables in the smoking cessation situations. The Study findings support the application of Transtheoretical model in smoke cessation among smokers in ardebil Hospital staffs, Using this model, it was found that the pros of smoking cessation is strongest Construct and self-efficacy was a mediator of process of change and decisional balance with stage of change, Which can lead to stage transition in smoking cessation, on the other hand using experimental process of change such as Environmental Reevaluation and behavioral process of change such as stimulus control and counter conditioning can lead to positive progress in stage of change in smokers and smoking quiters. So that Future studies should explore the effect of smoke ceccation interventions based on Transtheoretical model.

LIMITATIONS

The current study measured five stages of smoking cessation using the URICA scale. Measurement of the stages of change has presented significant challenges across various health behaviors, and multiple measures have been used to classify individuals into stages including URICA. The URICA scale was able to divide the individuals into subgroups that are consistent with the description of the five stages (DiClemente *et al.,* 2008).The current study recruited participants from four hospitals in Ardebil city. Therefore, the generalizability of the results may be limited to male current and ex-smokers in hospitals, and it may be inappropriate to make inferences to the wider population. Another limitation is the cross sectional nature of the study method, with relationships between the concepts identified in the current study being associational rather than truly predictive.

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