

Exploring smoking cessation behaviors of outpatients in outpatient clinics

Application of the transtheoretical model

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Abstract

To examine the knowledge, attitudes, and behaviors of smokers towards smoking prevention and provide high-quality smoking cessation services and education on tobacco prevention and establish a smoke-free care network.

This study is a cross-sectional survey. The research tool is a questionnaire composed of 4 sub-scales, namely, “tobacco harm awareness,” “tobacco prevention attitude,” “quitting smoking self-efficacy scale,” and “intentional behavior to quit smoking.”

A positive correlation was identified between cessation-specific knowledge, attitude to quit smoking, and intentional behavior to quit smoking among outpatients. Following the regression analysis, 2 factors (cessation-specific knowledge and attitude toward quitting the smoking habit) were considered in the model and its total variance explained reached 53.2%.

Regular smoking cessation classes should be conducted to increase the awareness of smoking hazards and improve the positive attitude toward smoking cessation to avoid smoking hazards.

Abbreviations: COPD = chronic obstructive pulmonary disease, TTM = transtheoretical model.

Keywords: attitude toward quitting the smoking habit, cessation-specific knowledge, intentional behavior to quit smoking, self-efficacy to quit smoking

1. Introduction

The World Health Organization (WHO) states that 1 person dies from smoking every 6 seconds, and 6 million smokers die each year from diseases caused by smoking. Most of these people live in developing countries. The theme of World No-Tobacco Day on May 31, 2019 was “Tobacco and lung health.” The report of the European Union (EU) also points out that young smokers can have poor physical fitness performance, which may reduce lung expansion and increase heart rate at rest; young smokers are also more likely to be exposed to alcohol and drugs, which results in

addiction. The economic costs of smoking in the United States in 2009 to 2012 ranged from 2.89 to 3.325 million dollars, including 1.325 to 1.759 million dollars in medical expenses and 1.15 million dollars in economic losses in terms of productivity reduction caused by the death of young smokers.

Smoking harm causes about 27,000 deaths each year in Taiwan, and 1 person dies from smoking in less than 20 minutes. Among the causes of death by smoking, cancer accounts for 47.5%, followed by cardiovascular disease at 28%, and respiratory disease at 24.5%. Smoking causes individuals, families, and society considerable harm. The economic cost attributable to tobacco harm in China is about 185.8 billion yuan, with the direct national healthcare expenditure at about 65 billion yuan and indirect productivity loss of about 120.9 billion yuan, accounting for 1.15% of the national gross domestic product (GDP). Smoking harms people’s health slowly and silently.

In many studies, smoking has been recognized as a risk factor for chronic diseases, such as chronic respiratory diseases (asthma, chronic obstructive pulmonary disease [COPD]), hypertension, cardiovascular disease, atherosclerosis, diabetes, cancer, and microbial infections (respiratory infections, bacterial meningitis).^[1–3] It also has an adverse effect on public health as shown in mortality statistics.^[4] Smoking also places a burden on health care systems and increases social costs.^[5] Wang et al (2019) investigated the prevalence of tobacco-related chronic diseases in 36,698 Shanghai residents from June 2016 to December 2017 and found that the smoking rate was 19.78%. The prevalence of tobacco-related chronic diseases among them ranged from 0.63% for COPD to 36.31% for hypertension; moreover, 52.33% of the smokers had the intention to quit the smoking habit after a diagnosis of COPD.^[6]

In response to the World Health Organization’s call for the prevention and control of noncommunicable diseases and to realize the goal of reducing smoking rates by 30% by 2025,

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China has been committed to starting from the root, creating smoke-free environments in schools, the military, communities, hospitals, and workplaces, and promoting all-around smoke control policies. The Health Promotion Administration of the Ministry of Health and Welfare has actively promoted the service quality improvement plan of smoke-free hospitals. Through the implementation of the plan, smoke-free hospitals are expected to comply with relevant smoking bans and become a comprehensive smoke-free place. Efforts should be exerted to reduce tobacco use and harm, improve service quality, help people quit smoking, implement a smoke-free environment, and reduce the harms of second-hand smoke.

Application of transtheoretical model (TTM): TTM was developed by Prochaska and DiClemente (1983) by integrating theories of psychotherapy and behavior change. Its theoretical structure spans the argument of treatment of heart disease and behavior change, which is why it is called the transcendence model. This model has 4 parts:

- (1) The stages of change,
- (2) The process of change,
- (3) Self-efficacy, and
- (4) Decisional balance.

The goal is to describe how people create beneficial new behaviors or modify current behavioral responses. This model attempts to explain how past experiences and motivations influence the adoption and maintenance of purposeful healthy behaviors.^[7]

TTM systematically integrates 3 important conceptual factors, including when to change, how to change, and which factors affect change. Among them, the stages of change are related to when it will occur,^[8] the process of change is related directly to how it will occur, and decisional balance and self-efficacy are related closely to factors that affect change. In addition, because “self-efficacy” is an important variable of this study, the following explanations are provided. Self-efficacy comes from one of the core concepts of social learning theory from the perspective of epistemology proposed by Bandura.^[9] According to Bandura’s definition, “self-efficacy refers to an individual’s ability to evaluate a person’s ability to perform a specific behavior in a specific environment. It is an important factor in determining behavior, and is also the degree of personal confidence that a specific behavior can be performed, which can be regarded as the determining factor of the behavior.” Self-efficacy is considered one of the most explanatory variables in the process of human behavior.^[9] Self-efficacy can be divided into “outcome expectation” and “efficacy expectation.” Outcome expectation refers to the expectation that an action will lead to a specific result, while efficacy expectation refers to the self-perceived ability to engage in an activity. The 2 concepts differ because individuals may believe that an action will lead to a certain result, but if they question their ability to do so, their behaviors will not be affected by the expectations of the result. In other words, efficacy expectations can predict individual behavior better than outcome expectations.

To sum up, “self-efficacy” refers to an individual’s degree of confidence in completing a task after self-assessment when performing a task or facing a situation. Therefore, individual behavior performance is affected by self-efficacy beliefs, that is, self-efficacy affects behavior change or maintains the original behavior. If it is applied to the belief of self-efficacy of diet behavior, it means individuals can perceive their degree of control of food intake in a special situation.

Bandura believes self-efficacy is the most explanatory variable of human beings in various behaviors.^[9] Berarducci and Lengacher (1998) state that self-efficacy is an important factor determining behavioral performance.^[10] Self-efficacy applied to healthy behavior research shows it can be used to predict and explain behavior and is an important variable for behavior change and maintenance.^[11,12]

As far as quitting smoking behavior is concerned, several studies at home and abroad that have found that self-efficacy is related significantly to quitting smoking.^[13–16] Therefore, in this study, self-efficacy is listed as an important variable with the hope of reconfirming that self-efficacy has an important influence on quitting smoking behaviors of people who quit smoking in clinics.

However, considering time, manpower, and material considerations, this study will only use the 3 concepts in the theoretical model, the stages of change, self-efficacy, and decisional balance, as important concepts in the research architecture, and describes them separately as follows:

- (1) Pre-contemplation: One does not realize his or her problematic behavior and has no intention to change the behavior within 6 months.
- (2) Contemplation: One begins to realize his or her problematic behavior and has the intention to change the behavior within 6 months.
- (3) Preparation: One intends to change his or her behavior within the last 6 months, and some irregular incidental changes occur.
- (4) Action: Regular changes in behavior have occurred and lasted for nearly 6 months.
- (5) Maintenance: Changes of behavior have persisted for more than 6 months or even up to 5 years.

Since the implementation of the New Law on Smoking Prevention in 2009, the smoking rate among adults dropped from 21.9% in 2008 to 14.5% in 2017, which reduced the smoking rate by 34%. This paper is expected to explore the knowledge, attitudes, and behaviors of smokers on smoking prevention through research. In the future, it will also provide high-quality information on quitting smoking behavior and implement advocacy education on smoking prevention to establish a smoke-free environment, maintain people’s health, and further reduce the burden of the health care system and social costs.

2. Method

2.1. Research design and case studies

This study was a cross-sectional and correlative study obtained through convenient sampling. The samples were taken from the patients who were seeking assistance to quit smoking at clinics in a teaching hospital in the south. The sample selection conditions are as follows:

- (1) Patients whose nationality was China and aged older than 20.
- (2) Patients with clear consciousness, no mental disorder, or mental illness diagnosis.
- (3) Patients who can communicate in Chinese and Taiwanese.

After explaining the research purpose, those who were willing to participate were asked to sign the consent form. The number of samples was based on the (means under test family *t*-test of software G power: Difference from constant [1 sample case]). The

standard of power was set as 0.8, and the significant standard $\alpha = 0.05$. With reference to other studies, the behavioral intention to quit smoking was set to 29, the standard deviation was set to 6, the estimated behavioral intention for sampling was set to 26 (calculated by effect size = 0.5), and the minimum number of samples required was set to 54. Considering the estimated case loss rate, 100 cases are expected to be accepted. The cases were accepted from June 6 to October 30, 2019. We issued 100 questionnaires and received 100 valid questionnaires, with a recovery rate of 100%.

2.2. Research tools and reliability

In this study, a structured questionnaire was used to collect data. The questionnaire contents included social demographic data, smoking awareness scale, the scale for attitude toward smoking prevention, the scale for behavioral intention to quit smoking, the scale for stages of changes to quit smoking, and scale for self-efficacy in quitting smoking. The relevant content of this scale is described as follows.

Scholars and experts with a background in health promotion provided professional guidance to test the content validity of the questionnaire. The Cronbach α value of the overall reliability was 0.94.

2.2.1. Smoking harm awareness scale. Smoking harm awareness scale included 9 items, and the options and scores included: correct (1 point), wrong and do not know (0). The higher the scale score, the higher the level of smoking harm awareness, and vice versa; the consistency Cronbach α value in this study scale was 0.79, and the content validity index (CVI) value was 0.94 after expert validity test.

2.2.2. Scale for attitude toward smoking prevention. The scale for attitude toward smoking prevention had a total of 9 questions. The Likert scale 4-point scoring method was used to understand the research subjects' attitudes toward smoking prevention and was divided into 4 levels. "Strongly disagree" was 1 point, "disagree" was 2 points, "agree" was 3 points, and "strongly agree" was 4 points, with a total score of 9 to 36 points. The higher the score, the more positive the attitude toward smoking prevention. The inherent consistency Cronbach α value of this scale was 0.94, and the CVI value was 0.94 based on the expert validity test.

2.2.3. Scale for behavioral intention to quit smoking. The scale for behavioral intention to quit smoking had 2 questions. The Likert scale 4-point scoring method was used to study the research subjects' behavioral intention to quit smoking, which was divided into 4 levels. "Definitely will not" was 1 point, "probably will not" was 2 points, "probably will" was 3 points, and "definitely will" was 4 points, with a total score of 2 to 8 points. The higher the score, the higher the behavioral intention to quit smoking. The inherent consistency Cronbach α value of this scale was 0.73 and the CVI value was 0.94 based on the expert validity test.

2.2.4. Scale for stages of change of quitting smoking. The scale for stages of change of quitting smoking had 4 questions. The Likert scale 5-point scoring method was used to study the research subjects' stages of change of quitting smoking, which was divided into 5 levels. "With no plan to take action in the next 6 months" was 1 point, "with plan to take action in the next 6 months" was 2 points, "will begin to take action within the

next month" was 3 points, "have taken action but not more than 6 months" was 4 points, and "have taken action for more than 6 months" was 5 points, with a total score of 4 to 20 points. A higher score suggests the stage of change of quitting smoking was towards the direction of smoking quitting. The inherent consistency Cronbach α value of this scale was 0.65, and the CVI value was 0.94 by the expert validity test.

2.2.5. Scale for self-efficacy in quitting smoking. The scale for self-efficacy in quitting smoking had 9 questions. The Likert scale 4-point scoring method was used to study the research subjects' self-efficacy, which was divided into 4 levels. "Definitely unconfident" was 1 point, "unconfident" was 2 points, "confident" was 3 points, and "definitely confident" was 4 points, with a total score of 9 to 36 points. The higher the score, the higher the self-efficacy in quitting smoking. The inherent consistency Cronbach α value of this scale was 0.99 and the CVI value was 0.94 by the expert validity test.

2.3. Data collection process and data analysis

After obtaining the approval from the human test review committee of the research site, the relevant unit was contacted for data collection. To protect the rights and ethical considerations of the research objects, the research content was explained orally before they confirmed the research objects' willingness to participate in the research. The participants were then asked to fill in the research consent form, which explained the research purpose, time and rights, and interests required. During the process, the research object may request to withdraw at any time and provide small gifts after completion.

This study used the SPSS 20.0 for Windows statistical software package for archiving and analysis. Descriptive statistics were described by frequency distribution, percentage, average, and standard deviation. Inferential statistics were determined by independent *t*-test, Pearson correlation coefficient, and multiple regression.

3. Results

3.1. Sociodemographic information

Table 1 shows the 100 study subjects had an average age of 41.2 ± 14.2 years old. Daily smoking amount in the past month was 12.7 ± 9.6 , mostly male, who accounted for 92%, while females accounted for 8%. Most of the subjects started smoking in high school and before middle school, accounting for 36% and 33%, respectively. The education level was mainly under high school, accounting for 67%, followed by junior college education, accounting for 33%. Their jobs were mainly military officers, government officials and teachers, and those occupations such as workers, businessmen, fishermen and farmers, accounting for 35% and 32%, respectively, followed by service industry, who accounted for 22%, and retired and unemployed personnel were the least, accounting for 11%. Most had no habit of chewing areca, accounting for 93%, while 7% had the habit of chewing areca. Most of them had no chronic diseases, accounting for 84%, and those with chronic diseases accounted for 16%; most had no exercise habit, accounting for 58%, and those with the habit accounted for 42%. As for whether their friends around smoke, most of them were non-smokers, accounting for 65%, and more than half of them were smokers, accounting for 35% (Table 1).

Table 1
Sociodemographic information.

Characteristics	(N = 100)	
	n (%)	Mean ± SD
Age		41.2 ± 14.2
Smoking time (yr)		21.9 ± 14.2
Daily smoking amount in the past month		12.7 ± 9.6
Start smoking		9.9 ± 8.5
Before middle school	33 (33)	4.1 ± 2.7
High school	36 (36)	
After college	15 (15)	
After work	16 (16)	
Chewing areca habit		
Yes	7 (7)	
No	93 (93)	
Chronic diseases		
Yes	16 (16)	
No	84 (84)	
Exercise habit		
Yes	42 (42)	
No	58 (58)	
Gender		
Male	92 (92)	
Female	8 (8)	
Education level		
Under high school	67 (67)	
Junior college or above	33 (33)	
Job		
Workers, businessmen, fishermen, and farmers	32 (32)	
Military officers, government officials, and teachers	35 (35)	
Service industry	22 (22)	
Retired and unemployed personnel	11 (11)	
Whether their friends around smoke		
More than half were smokers	35 (35)	
Less than half were nonsmokers	65 (65)	

SD = standard deviation.

3.2. Related scale of smoking quitting behaviors of outpatients

The score of smoking harm awareness among the outpatients was 7.4 ± 1.9 (a full score of 9 points), attitude toward smoking prevention was 27.8 ± 6.3 (a full score of 36 points), intentional behavior to quit smoking was 5.1 ± 1.5 (a full score of 8 points), the change of behavior was 8.9 ± 3.6 (a full score of 20 points), and self-efficacy in quitting smoking was 34.6 ± 13.1 (a full score of 36 points) (Table 2).

3.2.1. Distribution of stages of change in smoking quitting behaviors of outpatients.

For the stages of change, the outpatients “with no plan to take action in the next 6 months”

Table 2
Distribution of smoking cessation awareness, smoking prevention attitude, and behavior of smoking cessation among people who quit smoking (N = 100).

Characteristics	Mean ± SD
Score of smoking harm awareness	7.4 ± 1.9
Score of attitude toward smoking prevention	27.8 ± 6.3
Score of intentional behavior to quit smoking	5.1 ± 1.5
Score of change of behavior	8.9 ± 3.6
Score of self-efficacy in quitting smoking	34.6 ± 13.1

SD = standard deviation.

Table 3
Distribution of stages of change in smoking quitting behaviors of outpatients (N = 100).

Characteristics	n	(%)
No plan to take action in the next 6 mo	Pre-contemplation	68.7%
Plan to take action in the next 6 mo	Contemplation	10.0%
Will begin to take action within the next month	Preparation	5.3%
Have taken action but not more than 6 mo	Action	7.3%
Have taken action for more than 6 mo	Maintenance	8.7%

(pre-contemplation) accounted for 68.7%, those “with plan to take action in the next 6 months” (contemplation) accounted for 10.0%, those who “will begin to take action within the next month” (preparation) accounted for 5.3%, those who “have taken action but not more than 6 months” (action) accounted for 7.3%, and those who “have taken action for more than 6 months” (maintenance) accounted for 8.7% (Table 3).

3.3. Correlative analysis of factors affecting smoking quitting behaviors of outpatients

3.3.1. Correlation of intentional behavior to quit smoking of outpatients. Smoking harm awareness among outpatients was correlated positively with the intentional behavior to quit smoking ($r = 0.64$, $P < .01$), that is, the higher the smoking harm awareness, the better their smoking intentional behavior. Attitude toward smoking prevention of outpatients was correlated positively with the intentional behavior to quit smoking ($r = 0.70$, $P < .01$), that is, the more positive the attitude toward smoking prevention, the better their smoking intentional behavior. Smoking harm awareness of outpatients was correlated positively with the attitude toward smoking prevention ($r = 0.69$, $P < .01$), that is, the higher the smoking harm awareness, the more positive their attitude toward smoking prevention (Table 4).

3.3.2. Important predictors of intentional behavior to quit smoking of outpatients. Sociodemographic variables, smoking harm awareness, attitude toward smoking prevention, self-efficacy to quit smoking and intentional behavior to quit smoking were analyzed using multiple regression, and predictive factors were selected using stepwise selection. Collinearity diagnosis indicated the absence of collinearity. The main predictors of the results were “smoking harm awareness” and “attitude toward smoking prevention” ($F = 57.3$, $P < .001$), with 53.2% variation in the overall interpretation of intention to quit smoking ($\Delta R^2 = .53$, 95% CI = -1.15 – 0.83) (Table 5).

4. Discussion

This study found that the important predictors of intentional behavior to quit the smoking habit included “smoking harm awareness” and “attitude toward smoking prevention.” Smoking harm awareness and attitude toward smoking prevention were correlated positively with intentional behavior toward smoking, indicating that smoking harm awareness and attitude toward smoking prevention were positive predictors.

Nishio et al (2018) reviewed studies on African countries' education on smoking quitting in schools in 2000 to 2016, finding that smoking harm prevention awareness and attitudes have been improved significantly after school smoking quitting education,^[17] and many studies have found that awareness and

Table 4**Correlative analysis of factors affecting smoking quitting behaviors of outpatients (N = 100).**

Characteristics	Smoking harm awareness	Attitude toward smoking prevention	Smoking intentional behavior	Score of self-efficacy in quitting smoking
Smoking harm awareness	1			
Attitude toward Smoking prevention	0.69 [†]	1		
Smoking intentional behavior	0.64 [†]	0.70 [†]	1	
Score of self-efficacy in quitting smoking	0.08	-0.02	-0.15	1

[†] $P < .01$.**Table 5****Stepwise multiple regression of intentional behavior to quit smoking.**

Characteristics	Unstandardized β coefficients	Standardized β coefficients	t	Tolerance	VIF	R^2	ΔR^2	(N = 100) F
Constant	-0.15		0.31 [‡]			0.54	0.53	57.3 [‡]
Smoking harm awareness	0.13	0.49	5.2 [‡]	0.53	1.8			
Attitude toward smoking prevention	0.23	0.29	3.1 [‡]	0.53	1.8			

[‡] $P < .001$.

attitudes of smoking harm prevention have shown significant progress after smoking quitting education.^[17,18] Therefore, a systematic education proposal is put forward. The education team is composed of doctors, nurses, pharmacists, physiotherapists, and other medical personnel to arrange a series of smoking quitting education and training and provide activities planning that can increase cardiopulmonary endurance and improve the physical fitness of the outpatients who are quitting smoking in clinics. In addition to increasing their smoking harm awareness and attitudes toward smoking prevention, and their willingness to cooperate with medical teams, we hope to achieve a consistent concept of teamwork and improve the success rate of smoking quitting among outpatients.

5. Conclusions

This study found that important predictors of smoking cessation behaviors among outpatients in the outpatient clinic, including “smoking harm awareness” and “attitude toward smoking prevention,” and people “with no plan to take action in the next 6 months” (pre-contemplation) accounted for 68.7%. Based on the results of this study, education and activities that focus on smoking quitting classes should be arranged regularly and relevant information promoted every year to increase smoking harm awareness among outpatients, enhance the positive attitude of smokers to prevent smoking, increase the number of people who have given up smoking to obtain quality smoking cessation services and correct information in smoking prevention education advocacy, and establish a smoke-free care network. Cooperation with the Health Promotion Administration of the Ministry of Health and Welfare should be established to promote smoke-free hospital service quality improvement programs. Through the implementation of the plan, smoke-free hospitals are expected to comply with relevant smoking bans and become a comprehensive smoke-free place, assist outpatients who quit smoking to reduce tobacco use and reduce the occurrence of smoking harm, improve the quality of services to help people quit smoking, implement a smoke-free environment, and reduce the harm of second-hand smoke to establish a healthy behavioral model for patients and their families.

6. Limitations and suggestions

The results of this study are limited to the results measured by the research tools, which are evaluation tools of personal self-reporting. The differences between the Chinese and Western cultures may give rise to the research objects to be unwilling to report their true opinions because they are afraid of being exposed. This research is also limited to a regional teaching hospital in the south, which limits the inference of the research. The study is also a cross-sectional study and thus, it did not study the changes in the behavior toward quitting the smoking habit over time. Based on the limitations of this study and the current situation of smoking health education, the following future research directions are suggested:

- (1) Additional experience assessment tools or physiological indicators, such as smoking experience, cardiopulmonary function test, and other projects, should be included in the assessment project.
- (2) Future research on smoking behavior should include the use of e-cigarettes, flavored cigarettes, and other related smoking behaviors in recent years.
- (3) The research object and area should be expanded to confirm our results.
- (4) The family members of participants included in health educators and smoking behaviors should discuss the factors affecting behaviors on quitting the smoking habit.
- (5) Studies using longitudinal design are required to enable the exploration of changes in the behaviors of smokers who have quit the smoking habit.

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Author contributions

Ching-Yi Hsu and Hung-En Liao performed the experiments and analyzed the data. Ching-Yi Hsu and Li-Chun Huang wrote the paper.

Li-Chun Huang designed the experiments, provided crucial suggestions.

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