

# Factors Associated with the Stage of Change of Smoking Cessation Behavior in Adolescents

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**Purpose.** The purpose of this study was to identify the stage of change of smoking cessation behavior and investigate factors associated with the stage of smoking cessation behavior according to the transtheoretical model.

**Methods.** The participants, 297 smokers & quitters were selected by a stratified random sampling from 127 high school sophomore students in B city. Data were collected from April 6th to 16th, in 2002 using the structured self-report questionnaire.

**Results.** The subjects were distributed in each stage of change of smoking cessation behavior: there were 46 subjects (15.5%) in precontemplation, 73 subjects (24.6%) in contemplation, 67 subjects (22.3%) in preparation, 56 subjects (18.5%) in action, 55 subjects (18.5%) in maintenance. Compared to the precontemplation and contemplation, people in preparation tended to smoke daily more and smoked for a shorter time, and as precontemplation progressed to the maintenance, past 1 year smoking cessation frequency increased and friends smoking decreased. Smoking onset age was the earliest in preparation, and the latest in maintenance. Helping relationships and self relationships are used a lot in precontemplation and also in contemplation. In preparation, self liberation and helping relationships are used a lot, in action, self liberation and helping relationships, and in maintenance, self liberation and environmental reevaluation. At each stage, the score of negative affect situation was the highest, but the one of negative affect situation, positive social situation, habitual strength, weight control decreased as precontemplation progressed to the maintenance. While the score of social pros and coping pros decreased with increasing stage, the one of cons tended to increase. Through stepwise discriminant analysis, it was found that social pros, smoking onset age, self-liberation were the most influencing powers among factors associated with the stages of smoking cessation behavior.

**Conclusions.** This study suggested that, in developing an effective smoking cessation intervention for adolescents, all the stage of a client's cessation had to be assessed prior to applying intervention programs. In addition, the results of this study will become a pillar of smoking cessation program planning and application.

**Key Words:** Adolescent, Smoking cessation, Transtheoretical model

## INTRODUCTION

As it is well-known that smoking is the main cause of

lung diseases and other diseases (Prochaska, Emmons, Pallonen & Tsoh, 1996), personal concerns about smoking cessation have increased, and at the same time, the government is vigorously pursuing a nationwide smok-

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ing cessation campaign (Ministry of Health & Welfare, 2001; Alexander, 2001).

However, despite government and other private organizations' various smoking cessation programs, the smoking rate of Korean men over the age of 15 is twice that of other advanced countries; It is the highest in the world (Korean Association of Smoking & Health, 2001). Furthermore people starting to smoke before 15 tend to get lung cancer 4 times as much as people who begin over 25 (Vecchia, Decarli & Pagano, 1995). It is very important for adolescents, more than other ages, to realize the importance of teenage smoking cessation and its practice because smoking in adolescence strongly influences health, even into adulthood.

Likewise, although there have been studies using various smoking cessation education programs in order to decrease the smoking rate of adolescents (Kim, 1998; Shin et al., 1998), they were effective just in the short run, but didn't reduce the rate in the long run (Park, 2002). It's because we have tried to change smoking behavior on the assumption that the motive for quitting smoking is always the same (Oh & Kim, 1996a, 1996b), in spite of the fact that the most effective approach to smoking cessation is to apply smokers' voluntary motive (Choi, 1999).

To solve this problem, a smoking cessation study is in progress, based on transtheoretical model, TTM, by

Prochaska and Diclemente (1983), which regards smoking cessation behavior as a dynamic process of change (Prochaska & Velicer, 1997). In other words, it suggests that we should develop a reasonable stimulus to change behavior because not quitting smoking is just a stage in smoking cessation behavior, and this stage could be affected by various stimuli (cognitive or behavioral ones).

Now, among smoking cessation studies using TTM, there are some studies of university students (Oh & Kim, 1996a, 1996b, 1997; Choi, 1999) and adults (Chang, Park & Min, 2000; Kim, 2000; Chang & Park, 2001), but not enough studies of adolescents.

Therefore, in contrast to previous smoking cessation studies that have no concern for smoker's motives and preparations of smoking and suggest one-sided methods for provider, this study was intended to furnish practical data in planning the smoking cessation intervention strategies, adapting TTM which can predict the change of behavior in smoking cessation based on personal motives, and knowing the difference in smoking related characteristics, process of change, temptation/self-efficacy, and decisional balance associated with the smoking cessation behavior stage (Figure 1).

### Objectives

The purpose of this study is to divide the smoking cessation behavior stage of adolescents, and to find out the

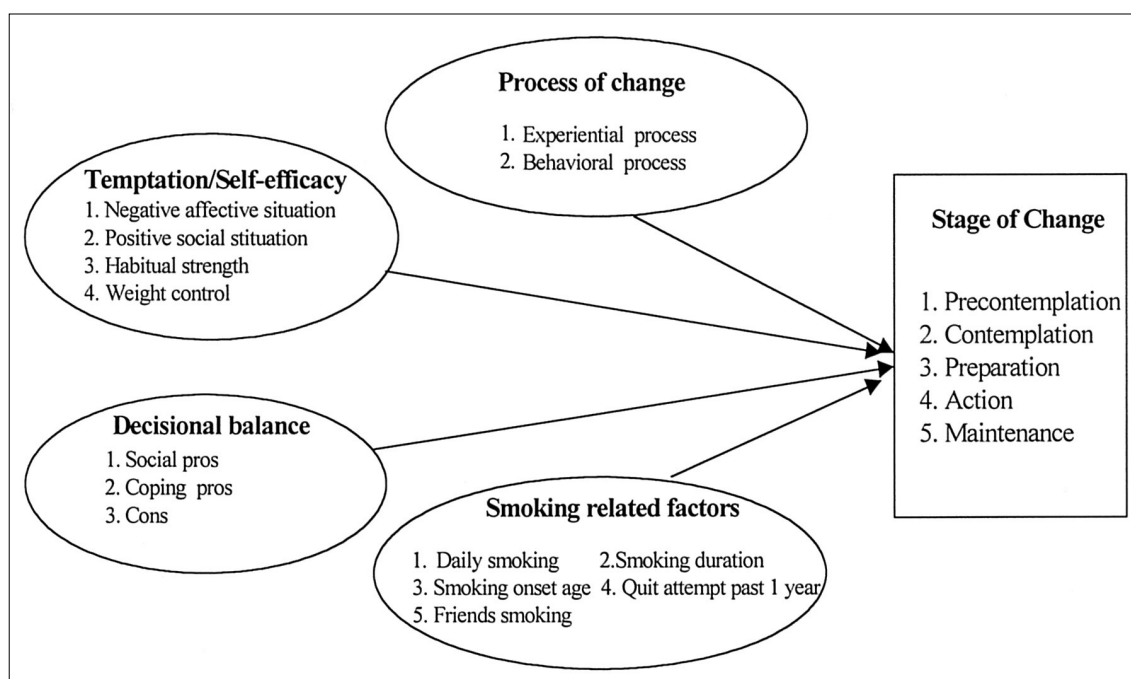


Figure 1. Theoretical Framework of the study.

difference in smoking related characteristics, process of change, temptation/self-efficacy, and decisional balance associated with the stage of change. The specific objectives were;

1) to identify the stage of smoking cessation behavior in adolescents

2) to identify the difference in smoking related characteristics, process of change, temptation, and decisional balance

3) to analyze the explanatory power of factors associated with the stage of smoking cessation behavior in adolescents.

## METHODS

### *Research design*

This study is a cross-sectional research to identify factors that influence the smoking cessation behavior stage of adolescents.

### *Subjects and data collection*

The participants, quitters or current smokers, were selected by a stratified random cluster sampling among the sophomore high school male and female students in B city on April, 2002. It was determined that a sample size of 270 subjects was needed to fulfil the aim of this study. This was accomplished by considering size of effect ( $f=0.2$ ), and power ( $p=0.75$ ) at significance level ( $\alpha=0.05$ ) as calculated by G-Power program.

The following is the specific process of sampling;

First, 127 high schools of the Office of Education were stratified by sex and type of school in 6 layers (general male highschool, general female highschool, general co-educational highschool, vocational male highschool, vocational female highschool, vocational coeducational highschool)

Second, 3 general male high schools, 3 general female high schools, 3 general coeducational high schools, 2 vocational male high schools, 2 vocational female high schools, 3 vocational coeducational high schools were selected by random probability proportion (the first sampling process).

Third, classes of each school, cluster, 2 classes were sampled randomly, and altogether 1041 students were chosen (the second sampling process).

Fourth, the questionnaires were distributed to all of students in the randomly chosen first sample, and I investigated their latest smoking condition. Among these

students, 301 quitters and current smokers were chosen as final subjects and finally, 297 students in all were put on the list of subjects for analysis except for 4 students, who hadn't answered faithfully.

For data collection, the selected high schools were contacted in person from the 6th to the 16th of April in 2002, and health teachers of these schools were asked for help, with explanation of the objectives and contents of the research. After that, the researchers visited the selected classes of these schools, explained the objectives of the research and gave students questionnaires. Students who agreed to the research filled out the questionnaires directly and they were collected.

### *Instruments*

#### *Stage of change*

Developed by Pallonen et al (1998), scales are composed of 5 questions, which decide what smoking cessation stage (precontemplation, contemplation, preparation, action, maintenance) subjects correspond to. The precontemplation stage includes smokers who are not thinking about quitting smoking in the next 6 months. The contemplation stage includes smokers who are thinking about quitting within the next 6 months. The preparation stage consists of smokers who are planning to quit within the next 30 days. The action stage includes those who have quit smoking during the past 6 months. The maintenance stage includes those who remained nonsmokers for more than 6 months.

#### *Smoking-related characteristics*

Characteristics include the amount of daily smoking, smoking duration, smoking onset age, smoking cessation frequency over the past 1 year, and the number of smoking friends. The amount of daily smoking was measured on Minnesota Smoking Index, invented by Pechacek in 1984, which is a self-report questionnaire, and consists of 3 questions: the number of cigarette butts over the past 7 days, over the past 24 hours, and over the past 1 month.

#### *Process of change*

A 5-point scale tool was used after translation and back translation; it was invented by Prochaska et al in 1988 and has 40 questions and 10 subordinate factors. Subordinate parts are composed of the experiential process, which includes consciousness raising, dramatic relief, self-reevaluation, social liberation, and environ-

mental reevaluation, and the behavioral process, which includes helping relationships, counter conditioning, reinforcement management, stimulus control and self-liberation. Each factor has 4 questions. Higher scores on the questions means that he or she experienced the factor more. The reliability(Cronbach's Alpha) of the tool was 0.62 - 0.92 when developed, and 0.60 - 0.84 for the present study.

#### Temptation/Self-efficacy

A 5 point scale, developed by Plummer et al. in 2001, and composed of 8 questions and 4 subordinate factors, was used after translation and back translation. Subordinate factors consist of 2 questions of negative affect situation, 2 of positive social situation, 2 of habitual strength, and 2 of weight control. Higher point in these factors means that he or she can't avoid smoking temptation situations. The reliability (Cronbach's Alpha) of the tool was 0.92 of negative affect situation, 0.81 of positive social situation, 0.72 of habitual strength, and 0.88 of weight control when developed, and 0.84, 0.81, 0.64, 0.97 on preliminary research, and 0.83, 0.82, 0.78, 0.89 on this research respectively.

#### Decisional balance

The 5-point scale, developed by Pallonen et al (1988) for adolescents based on the tool of Velicer et al. (1985), including 12 questions and 3 subordinate factors, was used after translation and back translation. Subordinate factors are made up of 3 questions of change to positive aspects (social pros), 3 of change to positive aspects (coping pros), and 6 of change to negative aspects (cons) of smoking. Higher points in these factors means that each factor plays an important role in making a decision on smoking. The reliability (Cronbach's Alpha) of the tool was 0.67 in social pros, 0.75 in coping pros, 0.75 in cons when developed, 0.60, 0.80, 0.94 on preliminary research and 0.66, 0.82, 0.84 on this research respectively.

#### Data analysis

Data were analyzed by the SPSS Win 10.0 program.

1) The general characteristics of subjects were analyzed by frequency, and percentage.

2) The smoking cessation stage of change of subjects were analyzed by frequency and percentage

3) One-way ANOVA was used to analyze the differences in smoking related characteristics, process of change, temptation, and decisional balance associated

with the smoking cessation stage of subjects. Post hoc test was used to Turkey comparison.

4) Discriminant analysis was used to analyze influencing power of relevant factors associated with the stage of change of smoking cessation.

## RESULTS

### General characteristics

Table 1 shows the general characteristics of subjects. For subjects, 56.7% (169) were males, and 43.1% (128) females. For school type, vocational high school students(66.7%) were more than general high school students(33.3%). Moderate economic status, (50.5%) and unsatisfaction with school (39.4%) rated highest, and below moderate school performance (90.6%) placed in the majority.

### Distribution of subject associated with the smoking cessation stage of change

Out of 297 subjects, 46 (15.5%) were in precontemplation, 73 (24.6%) in contemplation, 67 (22.3%) in preparation, 56 (18.5%) in action, and 55 (18.5%) in maintenance.

### Smoking related characteristics associated with the smoking cessation stage of change

Table 2 shows the results of an analysis of the difference in smoking related characteristics associated with the stage of change of smoking cessation of subjects.

Table 1. General Characteristics (N=297)

Characteristics		N(%)
Sex	male	169 (56.9)
	female	128 (43.1)
School type	general	99 (33.3)
	vocational	198 (66.7)
Economic status	well	37 (12.5)
	moderate	150 (50.5)
	poor	110 (37.0)
School satisfaction	satisfaction	66 (22.2)
	neutral	114 (38.4)
	unsatisfaction	117 (39.4)
School performance	upper (30%)	28 (9.4)
	moderate	153 (51.5)
	lower (30%)	116 (39.1)

There were significant differences in the amount of daily smoking ( $F=4.26$ ,  $p=0.00$ ), Post-hoc follow-up testing showed significant differences between the precontemplation and contemplation groups.

Only current smokers in precontemplation, contemplation, and preparation were researched on the amount of daily smoking and smoking duration; people in the precontemplation smoked the most, 8.61 butts on average. The amount of daily smoking tends to decrease as the subjects progress from precontemplation to preparation. A period of 2.63 years smoking in precontemplation was the longest, and it decreased with moving to the preparation stage.

There were significant differences in smoking duration ( $F=4.50$ ,  $p=0.00$ ), smoking onset age ( $F=8.26$ ,  $p=0.00$ ), smoking cessation frequency over the past 1 year ( $F=2.65$ ,  $p=0.00$ ), and the number of friends smoking ( $F=12.58$ ,  $p=0.00$ ) corresponding to the smoking cessation stage.

Those in preparation started to smoke the latest, when 15.13 years old, and those in maintenance began to smoke the earliest, when 14.00 years old, but there were no clear tendencies associated with the stage of change. In preparation, people tried to quit smoking the most, 10.22 times, over the past 1 year. People in precontemplation had the most, 6.80, friends smoking, which tended to decrease with increasing stage.

### *Process of change associated with the smoking cessation stage of change*

Table 3 tells the results of an analysis of the difference in process of change associated with the stage of change of smoking cessation of subjects.

Apart from re-inforcement management and environmental reevaluation, there was a significant difference in consciousness raising ( $F=3.80$ ,  $p=0.00$ ), Post-hoc follow-up testing showed significant differences between the precontemplation and contemplation groups. There was

**Table 2. Smoking Related Characteristics of Smoking Cessation Stage of Change (N=297)**

Characteristics	Smoking cessation stage of change					F	Turkey comparison
	Pc (N=46)	Con (N=73)	Pre (N=67)	Act (N=56)	Main (N=55)		
	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD		
Daily smoking (N=186)	8.61 $\pm$ 7.40	6.60 $\pm$ 5.05	4.33 $\pm$ 4.13	-	-	4.26**	Pc > Con > Pre
Smoking duration (N=186)	2.63 $\pm$ 1.49	2.46 $\pm$ 1.39	1.86 $\pm$ 1.14	-	-	4.50**	-
Smoking onset age	14.30 $\pm$ 1.21	14.40 $\pm$ 1.18	15.13 $\pm$ 0.92	14.79 $\pm$ 1.14	14.00 $\pm$ 1.52	8.26**	-
Past 1 years smoking cessation frequency	6.32 $\pm$ 7.10	8.16 $\pm$ 7.96	10.22 $\pm$ 8.28	9.04 $\pm$ 9.07	5.92 $\pm$ 8.39	2.65**	-
Friends smoking	6.80 $\pm$ 3.24	6.68 $\pm$ 2.93	5.88 $\pm$ 3.04	4.77 $\pm$ 3.16	3.45 $\pm$ 2.90	12.58**	-

\*\* $p < .01$

Pc = precontemplation, Con = contemplation, Pre = preparation, Act = action, Main = maintenance

**Table 3. Smoking Cessation Stage of Change and Process of Change (N=297)**

Characteristics	Smoking cessation stage of change					F	Turkey comparison
	Pc (N=46)	Con (N=73)	Pre (N=67)	Act (N=56)	Main (N=55)		
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD		
Experiential process							
consciousness raising	2.83 ± 0.97	3.41 ± 0.72	3.46 ± 1.05	3.21 ± 0.99	3.03 ± 1.14	3.80**	Pc< Con
dramatic relief	3.05 ± 1.08	3.46 ± 0.85	3.70 ± 1.06	3.37 ± 1.06	2.90 ± 1.14	5.60**	-
self- reevaluation	2.86 ± 0.82	3.19 ± 0.69	3.28 ± .90	3.01 ± 0.92	2.33 ± 0.79	12.35**	Act< Main
social liberation	2.88 ± 0.80	3.12 ± 0.76	2.90 ± 1.03	3.01 ± 0.84	2.59 ± 0.92	3.06*	-
environmental reevaluation	3.30 ± 0.94	3.42 ± 0.89	3.60 ± 1.00	3.75 ± 1.00	3.70 ± 0.92	2.16	
Behavioral process							
helping relationship	4.04 ± .88	4.10 ± .70	3.81 ± .69	3.89 ± .97	3.49 ± .89	5.00**	-
counter conditioning	2.76 ± .85	2.97 ± .76	3.26 ± .79	3.47 ± .96	3.05 ± .97	5.51**	-
re-inforcement management	2.91 ± 1.04	3.17 ± .73	3.28 ± .91	3.31 ± .91	2.88 ± 1.41	2.29	
stimulus control	1.88 ± .79	2.26 ± .84	2.51 ± .92	2.47 ± 1.14	2.00 ± .84	5.02**	-
self- liberation	3.61 ± .98	3.95 ± .74	4.23 ± .72	4.51 ± .61	4.48 ± .64	13.49**	-

\*\* $p < .01$ , \* $p < .05$

Pc = precontemplation, Con = contemplation, Pre = preparation, Act = action, Main = maintenance

a significant difference in self-reevaluation ( $F=12.35$ ,  $p=0.00$ ), Post-hoc follow-up testing showed significant differences between the action and maintenance groups. There were significant differences in dramatic relief ( $F=5.60$ ,  $p=0.00$ ), social liberation ( $F=3.06$ ,  $p=0.02$ ), helping relationships ( $F=5.00$ ,  $p=0.00$ ), counter conditioning ( $F=5.51$ ,  $p=0.00$ ), stimulus control ( $F=5.02$ ,  $p=0.00$ ), and self-liberation ( $F=13.49$ ,  $p=0.00$ ).

Figure 2 shows that in the process of change associated with the smoking cessation stage, people in precontemplation use helping relationships and self-liberation the most; and also those in the contemplation used self-liberation and helping relationships. In preparation, self liberation and helping relationship were used predominantly, in action, self-liberation and helping relationships were used predominantly, and in maintenance, self-liberation and environmental reevaluation were used predominantly.

#### *Temptation and decisional balance associated with the smoking cessation stage of change*

Table 4 shows the result of an analysis of the difference

in temptation and decisional balance associated with the smoking cessation stage of subjects. In temptation, there was a significant difference in negative affect situation ( $F=21.20$ ,  $p=0.00$ ), Post-hoc follow-up testing showed significant differences between the preparation and action groups. There was a significant difference in habitual strength ( $F=17.49$ ,  $p=0.00$ ), Post-hoc follow-up testing showed significant differences between the contemplation and preparation groups. There were significant difference in positive social situation ( $F=16.16$ ,  $p=0.00$ ), and weight control ( $F=7.31$ ,  $p=0.00$ ).

At every stage, negative affect situation scored highest, and the scores of negative affect situation, positive social situation, habitual strength, weight control decreased as they progressed from precontemplation to maintenance. In decisional balance, there were significant differences in social pros ( $F=28.51$ ,  $p=0.00$ ), and coping pros ( $F=15.64$ ,  $p=0.00$ ) corresponding to the smoking cessation stage.

There was a significant difference in cons ( $F=3.12$ ,  $p=0.05$ ), Post-hoc follow-up test showed significant differences between the preparation and precontemplation

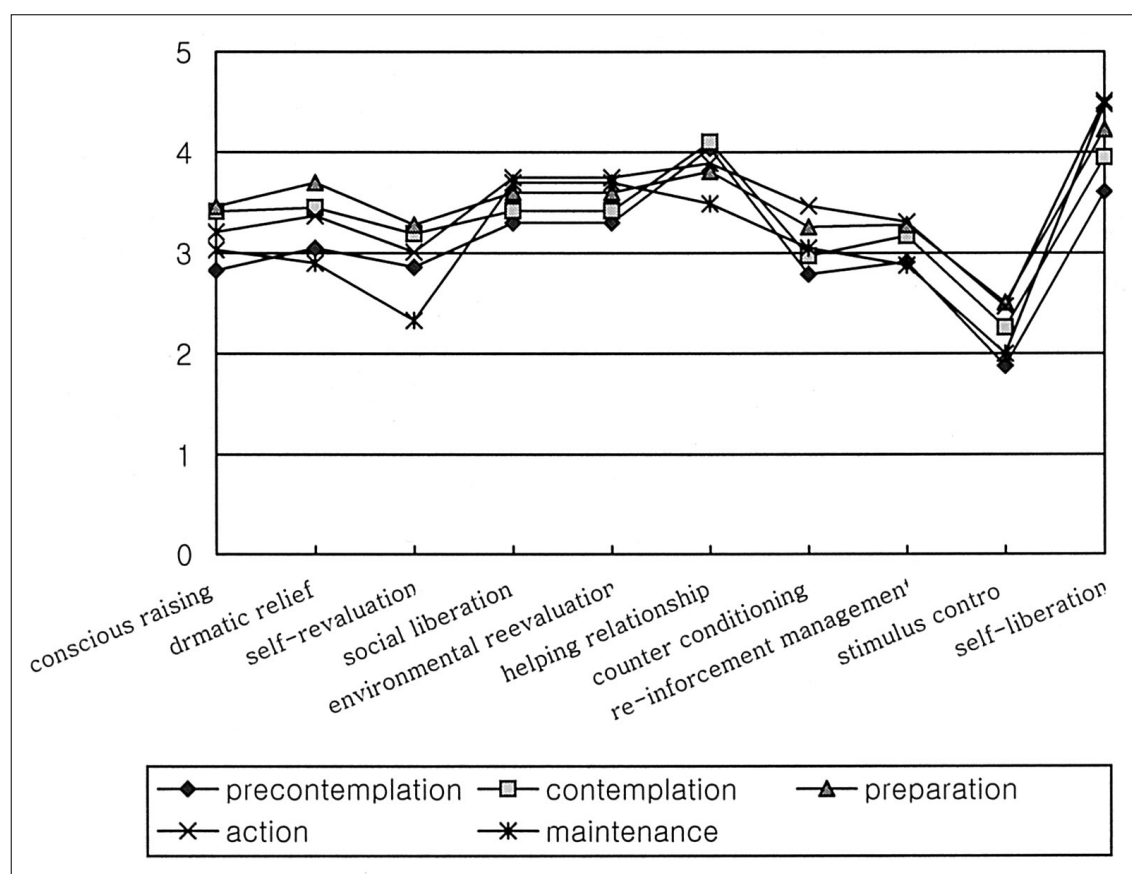


Figure 1. Smoking cessation stage of change and process of change (N=297).

groups. Although social pros and coping pros decreased with increasing stage, cons increased.

#### *Analysis of influence of factors associated with the smoking cessation stage*

In analyzing the influence of factors associated with the smoking cessation stage, we say that variables which were significantly different between the smoking cessation stage are the independent variables, and precontemplation, contemplation, preparation, action and maintenance belong to the dependent variables.

The assumption of stepwise discriminant analysis (Covariance Comparison, was done by Box's M, 252.11,  $p > 0.05$  which is above the significant level) satisfied the basic thesis that each stage's variance must be equal, and accordingly, discriminant analysis was conducted.

As a result of analysis, 4 canonical discriminant functions were extracted, and in view of the fact that the first canonical discriminant function provided an explanation of 74.3% (canonical correlation=0.676), and the second one offered an explanation of 20.8% (canonical correlation=0.437), both discriminant functions were important to explain the difference of groups in the smoking cessation behavior stage (Table 5).

There were a 32.6% probability to correctly classify precontemplation, a 56.2% for contemplation, 50.7%

for preparation, 42.9% for action, and 63.6% for maintenance, using the combination of variables, which had turned out to be significant in stepwise discriminant analysis (Table 6).

## DISCUSSION

This study revealed that in the smoking cessation stage, 72 subjects (24.2%) rated highest in contemplation, 62 subjects (21.1%) rated second in preparation, 60 subjects (19.2%) were in the maintenance, 57 subjects (19.2%) rated fourth in action, and the lowest rated stage was 45 subjects (14.2%) in precontemplation.

This result was rather different from the results of Prochaska et al. (1992)'s analysis of various adult population groups: 50 - 60% in precontemplation, 30 - 40% in contemplation, and 10 - 15% in preparation, and especially, it was somewhat distinct from the results of Pallonen (1998)'s analysis of adolescents: 50% in the

**Table 6. Classification Results** (N=297)

Smoking cessation stage of change	Classification(%)
Precontemplation	32.6
Contemplation	56.2
Preparation	50.7
Action	42.9
Maintenance	63.6

**Table 4. Smoking Cessation Stage of Change Temptation and Decisional Balance** (N=297)

Characteristics	Smoking cessation stage of change					F	Turkey comparison
	Pc (N=46)	Con (N=73)	Pre (N=67)	Act (N=56)	Main (N=55)		
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD		
Temptation							
negative affect situation	4.17 ± 1.04	3.69 ± 1.14	3.39 ± 1.20	2.83 ± 1.30	2.25 ± 1.23	21.20**	Pre < Act
positive social situation	3.38 ± 1.08	3.21 ± 1.02	2.75 ± 0.94	2.46 ± 1.23	1.98 ± 0.98	16.16**	-
habit strength	3.07 ± 1.28	2.59 ± 1.31	2.01 ± 1.03	1.76 ± 1.13	1.43 ± 0.88	17.49**	Con. < Pre
weight control	2.24 ± 1.44	1.88 ± 1.29	1.435 ± 0.97	1.29 ± 0.69	1.37 ± 0.91	7.31**	-
Decisional balance							
social pros	2.83 ± 0.91	2.69 ± 0.85	2.55 ± 0.91	1.79 ± 0.66	1.58 ± 0.53	28.21**	-
coping pros	3.43 ± 0.82	2.98 ± 0.91	2.75 ± 0.99	2.35 ± 0.93	2.09 ± 1.11	15.64**	Pre < Pc
cons	3.66 ± 0.82	3.98 ± 0.71	4.05 ± 0.78	4.21 ± 0.79	4.06 ± 0.98	3.12*	-

\*\* $p < .01$ , \* $p < .05$

Pc=precontemplation, Con=contemplation, Pre=preparation, Act=action, Main=maintenance

**Table 5. Canonical Discriminant Functions** (N=297)

Function	Eigen value	% of variance	Canonical Correlation	Wilk's Lambda	Chi - Square	df	p
1	0.842	74.3	0.676	0.416	254.056	32	0.00
2	0.236	20.8	0.437	0.766	77.190	21	0.00
3	0.039	3.5	0.195	0.947	15.888	12	0.20
4	0.016	1.4	0.127	0.984	4.680	5	0.46



precontemplation, 30% in contemplation, and 20% in preparation. It is believed that this study reports a bit different phase from existing distribution charts of smoking cessation stage because in the case of Korea people have been only concerned about smoking cessation since the end of 2001, governmental smoking cessation activities and anti-smoking campaigns for schools and public institutions such as no-smoking zones, began in earnest in 2002, and these campaigns played a large role in causing awareness of the dangers of smoking in adolescents which have been a motivating factor to quit smoking.

Moreover, the reason that the most subjects were in contemplation means that many adolescents were already motivated to stop smoking, and therefore, it's considered that these smokers, who were prompted to quit smoking, need intervention strategies at this point to help them progress to a higher stage and reach smoking cessation.

There were significant differences corresponding to the stages of smoking cessation in the amount of daily smoking ( $p=0.00$ ), smoking duration ( $p=0.00$ ), smoking onset age ( $p=0.00$ ), smoking cessation frequency over the past 1 year ( $p=0.00$ ), and the number of friends smoking ( $p=0.00$ ). And this study showed that as the subjects move from precontemplation to maintenance, the amount of daily smoking and smoking duration decreased, smoking onset age was more likely to be late and more smokers had tried smoking cessation frequently over the past 1 year.

This corresponded to the analysis result (Sargent et al., 1998; Zhu et al., 1999) that people in preparation smoke less daily, their smoking onset age is later, smoking duration is shorter, and smoking cessation frequency for the past 1 year is higher than people in the precontemplation and the contemplation. However, this differed from the result of Rose et al.'s study that the smoking amount and smoking cessation frequency can't predict smoking cessation behavior. As it is seen in the fact that the number of smoking friends of people in precontemplation decreased as they progress to preparation, the number of friends smoking were significantly different in each stage; and this result corresponded to the result (Stanton, 1995; Jeong et al., 1998) that smoking adolescents have many friends who smoke.

In the smoking cessation stage and process of change, there were significant differences in consciousness raising ( $p=0.00$ ), dramatic relief ( $p=0.00$ ), self-reevaluation ( $p=0.00$ ), social liberation ( $p=0.05$ ), helping relationships

( $p=0.00$ ), counter conditioning( $p=0.00$ ), stimulus control ( $p=0.00$ ), and self-liberation ( $p=0.00$ ).

It showed that subjects use helping relationships and self liberation predominantly in precontemplation, helping relationship and self-liberation in contemplation, self-liberation and helping relationship in preparation, self-liberation and helping relationships in action. In maintenance, coping strategies, such as self-liberation and environmental reevaluation, are being used predominantly. The study of Pallonen (1998) of adolescents reported that the factors influencing the change from precontemplation into contemplation are self-liberation and self-reevaluation, the factors influencing the change from contemplation into preparation are self-liberation, the factors influencing the change from preparation into action are counter conditioning and re-inforcement management, and the factors influencing the change from action into maintenance are re-inforcement management and environmental reevaluation, it showed that it matched coping strategies used in precontemplation and preparation, but partly, found somewhat different. Therefore, we can see that this result, as described on Oh & Kim (1998)'s study, supports indirectly that we have to consider cultural characteristics when TTM is used in each different culture.

Temptation associated with the smoking cessation stage decreased, as it progressed from precontemplation to contemplation, preparation, action, and maintenance. It means that self-efficacy increases with increasing stage. That is, this result supports that self-efficacy is an important predictable factor (Ding, Pallonen & Velicer, 1995, Pallonen et al., 1998; Plummer et al, 2001) in trying to quit smoking and continuing smoking cessation. Thus, through smoking temptation is an influencing factor in smoking behavior, it is considered that self-efficacy improvement programs are certainly necessary for nursing intervention and program development suitable for subjects' smoking cessation stage.

Social pros and coping pros in Decisional Balance decreased as they progressed from precontemplation to action and maintenance, and cons increased as they go to contemplation, preparation, and action, compared to cons of the precontemplation. This supports that the assessment of pros and cons of smoking is closely related to the smoking cessation stage (Velicer, 1985), and is the essential factor to predict smoking cessation(Pallonen, 1998; Pallonen et al., 1998; Plummer et al., 2001).

Therefore, We expect that the smoking rate of adoles-



cents could decrease, if we can change the erroneous perception that smoking is helpful in making friends or getting rid of the stresses and strains of studying and help adolescents to be strongly aware of how serious are smoking related harmful effects.

According to this study, to increase the smoking cessation rate of adolescents, it had to learn the skills to cope confidently with any smoking temptation situation considering the personal smoking cessation motivation level with regards to Korean circumstances, change the erroneous perception of smoking through smoking cessation education, and develop smoking cessation programs including various strategies that can change adolescents' smoking habits.

## CONCLUSION AND SUGGESTIONS

This study is a survey research study, attempting to increase the basic data for developing smoking cessation intervention programs for adolescents through understanding the stage of smoking cessation of adolescents, and analyzing the difference of smoking related characteristics, process of change, temptation, and decisional balance associated with smoking behavior stage of change.

The participants, 297 smokers & quitters, were selected from among 1041 high school sophomores in B city. Data were collected from April 6th to 16th, in 2002 using the structured self-report questionnaire, and analyzed using SPSS Windows Program (Version 10.0). The results are as follows;

1) The subjects were distributed in each stage of change of smoking cessation behavior: 46 subjects (15.5%) in precontemplation, 73 subjects (24.6%) in contemplation, 67 subjects (22.3%) in preparation, 56 subjects (18.5%) in action, 55 subjects (18.5%) in maintenance.

2) Of smoking related characteristics corresponding to the stages of smoking cessation behavior, there showed significant differences in daily smoking, smoking duration, smoking onset age, smoking cessation frequency for the past 1 year, and smoking friends. Compared to precontemplation and contemplation, people in preparation tended to smoke daily more and smoked for a shorter time, and as precontemplation progress to the maintenance, past 1 year smoking cessation frequency increased and smoking friends decreased. Smoking onset age was the earliest in preparation, and latest in

maintenance.

3) Of factors associated with the smoking cessation stage of change, process of change, temptation, pros and cons in decisional balance were different between each stage of change.

In process of change associated with the smoking cessation stage, there were significant differences in consciousness raising ( $F=3.80$ ,  $p=0.00$ ), dramatic relief ( $F=5.60$ ,  $p=0.00$ ), self reevaluation ( $F=12.35$ ,  $p=0.00$ ), social liberation ( $F=3.06$ ,  $p=0.02$ ), helping relationships ( $F=5.00$ ,  $p=0.00$ ), counter conditioning ( $F=5.51$ ,  $p=0.00$ ), stimulus control ( $F=5.02$ ,  $p=0.00$ ), and self liberation ( $F=13.49$ ,  $p=0.00$ ). Helping relationships and self relationship were used frequently in precontemplation and also in contemplation. In preparation, self liberation and helping relationships were used frequently, in action, self liberation and helping relationships, and in maintenance, self liberation and environmental reevaluation were predominant.

In temptation associated with the smoking cessation stage of change, there were significant differences in negative affect situation ( $F=21.20$ ,  $p=0.00$ ), positive social situation ( $F=16.16$ ,  $p=0.00$ ), habitual strength ( $F=17.49$ ,  $p=0.00$ ), and weight control ( $F=7.31$ ,  $p=0.00$ ). At each stage, the score of negative affect situations was the highest, but the scores of negative affect situation, positive social situation, habitual strength, and weight control decreased as precontemplation progressed to maintenance.

In decisional balance, there were significant differences associated with the stage of change in all social pros ( $F=28.21$ ,  $p=0.00$ ), coping pros ( $F=15.64$ ,  $p=0.00$ ), and cons ( $F=3.12$ ,  $p=0.05$ ). While the score of social pros and coping pros decreased with increasing stage, the scores of cons tended to increase.

4) It was found that social pros was the most influencing power among factors dividing the smoking cessation behavior stage of change, and smoking onset age and self liberation were the second most influential factors. The probability to be able to classify correctly precontemplation using these factors' combinations was 32.6%; for contemplation the probability was 56.2%, for preparation, it was 50.7%, for action, it was 42.9%, and for maintenance, it was 63.6%.

When the results of all these analyses are considered, the smoking behavior of adolescents, as showed in TTM, was classified into the stage of smoking cessation. It showed that the associated factors at each stage of smoking cessation behavior were the amount of daily smok-

ing, smoking duration, smoking onset age, past 1 year smoking cessation frequency, the number of friends smoking, process of change, temptation, and decisional balance. The most influencing factor were social pros in decisional balance, and the next most influential were smoking onset age and self liberation. Therefore, in developing an effective smoking cessation intervention program for adolescents, first of all, the stage of a subjects change prior to applying intervention programs had to be assessed. In helping them progress to a higher stage, it is important that we help subjects in precontemplation be aware of smoking cessation's good aspects and advance to contemplation, and for subjects in contemplation and preparation, we should apply programs for improving self-efficacy to try quitting smoking actively and continue smoking cessation.

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