Factors Associated with the Smoking Cessation Behavior according to the Transtheoretical Model in Korean College Students

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<Abstract>
Objectives: The purposes of this study were to examine the contribution of each of the Transtheoretical Model components in explaining stages of smoking cessation and to identify factors associated with the smoking cessation behavior among Korean college students. **Methods:** The participants for this study were 334 undergraduate students who enrolled in general education courses. Self-report surveys were distributed and returned. The survey variables comprised the stages of change for smoking cessation, self-efficacy, decisional balances and processes of change in smoking cessation. **Results:** Significant differences were noted in the five stages of change for self-efficacy, decisional balance, and the processes of change. The strongest factor associated with the smoking cessation behavior was self-efficacy. **Conclusion:** Study findings indicate application of the Transtheoretical Model may be useful to enhance future smoking cessation efforts in college students. The strategies to enhance smoking cessation self-efficacy in college students will be an important intervention component in future studies.

Key words: Stages of change, Self-efficacy, Decisional balance, Processes of change, Smoking cessation.

Ⅰ. Introduction

Smoking is one of the largest behavioral contributors to preventable morbidity and mortality in the world. Tobacco causes four million deaths per year with estimates projected at 10 million by the late 2020s (Habib and Saha, 2010); this includes those who consume tobacco and those environmentally exposed to its smoke. While the projected death toll is staggering, the global economy is losing more than $500 billion to tobacco use in a single year (Viswanath et al. 2010). The adverse effects of tobacco use are disparately experienced with less developed countries having more adverse outcomes (Viswanath et al., 2010).

South Korea, with its dense population and high prevalence of smoking, is at significant risk for preventable morbidity and mortality related to smoking. Almost half (47.7%) of college-aged Koreans smoke tobacco (Korea Antismoke Research Institution, 2010). Most Korean smokers adopt the behavior at a younger age but some adopt it while in college.

The Korean Ministry of Health and Welfare has in place several initiatives aimed at promoting health, and in particular, encouraging smoking cessation in the form of anti-smoking campaigns (Cho, 2006). While the prevalence of overall smoking in Korea has been reduced, data suggest that the smoking rate of Korean youth and young adults is extraordinarily high (Korea Antismoke Research Institution, 2009).

College students in samples from diverse countries report high exposure to pro smoking-related messages and events along

with the onset of new smoking behavior. American students may be legally targeted by tobacco companies at college-related or age-appropriate events where cigarettes may be distributed for free (Rigotti, Moran, and Wechsler, 2005). American (Hayes and Plowfield, 2007; Staten et al., 2007) and Mexican (Rasmussen-Cruz et al., 2006) college students report adopting smoking as a result of new peer-related pressure or to gain social support (Waters et al., 2006). New college-related stress (academic or social) has been related to the new onset of smoking behaviors in American (Otsuki et al., 2008) and Chinese students (Lin, Lou, andLiu, 2004). Furthermore, Korean young adults consider tobacco to be an acceptable item of personal preference (Korea Antismoke Research Institution, 2006) perhaps increasing its attractiveness to those in college.

College students are in a transition between adolescence and early adulthood. This transitional period may be a critical time of intervention to reduce the chances of both social smoking and movement toward habitual smoking (Waters et al., 2006). Their health behaviors are important because unhealthy behaviorsdeveloped during this time may be adapted into lifetime patterns. Considering the risks of smoking, it is important to understand the characteristics associated with smoking in this population and the factors that might be used to influence students' smoking behavior before it becomes a regular habit. Among college-age smokers who have attempted to quit, less than half have been successful (Kyungwon University Newspaper, 2009).

The Transtheoretical Model (TTM) is a 'readiness to change' stage-based theory of behavior change (Prochaska and DiClemente, 1982) heavily used with smoking and smoking cessation. The TTM has been applied to a wide range of health behaviors and has demonstrated efficacy across a number of health behaviors including smoking cessation, exercise adoption and dietary fat intake reduction (O' Hea, Wood, and Brantley, 2003).

The main concept of the TTM is that behavioral change is a process; it occurs through a series of stages of which individuals progress differentially (Prochaska and Velicer, 1997). The five stages of change describe different levels of motivational readiness to change and include: precontemplation, contemplation, preparation, action and maintenance (DiClemente et al., 1991).

The main constructs of the TTM is composed of the processes of change, decisional balance, and self-efficacy (Prochaska and Velicer, 1997). The processes of change are strategies and techniques people use as they proceed through the stages of change over time. The ten processes have a hierarchical structure with two broad dimensions, experiential and behavioral (Prochaska et al.,1988). Experiential processes are emphasized in the pre-action stages of change while the behavioral processes are used most often in the action and maintenance stages (Prochaska and Velicer, 1997). Decisional balance focuses on the importance of perceived positive (pros) and negative (cons) outcomes of a behavior change (Velicer et al., 1985) which reflects the individual's relative weighing of the pros and cons of behavioral change. It is more likely that an individual will change their behavior when they perceive the pros of change to outweigh the cons. Self-efficacy is defined as one's perceived confidence in the ability to carry out a specific behavior (Bandura, 1997). Self-efficacy is positively related to success in changing behavior and it has tended to increase with the person's progression through the stages of change from precontemplation to maintenance (DiClemente et al., 1991; Ham, 2007; Warnecke et al., 2001).

Studies related to smoking cessation using the TTM have been performed vigorously in many countries (Son, 2005) but only recently in Korea. Smoking and smoking cessation have been evaluated using the TTM on Korean adolescents (Chang et al., 2005; Ham, 2007; Kim, Suh, and Ham, 2007; Kim, 2006; Park, Kim, and Lee, 2003) and Korean adults (Ahn et al., 2005; Chang et al., 2005; Lee, 2004; Son, 2005). However, college students experience unique developmental challenges with respect to smoking and smoking cessation. Oh and Kim(1996a; 1996b; 1997) explored the TTM in a predominantly male sample of Korean college students (N=155). However, they used a modified version of the model; specifically, there were limited staging categories, evaluation of only seven change processes (including a new one they described as self-determination), and

no reported attention to decisional balance. The sample size appears small given the number of variables and constructs analyzed in their work. Additionally, it is highly likely that smoking trends have changed in the 14 years since their work was published.

Given the state of the science regarding TTM-based smoking cessation efforts in college students, descriptive research was needed to more fully understand predictors of smoking cessation in this sample. Using the TTM as the conceptual foundation for scholarly inquiry can facilitate comparison and evaluation of this study and future research findings in diverse populations. Thus, the primary purpose of this study was to examine the Transtheoretical Model of Behavior Change (TTM) relevant to smoking cessation in Korean college students. The specific aims were to (1) identify the stages of change for smoking cessation behavior, and (2) examine participants characteristics, self-efficacy, decisional balance, and the process of change by the stages of change for smoking cessation, and (3) evaluate TTM factors related to smoking cessation behavior in Korean college students.

Ⅱ. Methods

1. Design and participants

A cross-sectional descriptive survey was used to identify Transtheoretical Model (TTM) factors related to smoking cessation behavior in Korean college students.

Following appropriate University approval, undergraduate students enrolled in general education courses at a university in Jecheon, Chungbuk, Korea were invited to participate in the study. Approximately 2.1 million students were enrolled in over 197 four-year colleges and universities nationwide in Korea (Ministry of Education, Science & Technology, 2008). The sample used for the study consisted of 502 university students from one university in Jecheon. Four-year colleges in Korea are classified by size of enrollment, college types, competitiveness and districts. One medium-sized (an enrollment of 8,000) and middle-ranking university from Chungbuk province was selected

for participation in the study. Ten classes from one university were randomly selected with enrollments of 7,650 for 153 classes. Questionnaires were distributed to 550 students from 10 classes, of which 502 questionnaires were returned (response rate of 91.2%). Among them, 334 students (66.5%) self-identified as current or ex-smokers and were used to comprise the sample for this study. This sample size was sufficient to determine significant differences with a power of .80 and effects size of .25 (Cohen, 1988). All analyses were evaluated using a .05 level of significance. Data were collected between November 6-28, 2008.

2. Measures

Socio-demographic characteristics were collected on gender, age, grade, major subject, religion, family income, and household composition. Smoking-related characteristics included age smoking was started, years of smoking, and number of cigarettes smoked per day. Variables espoused by the TTM as predictive of behavior were collected with standardized measures as noted below. A questionnaire developed by Ham (2007) was used and it was pilot tested for this study. The survey was entirely in Korean and all measures had been previously used with a Korean sample (Ham, 2007).

1) Stages of change for smoking cessation

The single-item stage of change algorithm was used to determine readiness for smoking cessation. Those with a positive smoking history (N=334) were asked about current smoking status (active or not) and intention to quit. Participants were then categorized into one of five stages : 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 the past 6 months. The maintenance stage includes those who remained nonsmokers for more than 6 months

2) Self-efficacy for smoking cessation

This scale consists of five items scored on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5); higher scores indicate higher confidence to not smoke in different situations. Item in this measure includes "I am confident that I won't smoke when feeling tense". Internal consistency of this measure in this study was .93.

3) Decisional balance

This 18-item measure consists of two sub-scales: 9 items measure positive aspects of smoking (pros) and 9 items measure negative aspects of smoking (cons). Items in this measure include "smoking helps to reduce stress(a pro of smoking) and "smoking annoys others"(a con of smoking). Items are scored on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5); higher scores indicate stronger belief in the pros or cons of smoking. Internal consistency of this measure in this study was .88 for the pros subscale and .86 for the cons subscale.

4) Processes of change for smoking cessation

This 30-item measure captures 10 processes of change; 5 are experiential and 5 are behavioral. The experiential processes comprised consciousness raising, dramatic relief, self reevaluation, environmental reevaluation, and social liberation, while the behavioral processes consisted of self liberation, helping relationships, counter conditioning, reinforcement management, and stimulus control. Example statements included "experiencing fear after recognizing the harmful effects of smoking on health" (for dramatic relief) and "removing things from around myself that remind me of smoking" (for stimulus control). Each process is measured with 3 items scored on a 5-point Likert scale ranging from never (1) to always (5); higher scores indicate more frequent use of that process. Internal consistency of this measure in this study was .75 for the experiential subscale and .91 for the behavioral subscale.

3. Data analysis

Data were entered into and analyzed by the SPSS (version 10.0, SPSS Inc., Chicago, IL). Data were analyzed descriptively to examine characteristics of the participants, study variables, and assumptions necessary for parametric analyses. Chi-square tests were performed to examine general and smoking-related characteristics of the participants by smoking cessation stages of change. Analysis of variance (ANOVA) tests were performed to identify significant differences in self-efficacy, decisional balance and processes of change according to the stages of change. Post hoc analyses were conducted with the Scheffe comparison as needed. Finally, logistic regression was performed to identify factors associated with the smoking cessation for current and former smokers.

III. Results

1. General characteristics of the participants

Participants (N=334) ranged in age from 19-31 years (mean 22.3 years; SD 2.38). There were 221 males (66.2%) and 113 females (33.8%). Table 1 provides results concerning general sociodemographic characteristics by stage of change. Significant stage of change differences were noted between males and females (X^2=16.10, p=.003). Significant stage of change differences were not noted among any other sociodemographic variables (Table 1).

2. Smoking-related characteristics of the participants

Smoking related characteristics were examined and are presented in Table 2. Relatively few began smoking by 13 years of age. While the majority began smoking between ages 14 to 19, about 21% of the sample started during their college education. There were significant stage of change differences in duration of smoking (X^2=65.63, p=.000) and number of cigarettes smoked per day (X^2=14.18, p=.028) (Table 2).

<Table 1> General characteristics of the participants by smoking cessation stages of change (N=334)

	Total	PC	C	P	A	M	X^2	p
	n (%)	n (%)	n (%)	n (%)	n (%)	n(%)		
Gender							16.10	.003
Male	221(100.0)	70(31.7)	62(28.1)	31(14.0)	27(12.2)	31(14.0)		
Female	113(100.0)	21(18.6)	31(27.4)	9(8.0)	22(19.5)	30(26.5)		
Age(year)							4.80	.778
≤20	98(100.0)	30(30.6)	24(24.5)	15(15.3)	14(14.3)	15(15.3)		
21 -25	205(100.0)	50(24.4)	61(29.8)	22(10.7)	31(15.1)	41(20.0)		
≥26	31(100.0)	11(35.5)	8(25.8)	3(9.7)	4(12.9)	5(16.1)		
Grade							19.40	.079
1	112(100.0)	37(33.0)	27(24.1)	15(13.4)	18(16.1)	15(13.4)		
2	117(100.0)	26(22.2)	40(34.2)	10(8.5)	18(15.4)	23(19.7)		
3	67(100.0	14(20.9)	17(25.4)	7(10.4)	10(14.9)	19(28.4)		
4	38(100.0)	14(36.8)	9(23.7)	8(21.1)	3(7.9)	4(10.5)		
Major subject							5.26	.729
Natural science	122(100.0)	38(31.1)	31(25.4)	14(11.5)	17(14.0)	22(18.0)		
The humanities	173(100.0)	45(26.0)	46(26.6)	22(12.7)	28(16.2)	32(18.5)		
Art & physical education	39(100.0)	8(20.5)	16(41.0)	4(10.3)	4(10.3)	7(17.9)		
Religion							4.32	.364
Have	141(100.0)	31(21.9)	41(29.1)	19(13.5)	20(14.2)	30(21.3)		
None	193(100.0)	60(31.1)	52(26.9)	21(10.9)	29(15.0)	31(16.1)		
Family income(monthly)							13.56	.094
<$2,000	61(100.0)	13(21.3)	13(21.3)	5(8.2)	10(16.4)	20(32.8)		
$2000-$4,000	218(100.0)	63(28.9)	60(27.5)	29(13.3)	32(14.7)	34(15.6)		
>$4,000	55(100.0)	15(27.3)	20(36.4)	6(10.9)	7(12.7)	7(12.7)		
Household composition							2.71	.606
Living with both parents or a single parent	84(100.0)	20(23.8)	22(26.2)	14(16.6)	13(15.5)	15(17.9)		
Not living with parents	250(100.0)	71(28.4)	71(28.4)	26(10.4)	36(14.4)	46(18.4)		
Total	334(100.0)	91(27.2)	93(27.8)	40(12.0)	49(14.7)	61(18.3)		

Note. PC=precontemplation. C=contemplation. P=preparation. A=action. M=maintenance.

<Table 2> Smoking-related characteristics of the participants by smoking cessation stages of change (N=334)

	Total	PC	C	P	A	M	X^2	p
	n (%)	n (%)	n (%)	n (%)	n (%)	n(%)		
Age at smoking initiation (years)							9.12	.692
≤13	19(100.0)	5(26.3)	5(26.3)	3(15.8)	4(21.1)	2(10.5)		
14 - 16	111(100.0)	30(27.1)	27(24.3)	18(16.2)	12(10.8)	24(21.6)		
17 - 19	134(100.0)	39(29.1)	39(29.1)	11(8.2)	20(14.9)	25(18.7)		
≥20	70(100.0)	17(24.3)	22(31.4)	8(11.4)	13(18.6)	10(14.3)		

	Total	PC	C	P	A	M	X²	p
	n (%)	n (%)	n (%)	n (%)	n (%)	n(%)		
Duration of smoking (years)								
<1	61(100.0)	6(9.8)	8(13.1)	3(4.9)	19(31.2)	25(41.0)	65.63	.000
1 - 4	118(100.0)	28(23.7)	43(36.5)	13(11.0)	11(9.3)	23(19.5)		
5 - 9	139(100.0)	50(36.0)	38(27.3)	21(15.1)	17(12.2)	13(9.4)		
≥10	16(100.0)	7(43.7)	4(25.0)	3(18.8)	2(12.5)	0(.)		
Cigarettes per day (current smoker n=224)								
half a pack or less	109(100.0)	31(28.4)	54(49.6)	24(22.0)			14.18	.028
1 pack	102(100.0)	54(52.9)	33(32.4)	15(14.7)				
1 and half a pack	11(100.0)	5(45.5)	5(45.5)	1(9.0)				
2 packs or more	2(100.0)	1(50.0)	1(50.0)	0(.)				

Note. PC=precontemplation. C=contemplation. P=preparation. A=action. M=maintenance.

3. Comparison of Transtheoretical Model variables across smoking cessation stages of change

Analysis of variance (ANOVA) was used to examine stage of change differences in self-efficacy, decisional balance, and the processes of change. Post hoc analyses (Scheffe test) were conducted to evaluate significant differences with comparisons as needed. Results are provided in Table 3 and are discussed in some detail below.

<Table 3> Mean differences of the TTM variables across smoking cessation stages of change (N=334)

	PC	C	P	A	M	F(p)	Post hoc
	mean(±SD)	mean(±SD)	mean(±SD)	mean(±SD)	mean(±SD)		
Self-efficacy	2.78(1.20)	3.30(.86)	3.28(1.01)	4.13(.80)	4.49(.69)	36.30(.000)	PC<C, A, M C, P<A, M
Decisional balance							
Pros of smoking	3.08(.83)	2.84(.63)	2.86(.63)	2.68(.75)	2.29(.89)	10.35(.000)	M<PC, C, P A<PC
Cons of smoking	3.70(.74)	3.78(.61)	4.13(.52)	4.14(.81)	4.25(.66)	9.06(.000)	PC<P, A, M C<M
Processes of change							
Experiential	3.28(.48)	3.52(.57)	3.72(.61)	3.55(.60)	3.51(.64)	4.69(.001)	PC<P
Consciousness raising	3.92(.63)	3.81(.82)	3.94(.72)	4.04(.63)	3.94(.63)	.95(.430)	
Dramatic relief	2.73(.77)	3.20(.79)	3.52(.85)	3.21(1.07)	3.31(.93)	7.74(.000)	PC<C, P, M
Self-reevaluation	2.46(.89)	3.09(1.01)	3.43(1.01)	2.83(1.14)	2.45(1.32)	9.07(.000)	PC<C, P; M<C, P
Environmental reevaluation	3.59(.70)	3.79(.69)	3.88(.81)	4.06(.73)	4.07(.90)	4.98(.001)	PC<A, M
Social liberation	3.72(.90)	3.70(.80)	3.83(.75)	3.61(.84)	3.78(.94)	.42(.794)	
Behavioral	3.01(.50)	3.33(.52)	3.46(.58)	3.62(.66)	3.80(.68)	19.70(.000)	PC<C, P, A, M C<M
Self-liberation	2.93(.89)	3.44(.69)	3.75(.79)	4.16(.80)	4.30(.86)	33.81(.000)	PC<C, P, A, M C<A, M P<M
Helping relationships	3.37(.90)	3.51(.83)	3.48(.83)	3.77(.81)	4.06(.95)	6.67(.000)	PC, C, P<M
Counter conditioning	3.01(.85)	3.27(.82)	3.35(.83)	3.44(1.11)	3.92(1.10)	8.96(.000)	PC, C, P<M
Reinforcement management	3.61(.80)	3.84(.78)	3.98(.78)	3.92(.82)	4.19(.84)	4.88(.001)	PC< M
Stimulus control	2.13(.76)	2.61(.87)	2.76(.89)	2.80(1.20)	2.56(.94)	6.13(.000)	PC<C, P, A, M

Note. PC=precontemplation. C=contemplation. P=preparation. A=action. M=maintenance.

1) Self-efficacy for Smoking Cessation

As expected, self-efficacy was lowest in precontemplation and highest in the maintenance stage of change. Differences in self-efficacy across the stages were significant ($F=36.30$; $p = .000$). Students in the precontemplation stage had lower self-efficacy in comparison to those in the contemplation, action and maintenance. Students in contemplation and preparation had lower self-efficacy when compared to those in action and maintenance.

2) Decisional Balance

The pros (positive aspects) and cons (negative aspects) of smoking were significantly different across the stages of change. As expected, students in the maintenance stage (already quit) reported lower pros for smoking when compared to those in the precontemplation, contemplation, or preparation stages. Pros were significantly lower in the action stage of smoking when compared to precontemplation. Cons of smoking were reported at sequentially higher levels across the five stages. Cons were

higher for those in maintenance compared to those in contemplation stage.

3) Process of Change for Smoking Cessation

Processes of change were significantly different across stages of change. For experiential processes, significant stage differences were noted in dramatic relief, self-reevaluation, and environmental reevaluation. Dramatic relief was used less frequently in precontemplation than contemplation, preparation, and maintenance. Self-reevaluation was lower in precontemplation and maintenance than contemplation and preparation. Environmental reevaluation was lower in precontemplation than in action or maintenance.

All behavioral processes of change were significantly different across the stages of change. Post hoc evaluation determined self-liberation was significantly lower in precontemplation than all other stages. Differences in self-liberation were also found to be lower in contemplation when compared to action or maintenance. Helping relationships and counter

<Table 4> Logistic regression analysis for factors related to smoking status (N=334)

	β	S.E.	p	OR	95% CI
Gender[a]					
Female				1.00	
Male	-.83	.37	.02	.43	.21 - .89
Duration of smoking	-.44	.11	.00	.64	.51 - .80
Self-efficacy	1.13	.23	.00	3.11	1.96 - 4.91
Pros	-.33	.24	.16	.71	.44 - 1.15
Cons	.96	.29	.00	2.63	1.47 - 4.69
Consciousness raising	-.13	.26	.61	.87	.51 - 1.47
Dramatic relief	-.45	.24	.06	.63	.39 - 1.02
Self-reevaluation	-.06	.19	.72	.93	.64 - 1.36
Environmental reevaluation	.04	.32	.89	.95	.50 - 1.81
Social liberation	-.57	.23	.01	.56	.35 - .89
Self-liberation	1.12	.28	.00	3.06	1.76 - 5.34
Helping relationships	-.09	.25	.71	.91	.55 - 1.49
Counter conditions	-.17	.22	.45	.84	.53 - 1.31
Reinforcement management	-.23	.31	.45	.79	.42 - 1.46
Stimulus control	.41	.20	.04	1.51	1.02 - 2.25

Note. Smoking status was coded as ex-smoker (1) vs. smoker (0). [a] gender was coded as female (0) vs. male (1).

conditioning were higher in maintenance than in precontemplation, contemplation or preparation. Reinforcement management was used more frequently in maintenance than precontemplation. Stimulus control was lower in precontemplation than all other stages.

4. Logistic regression analysis for factors related to smoking cessation behavior

To identify factors associated with the smoking cessation behavior among Korean college students, logistic regression analysis was performed (Table 4). The dependent variable in logistic regression model was smoker (0) which includes the precontemplation, contemplation and preparation stages of change and ex-smoker (1) which includes the action and maintenance stages. The independent variables included gender, duration of smoking and components of the Transtheoretical Model. Goodness of fit was determined to be sufficient with the Hosmer-Lemeshow analysis (-2LL= 237.189, X^2= 12.670, df=8, p= .124). There was 85.3% probability to correctly classify smoking cessation behavior and this model explained 59.5 % of the variance of smoking cessation behavior (Nagelkerke's R^2=.595).

Results of the analysis indicated that the predictor most strongly associated with smoking cessation was self-efficacy (odds ratio: 3.11, p=.00).Other predictors associated with quitting smoking included self-liberation (odds ratio: 3.06, p=.00), cons of smoking (odds ratio: 2.63, p=.00), stimulus control (odds ratio: 1.51, p=.04), duration of smoking (odds ratio: .64, p=.00), social liberation (odds ratio: .56, p=.01), and gender (odds ratio: .43, p=.02). Therefore, those who quit and stayed quit were more likely to have a higher self-efficacy to do so, were more likely to be female, and to strongly recognize the cons of smoking. Those who quit and stayed quit were more likely to use change processes of self-liberation, social liberation, and stimulus control. Change processes accounting for significant variation included positive use of self-liberation, stimulus control, and social liberation.

Ⅳ. Discussion

This study sought to examine Transtheoretical Model constructs as predictors of smoking cessation in Korean college students. Participants self-identified their smoking status; of those returning the survey approximately 66.5% (n=334) indicated they were a current or ex-smoker. The majority of participants in the study reported being in an early stage of change for smoking cessation or not yet ready to quit. Significant differences were noted in smoking cessation stage of change and gender; males predominantly reported being in precontemplation and contemplation. Thus, most men in this study were not actively considering making a change in their smoking behavior. This is consistent with previous findings in Korean samples – males are more likely to smoke (Khang and Cho, 2006; Lee et al., 2009) and not be ready to quit (Kim, 2006).

Other participant characteristics of smoking cessation were explored. While statistical significance was not noted for age smoking was initiated, it is clinically significant to note that 21% of this sample began smoking at an age when they were eligible to start college. The concept of social smoking or late initiation (and continuation) of smoking in college students has been previously reported (Myers et al., 2009; Otsuki, 2009; Staten et al., 2007; Wang et al., 2009; Waters et al., 2006). Reasons for this late initiation of smoking behavior were not explored in this study; however, implications for a targeted anti-smoking campaign to discourage the new onset of smoking appear evident in this sample.

Transtheoretical Model indicators relevant to smoking cessation were evaluated across the five stages of change. Readiness to quit smoking was indicated by being in the later stages of change. As expected, self-efficacy increased as participants moved toward the maintenance stage of smoking cessation. These findings are consistent with the TTM theory and support previous research with college (Haddad and Petro-Nustas, 2006; Pimenta, Leal, and Maroco, 2008) and community samples (Yalinkaya-Alkar and Karanci, 2007).

Decisional balance was a key indicator for smoking cessation.

Students were more likely to report a lower level of pros and a higher level of cons as they progress toward maintenance. Cons of smoking served as an important predictor for smoking cessation and are consistent with the TTM theory and previous research (Ridner and Hahn, 2005; Yalinkaya-Alkar and Karanci, 2007). These results may reflect the significant amount of Korean governmental anti- smoking campaigns in place for schools and public institutions.

College students are more likely to use experiential processes in the early stages of change and behavioral processes in the later stages. While experiential and behavioral processes of change were significantly different across the stages only a few demonstrated a strong ability to contribute to smoking cessation. It is not known if adding additional processes of change to smoking cessation interventions for college students will be useful. While there is a significant body of literature concerning change processes in adolescent samples (Ham, 2007; Hoeppner et al., 2006; Kim, 2006), relevant studies with college-age samples are lacking. In the specific experiential processes of change and the smoking cessation stage, dramatic relief and self-reevaluation of experiential processes of change increased sequentially from precontemplation to preparation and after the preparation stage, it decreased to maintenance stage. Environmental reevaluation increased sequentially from precontemplation to maintenance stage. This result indicates that college students may have resolved emotional reaction to negative aspects of smoking and negative perceptions on themselves related smoking when they entered the action stage and they do much to shift their environment away from smoking as they proceed through the stages of change. There were not significant differences in consciousness raising and social liberation. Various smoking control programs are providing for community residents, such as smoking prevention programs for kindergarten to school age children, a smoking cessation camp for high school students and cessation classes for adults and the elderly in Korea since 2001(Ham, 2007; Lee et al, 2001). Therefore, these findings indicate that students are exposed to various health messages that promoted smoking cessation, result in students across the fine stages having similar awareness associated with smoking cessation and trying to find information about quitting smoking. There were significant differences with the stages of change and all of the behavioral processes. Self-liberation, helping relationships, counter conditioning and reinforcement management were used more in maintenance stage than in the precontemplation stage, while stimulus control was used more in action stage than in the precontemplation. This result implies that behavioral processes are important in avoidance of smoking temptations and maintenance of quitting smoking. Therefore, it requires programs such self-help, telephone- and computer based interactive interventions to keep quitting smoking and prevent smoking from returning. Also this study revealed that stimulus control showed lower mean compared to another behavioral processes of change. It seems to reflect that college students do not use actively stimulus control of processes of change. Future research should attempt to examine the way of increasing stimulus control to facilitate progress from precontemplation to maintenance.

This is among studies of smoking behavior and readiness to quit in Korean college students. Like their global counterparts, smoking in this population is high. Limitations to this study include the cross-sectional design, the use of self-reported smoking behavior and readiness to quit, and use of a convenience sample. While the predictors of smoking behavior were evaluated, additional variables related to smoking behavior were not collected. Reasons why 21% of this sample initiated smoking at a later age were not able to be explored. Another aspect not collected in this study was the social nature and reasons why participants smoked. Previous attempts at quitting (Haddad and Petro-Nustas, 2006; Thompson et al., 2007; Velicer et al., 2007) are cited as a strong indicator of smoking cessation; however, previous quit attempts were not measured in this study.

Despite the limitations there are implications for international nursing practice, education, and research. The burden of premature death due to smoking in Korea is estimated at 57.7% formales and 11.4% in females (Ha et al., 2003). Smoking among Korean college students is high and the new onset of smoking behavior for college-aged individuals is of concern.

The majority of participants were not yet ready to quit smoking. As self-efficacy was lower in the early stages of change it seems desirable to include efforts to increase self-efficacy in a stage-appropriate dose to facilitate behavior change.

College students desire age-appropriate smoking cessation materials as they feel most are focused on adolescents or older adults (Staten and Ridner, 2007). Research indicates college students are concerned about the financial burden of smoking, while at the same time, being concerned about weight gain if they quit (Ridner and Hahn, 2005). An innovative approach to incorporate age-appropriate processes of change in smoking cessation interventions for college students may be a promising area of inquiry (Horneffer-Ginter, 2008).

Nursing education needs to include relevant smoking cessation curricula considering the extent that tobacco use is a leading cause of preventable morbidity and mortality worldwide. Recent research indicates smoking cessation content in undergraduate nursing programs is lacking (Durkin, 2007; Lenz, 2009; Sarna et al., 2006).

Ⅴ. Conclusion

Substantial research documents the descriptive and predictive usefulness of the Transtheoretical Model across behaviors and populations. Essential tenets of the model were found in this sample of Korean college students who smoked. Findings of students adopting smoking behavior while in college are alarming for the international nursing community. In helping students move toward the maintenance stage of smoking cessation, it is important that students are aware of smoking cessation's benefit. It is needed programs for improving self-efficacy to try quitting smoking and maintain smoking cessation. Innovative approaches to incorporate stage-appropriate interventions that enhance use of change processes may assist in the effort to reduce smoking in college-aged individuals.

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〈국문초록〉

범이론적 모델에 근거한 한국 대학생의 금연행위 관련 요인

목적: 본 연구는 대학생의 금연행위 변화단계를 설명하는데 있어 범이론적 모델 구성요소들의 기여정도를 조사하고 범이론적 모델에 근거한 대학생의 금연행위와 관련된 요인을 파악하기 위해 시행되었다.

방법: 연구대상자는 일반교양 과목을 수강하는 334명의 대학생으로 자가보고식 설문을 통해 범이론적 모델의 구성요소인 금연행위 변화단계, 자기효능감, 의사결정균형 및 변화과정 등의 자료를 수집하였다.

결과: 금연행위 변화 5단계에 따라 자기효능감, 의사결정균형 및 변화과정에서 유의한 차이가 있었고 자기효능감은 금연행위와 관련된 가장 중요한 요인으로 나타났다.

결론: 대학생의 금연 유도를 높이기 위해 범이론적 모델를 적용하는 것이 유용함을 확인하였고 금연행위 변화단계를 고려한 개별화된 프로그램의 개발이 필요하며 특히 대학생의 금연 자기효능감을 증진시킬 수 있는 전략이 요구된다.

주제어: 변화단계, 자기효능감, 의사결정균형, 변화과정, 금연