

# Standardization Study of the Korean Version of the Stages of Change Readiness and Treatment Eagerness Scale for Smoking Cessation (K-SOCRATES-S) and Its Predictive Validity

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**Objective** The purpose of the study was to develop the Korean version of the Stage of Change Readiness and Treatment Eagerness Scale for Smoking Cessation (K-SOCRATES-S) based on the Korean version of the Stages of Readiness for Change and Eagerness for Treatment scale (K-SOCRATES). This paper also demonstrates its reliability and validity among patients with nicotine dependence in South Korea.

**Methods** At seven healthcare promotion centers in Gyeonggi-do, 333 male smokers aged 20 to 70 who visited smoking cessation clinic were recruited for this study and the K-SOCRATES-S was administered. After three months, the number of respondents who successfully stopped smoking was assessed by testing their urine cotinine level. Subsequently, exploratory factor analysis was performed to verify the reliability and validity of the K-SOCRATES-S. Also, a logistic regression analysis was performed to examine the variables that can predict the successful cessation of smoking on subscales of the K-SOCRATES-S.

**Results** Exploratory factor analysis of the K-SOCRATES-S showed that the scale consisted of three factors: Taking Steps, Recognition, and Ambivalence. The scales measuring Taking Steps and Recognition in this scale had a significantly positive correlation with the scores observed on Kim's smoking cessation motivation scale. The scales measuring Taking Steps and Recognition had a significantly negative correlation with Ambivalence. Overall, the results indicate that the K-SOCRATES-K scale showed high validity.

**Conclusion** The K-SOCRATES-S developed in the present study is highly reliable and valid for predicting a patient's likelihood of success in quitting smoking among patients who want to cease smoking.

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**Key Words** SOCRATES, Smoking, Smoking cessation, Motivation scale, Motivational enhancement therapy, Predictive validity.

## INTRODUCTION

Like many other dependence syndromes, patients with nicotine dependence have a tendency to experience a high degree of craving. The factors associated with the decision to

continue to smoke depend on avoiding professional assistance, avoiding the withdrawal symptoms, and either negative or positive reinforcements, or both. The rate at which individuals stop cigarette smoking is reported to be lower when the patients attempt to quit smoking without getting help from accessible assistance, such as nicotine replacement services, medications, or social interventions and among patients who experience various nicotine withdrawal symptoms. When the patients begin to feel tense, anxious, or depressed after not smoking for some period of time, they remove these unpleasant symptoms.

Negative reinforcements such as removing or reducing an unpleasant condition such as withdrawal symptoms may ac-

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count for ongoing smoking behavior. The positive reinforcement, such as a pleasurable event, also makes smoking cessation difficult. A range of studies have suggested that the patients' motivation or intense desire to quit smoking represent a critical part of the process of smoking cessation.<sup>1-5</sup> In this regard, it is vital to not only assess individual motivations, but also take an effective approach to promote motivations when a smoking cessation treatment is provided.

Recently, substantial advances have been made in assessing individuals' motivation to change their behaviors through advances in using a more integrative model of the stages and process of self-change.<sup>6</sup> One of the instruments widely used to measure an individual's motivation to change is the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). Different versions of SOCRATES have been used in various clinical settings for diverse dependency syndromes. Miller and Tonigan<sup>7</sup> initially developed 19 items of the SOCRATES, which loaded on the three relatively independent factors of Ambivalence, Recognition, and Taking Steps. SOCRATES was first designed to measure motivation to change behavior in adults with alcohol problems, and its high reliability and predictive validity have been well established in various clinical settings.<sup>8,9</sup> The three subscales of this instrument have been considered to reveal core factors that predict successful behavior changes. Given this background, Korean versions of SOCRATES for smoking (K-SOCRATES-S), which is specifically designed to assess an individual's motivation to quit cigarette smoking, has been developed for the present study. The reliability, construct validity, and predictive validity of this scale for successful smoking cessation has also been demonstrated.

## METHODS

### Participants

A total of 333 male smokers who visited a smoking cessation clinic in one of seven health promotion centers were selected randomly for the present study. The participants all agreed to participate in the present study and submitted a written informed consent. The demographic characteristics of the subjects are shown in Table 1.

**Table 1.** Demographic variables

Variable	M (SD)	Range
Age	45 (11)	20-70
Onset age (smoking)	20 (4)	13-35
Smoking duration (year)	26 (11)	4-51
Cigarette per day	21 (9)	1-50
Breath CO (ppm)	16 (11)	0-69

## Procedure

### Developing the K-SOCRATES-S

Each question of the original SOCRATES and its Korean equivalent (K-SOCRATES), which was translated by Chun,<sup>10</sup> was modified to fit the smoking cessation goals of the present study. The K-SOCRATES-S contains 19 questions and was converted to English through a translation process that used two translation specialists who had a good command of both English and Korean. The English version is presented in the Appendix.

### Performance of smoking-related measures and defining successful smoking cessation

In subjects who participated in the present study, several related measures were conducted. While nicotine replacement therapy was supplemented, assessing whether the participants successfully stopped smoking was performed for three months. The urine cotinine level was measured for each participant who reported that they had successfully quit smoking. Cases with urine cotinine level <100 ng/mL were considered as having successfully quit smoking, whereas those with a urine cotinine level of >100 ng/mL were considered to have failed to quit smoking.

## Measure

### Korean version of SOCRATES-S

The scale developed for the present study included 19 questions modified from the SOCRATES Version 8.0 and its Korean equivalent, which Chun<sup>10</sup> translated, were used to assess patients with smoking-induced nicotine dependence. The scale measured participants' motivation to change.

### Kim's smoking cessation motivation scale

To verify the concurrent validity of the K-SOCRATES-S, Kim's Smoking Cessation Motivation Scale (KSCMS),<sup>11</sup> which was also developed for the present study, was also used. The KSCMS contains 10 questions and evaluates motivations to quit smoking at the early stages of pre-contemplation, contemplation, and preparation. The answers were graded using a 5-point scale ranging from 1 to 5 points. One of the important objectives of the current scale was to detect patients with low motivation to quit smoking and those who are more likely to fail to cease smoking using the initial assessment questions. Questions corresponding to the action and maintenance stages of motivation in the initial assessment were excluded. To avoid random response effects, some questions were inversely scored. The internal consistency of KSCMS was measured to be 0.679.

## Statistical analysis

### Factor structure of K-SOCRATES-S and its reliability

To identify the subscales for K-SOCRATES-S, an exploratory factor analysis was performed. Any scales with an eigenvalue greater than 1 were selected. Identical to the methods used to analyze the factors of the original SOCRATES, alpha extraction and varimax rotation were used. The internal consistency for each subscale was also measured.

### Validity of K-SOCRATES-S

A correlation analysis was performed for scores indicating low-level factors comprising K-SOCRATES-S and the overall scores of KSCMS. This analysis examined whether each low-level scale of K-SOCRATES-S could relatively measure the independent concepts of the motivation to quit smoking and whether it could measure the similar concepts of other scales that evaluate motivations to stop smoking.

### Predictive validity of K-SOCRATES-S

To determine whether the K-SOCRATES-S significantly predicted successful smoking cessation, a logistic regression analysis was performed. Subscale scores of the K-SOCRATES-S were chosen as independent variables. Successful smoking cessation, which was defined as participants' verbal reports and confirmed by urine cotinine level measured three months later were chosen as the dependent variables.

## RESULTS

### Factor structure and internal consistency

Based on the results of the factor analysis, the structures of factors comprising K-SOCRATES-S were identical to that of the SOCRATES and K-SOCRATES. Each factor of the K-SOCRATES-S, which was identical to the questions of the SOCRATES, was labeled Taking Steps, Recognition, and Ambivalence. In the present study, the internal consistency was

0.889, 0.836, and 0.508, respectively (Table 2).

### Correlation validity of low-level factors and measures for overall motivation

A correlation analysis between low-level factors comprising the measures for the motivations to quit smoking and the K-SOCRATES-S was conducted to reveal the validity of the K-SOCRATES-S. The Taking Steps subscale of the K-SO-

**Table 2.** Factor structure and reliability of K-SOCRATES-S

Item No.	Factor		
	Taking steps	Recognition	Ambivalence
SOC1-08	0.810		
SOC1-13	0.798		
SOC1-18	0.788		
SOC1-04	0.691		
SOC1-19	0.684		
SOC1-09	0.665		
SOC1-05	0.660		
SOC1-07		0.753	
SOC1-15		0.740	
SOC1-12		0.698	
SOC1-10		0.662	
SOC1-17		0.642	
SOC1-03		0.598	
SOC1-01		0.509	
SOC1-14		0.471	
SOC1-02			0.648
SOC1-06			0.458
SOC1-16			0.440
SOC1-11			0.395
Cronbach's alpha	0.889	0.836	0.508

The Factors are presented based on the order in which the factors were extracted. K-SOCRATES-S: The Korean version of Stages of Change Readiness and Treatment Eagerness Scale for Smoking Cessation

**Table 3.** Pearson correlation of between motivation sub-scales (validity test)

KSCMS	K-SOCRATES-S			K-NDSS					K-NDIS
	S1	S2	S3	N1	N2	N3	N4	N5	Total
K1	0.227**	0.107	-0.277**	0.052	-0.213**	0.108	-0.074	-0.053	-0.382**
K2	0.398**	0.162**	-0.076	0.094	0.086	-0.092	0.062	0.009	-0.350**
K3	0.328**	0.111	-0.112*	0.148**	0.052	-0.011	0.103	0.133*	-0.356**
K4	0.082	0.346**	0.207**	0.036	0.001	-0.054	-0.001	0.128*	-0.087
Kt	0.514**	0.334**	-0.178**	0.127*	-0.055	-0.005	0.025	0.074	-0.434**

\*p<0.05, \*\*p<0.01. KSCMS: Kim's Smoking Cessation Motivation Scale, K-SOCRATES-S: The Korean version of Stages of Change Readiness and Treatment Eagerness Scale for Smoking Cessation, K-NDSS: The Korean version of Nicotine Dependence Syndrome Scale, K-NDIS: The Korean version of Nicotine Dependence Insight Scale, K1: pre-contemplation, K2: contemplation, K3: preparation 1, K4: preparation 2, Kt: KSCMS-total, S1: recognition, S2: taking Steps, S3: ambivalence, N1: drive, N2: priority, N3: continuity, N4: tolerance, N5: stereotypy

**Table 4.** Predicting validity of sub-scales of K-SCORATES-S (logistic regression)

Subscales*	B	S.E.	Wald	df	Sig.	OR	95.0% CI for OR	
							Lower	Upper
Taking steps	0.546	0.249	4.798	1	0.028	1.726	1.059	2.812
Recognition	-0.086	0.224	0.147	1	0.701	0.918	0.592	1.422
Ambivalence	-0.223	0.246	0.818	1	0.366	0.800	0.494	1.297
Constant	0.180	0.238	0.572	1	0.449	1.197		

\*Variable(s) entered on step 1: taking steps, recognition, ambivalence. K-SOCRATES-S: The Korean version of Stages of Change Readiness and Treatment Eagerness Scale for Smoking Cessation

CRATES-S had a positive correlation with the overall KSC-MS scores ( $r=0.307$ ,  $p<0.01$ ) and the Recognition subscales ( $r=0.466$ ,  $p<0.01$ ). The Taking Steps measure of the K-SOCRATES-S had a negative correlation with the Ambivalence measure ( $r=-0.162$ ,  $p<0.01$ ) (Table 3). These results indicate that each low-level scale of the K-SOCRATES-S was positively correlated with the overall level of motivation to quit smoking.

### Predictive validity for successful smoking cessation

Based on the results of a logistic regression analysis, the Taking Steps measure could significantly predict an individual's success to quit smoking. The results of the logistic regression analysis are shown in Table 4. The results reveal that the K-SOCRATES-S had a high level of predictive validity, and that it can also be used to screen patients with a high risk of failing to quit smoking.

## DISCUSSION

Motivation is defined as what makes someone energetic and his or her behaviors goal-directed ones.<sup>12</sup> Without motivation there is no desire to do or achieve something.<sup>13</sup> Treatment motivation of alcoholics is important concept for those who try to reduce alcohol usage or to participate in treatment program.<sup>14</sup> And that the structure of motivation is powerful predicting factor for improvement of alcohol problems<sup>15</sup> and the level of motivation of the patients is influencing factor for maintaining abstinence and treatment results.<sup>16</sup>

Unlike many other psychiatric illnesses, dependence syndromes are associated with a strong pleasure, which might be one of the important factors that lead to a low motivation for treatment. Motivational enhancement therapy is therefore based on acknowledging the motivational factor to change. It does not require patients to regard their dependence problem as a disease, and it focuses on enhancing the patients' motivations to change their behavior by resolving their ambivalence.<sup>17</sup> According to this theory, strengthening patients' treatment motivation is a critical step to treat dependence syndromes successfully. In this regard, assessing the individual's motivation

is a fundamental starting point.

The SOCRATES, developed by Miller and Tonigan,<sup>7</sup> assesses patients' motivations to change. The scale has been reported to have a high reliability, construct validity, and predictive validity when it was applied to smoking cessation.<sup>8,17</sup> The scale was also translated into the Korean language, and it has been reported to have an equivalent extent of elemental structures. The Korean version of the SOCRATES(K-SOCRATES) has been reported to provide reliable and valid measure of motivation to change among the Korean population.<sup>10</sup>

Dependence disorders on diverse chemicals, drugs, and behaviors include alcohol, nicotine, and computer games.<sup>2</sup> To evaluate these dependence problems correctly in each case, it is necessary to develop and modify a specific scale for that specific dependence, because motivations to cease each dependence disorder can differ. Consequently, K-SOCRATES was modified for the present specific study to assess motivations to quit smoking in patients with nicotine dependence. The basic process of authentication and predictive validity was conducted to demonstrate the scale's validity.

The results showed that the K-SOCRATES-S has an optimal level of reliability and validity. When the patients were followed for three months, the scale's predictive validity to predict successful smoking cessation was high. The results of a logistic regression analysis showed that higher scores on the Taking Steps measure correlated with a higher rate of success in quitting smoking. The results also suggest that a higher degree of the Recognition measure or a lower level of the Ambivalence measure is not associated with the success of quitting smoking. Despite these results, it must also be considered that participants who were voluntarily recruited might have had a higher degree of the Recognition measure and a lower degree of the Ambivalence measure related to their smoking problems. The difference of degree motivation to quit smoking, therefore, might not have been large among participants. It must therefore be considered that certain factors existed with no significant effect on participants' ability to stop smoking successfully.

To compensate for these demerits, K-SOCRATES-S was also implemented for a general population of smokers. By

setting attempts to quit smoking within the recent six-month period as the dependent variable, follow-up studies are warranted to conduct a logistic regression analysis. In these follow-up studies, a hypothesis would be “A higher degree of Recognition or a lower degree of Ambivalence lead to the increased attempts to quit smoking.” The results of the hypothesis indicate that a higher degree of recognizing the problems or a lower degree of ambivalence lead to increased attempts to quit smoking. The higher scores indicating the scale of Taking Steps related to a higher degree of success in stopping smoking. This series of explanations are assumed to agree with the explanation provided by motivational enhancement therapy; that is, a substantially preparatory stage was entered when the degree of recognizing the problem was increased to some extent following the progression of the pre-contemplation stage to contemplation stage.<sup>2</sup>

The present study has several limitations. First, the research participants were all Koreans. Therefore, the results of the study cannot be generalized to other ethnic groups. To generalize these results, it is necessary to conduct and replicate the studies with diverse ethnic groups. Second, the duration of successful smoking cessation was not measured after the participants had successfully quit smoking. A transtheoretical model defines the maintenance stage as the period during which an individual has stopped smoking for more than six months. Studies have also suggested that a permanent change of behavior could be expected when the duration of smoking cessation has lasted for two to three years.<sup>5</sup> In this respect, the duration of smoking cessation for three months may be relatively short. Third, in case of reliability, the internal consistency of ambivalence subscale was low (0.508). This result can be explained by the content of items which were composed of ambivalence subscale. Although four items measure the level of ambivalence for stop smoking generally, each item measures the level of insight, recognition that smoking is hurting other people, controllability for smoking, and smoking amount respectively. This can make the internal consistency of ambivalence subscale somewhat low. Last, the results cannot be generalized even in people whose level of Taking Steps was relatively high. In other words, some people failed to stop smoking whereas others succeeded even among those people that had a high score on the Taking Steps measure.

Despite these limitations, the present study has several strengths and clinical implications. First, K-SOCRATES-S modified by the K-SOCRATES has been developed successfully to assess an individual's motivation to quit smoking. Second, the scale showed a high degree of reliability and validity. Third, the results of the present study suggest that the action

stage might predict an individual's success to stop smoking among the five stages of change. Fourth, this study reveals that participants with lower scores on the K-SOCRATES-S scale can be screened and detected as a high-risk group to fail to quit smoking in the initial assessment. By providing more intensive interventions to these high-risk groups, it is possible to enhance the overall success rate of smoking cessation in clinical settings.

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## ▪ Appendix ▪

## English version of K-SOCRATES-S

Items	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
1. I really want to make change in my smoking.	1	2	3	4	5
2. Sometimes I wonder if I am an nicotine dependence patient.	1	2	3	4	5
3. If I don't change my smoking soon, my problems are going to get worse.	1	2	3	4	5
4. I have already started making some changes in my smoking.	1	2	3	4	5
5. I was smoking too much at one time, but I've managed to change my smoking.	1	2	3	4	5
6. Sometimes I wonder if my smoking is hurting other people.	1	2	3	4	5
7. I am a problem smoker.	1	2	3	4	5
8. I'm not just thinking about changing my smoking, I'm already doing something about it.	1	2	3	4	5
9. I have already changed my smoking, and I am looking for ways to keep from slipping back to my old pattern.	1	2	3	4	5
10. I have serious problems with smoking.	1	2	3	4	5
11. Sometimes I wonder if I am in control of my smoking.	1	2	3	4	5
12. My smoking is causing a lot of harm.	1	2	3	4	5
13. I am actively doing things now to cut down or stop smoking.	1	2	3	4	5
14. I want help to keep from going back to the smoking problems that I had before.	1	2	3	4	5
15. I know that I have a smoking problem.	1	2	3	4	5
16. There are times when I wonder if I drink too much.	1	2	3	4	5
17. I am an nicotine dependent patient.	1	2	3	4	5
18. I am working hard to change my smoking.	1	2	3	4	5
19. I have made some changes in my smoking, and I want some help to keep from going back to the way I used to smoke.	1	2	3	4	5

K-SOCRATES-S: The Korean version of Stages of Change Readiness and Treatment Eagerness Scale for Smoking Cessation