

Korean medicine students' entrance factors and satisfaction with their college experience: a quantitative nationwide study

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Abstract

Background Korean medicine (KM) has equal legal rights with conventional Western medicine in South Korea and is taught at KM colleges. To date, no research has been conducted on the entrance factors and satisfaction of KM college students. Thus, this study attempts to fill this gap in the literature. Methods Content validity tests and face validity tests were conducted during the development of the questionnaires used in this study. The scores of each item and the correlation between items and sub-items were analyzed and factors were correlated with students' satisfaction and willingness to re-enter KM colleges. Results A total of 420 students responded to the survey. The mean of the item considering stable incumbency and examination scores was the highest. The highest correlation between an item and sub-item concerned interaction with people. The questionnaire items or sub-questionnaire items that showed moderate high correlation with the questionnaire items asked whether participants were willing to re-enter the KM college and were both about independent choices. Conclusions Identifying college entrance factors can contribute to increasing current students' academic satisfaction and decreasing drop-out rates. College entrance factors that are closely related to students' motivation to become KM doctors may increase the current academic satisfaction of KM students and decrease drop-out rates. This study highlights factors that can be applied in college curriculum or subject teaching, such as interest in research on KM.

Background

Students entering college choose their major based on various factors. Their perception of their major affects their satisfaction with the curriculum, and their perception of their department affects their satisfaction during enrollment and academic adjustment [1]. Factors such as students' individual characteristics, values, and needs [2] affect their experience of medical school. Prior research has shown that the factors affecting medical students' choices of majors are becoming increasingly complex [3, 4]. Therefore, identifying relevant college entrance factors is important for establishing healthcare provisions because these factors reflect students' perspectives on their compatibility with certain fields and the flexibility of various jobs [3].

Furthermore, students' primary career plans may change over the course of their college education and are influenced by the degree to which college education presents diverse career opportunities [2]. Therefore, medical students' major choice or satisfaction level may differ according to their motivation for entering the college. These factors may not only impact students' career decisions, but also those of policy makers and educators.

Many researchers have examined college entrance factors, as they have a high impact on the healthcare system. The results of related research have reported factors that make students likely to become doctors, college entrance factors according to gender, and college entrance factors that differ between medical students and dental students [5-8].

Korean medicine (KM), also known as traditional Korean medicine, is distinct from conventional Western medicine but has legally equal rights in South Korea's healthcare system. Korean medicine is based on traditional Chinese medicine but encompasses unique practices such as four-constitution medicine and saam acupuncture [9]. Korean medicine considers human beings as holistic entities and employs both a modern medical diagnosis system and a unique pattern diagnosis theory [10]. Korean medicine doctors (KMD) that apply Korean medicine in their treatment use codes from the Korean Standard Classification of Disease 7th edition (KCD7) to diagnose, prescribe, and select the most appropriate description of a patient's condition. This code is based on ICD-10 and includes the original disease codes of KM. These original codes for Korean medicine contributed to traditional medicine conditions-Module 1, included in ICD-11 [9].

The education curriculum of many KM colleges is a six-year program consisting of two years of premedical school and four years of medical school [11]. The purpose of KM colleges is to cultivate KMD who have learned about the traditions of KM, possess both scientific knowledge and clinical skills, and volunteer their knowledge in society [12]. To meet this purpose, KM colleges provide a balanced education in modern biomedicine as well as traditional KM knowledge [9, 13]. The Institute of Korean Medicine Education and Evaluation was established to ensure quality control in KM education. Because of the distinct characteristics of KM colleges, the education provided by such colleges has been evaluated from various perspectives such as the level of satisfaction of KM college students, their education in evidence-based medicine, and the introduction of problem-based learning [14-16].

However, factors that influence KM college entrance and motivation have not been evaluated in previous studies. Further, students of KM colleges only share some characteristics with medical and dental students, so it is necessary to examine the college entrance factors of KM college students independently. Evaluating such factors may allow the identification of potential KM students in the course of career guidance. Furthermore, some factors that are significantly related to students' satisfaction with KM college life can be used to establish constructive KM educational environments. Therefore, the purpose of this study is to identify the factors that induce KM college students to attend KM colleges and the factors that are significantly related to their satisfaction levels with their KM colleges.

Methods

Designing questionnaire items

To design the questionnaire items for KM students, we followed the questionnaire design guideline from AMEE (An International Association for Medical Education) [17]. The guideline mainly consists of the process of collecting and synthesizing literature review, item developing, content validity test, cognitive interviewing, and pre-testing [17]. Based on the results of questionnaires conducted on medical, dental, and KM college students [5, 7, 18] and discussions between the authors of this study, the authors defined seven latent variables: (1) status and security (social status, stable incumbency, expecting higher earning), (2) career (research, clinical activities), (3) patient care and working with people (interactions with people), (4) requiring personal and clinical skills (manual skills, psychological skills), (5) interest in Korean medicine (interest in the theory of KM, interest in KM treatment methods based on modern science), (6) personal experience or atmosphere (positive experience receiving KM treatment, military duty, examination scores, belief that KM is students' calling,

chronic disease experienced by the student or their family member), (7) influencing person or method (family and relatives, acquaintances, mass media, independent choice).

To conduct a general investigation of students' satisfaction levels, we created two questionnaire items: 'I am satisfied with my current enrollment in the college/graduate school of Korean medicine' and 'If I were to restart my post-secondary education, I would choose the college/graduate school of Korean medicine again'.

We constructed questionnaires to obtain demographic information including participants' age; gender; whether they were currently attending university; whether they had a doctor, dentist, or Korean medicine doctor in their family including parents and siblings; and their academic discipline group. The questionnaire was used to examine college-related factors rather than respondents' general perceptions of KM. Therefore, examples of the questionnaire items are included to provide a better understanding of participants' answers.

The twenty-two questionnaire items described above were constructed with a 5-point Likert scale. However, because some participants were female or had already finished their military service, the questionnaire item related to 'military duty' included an additional 'not applicable' answer. The study intended to identify KM college students' satisfaction levels both at the point they decided to matriculate and at the present time. Thus, in addition to the two questionnaire items stating 'I am satisfied with my current enrollment in the college/graduate school of Korean medicine' and 'If I were to restart my post-secondary education, I would choose the college/graduate school of Korean medicine again', a sub-questionnaire item stating 'My experience attending this school is satisfactory for the same reason as above' was included.

Content validity test

Content validity determines whether developed questionnaire items properly reflect the content[19]. In this study, the researchers measured I-CVI, which involves the representativeness of individual questionnaire items[20]. Content experts measured the representativeness of individual items with a 4-point Likert scale, after which the researchers divided the number of experts who rated each item as three or four points by the total number of experts. When the average I-CVI score was 0.8 or higher, the item was measured as content valid[19, 20]. Content experts are those who conduct research in the relevant field or who have experience in that field[20]. Therefore, in the research, we selected three experts: a KM college professor teaching basic science, a KM college professor teaching clinical medicine, and a professor who had major experience in survey research. Furthermore, we selected three consultants for college entrance.

After acquiring consent from the six experts, one of the researchers explained the method and the implication of the content validity measurement. Experts were given a panel link created with Google Forms (www.google.com/forms, Mountain View, CA, USA), an online survey platform. The representativeness, clarity, and relativeness of each item consisting each latent variable were measured by evaluating items with a score range of one to four. To acquire meaningful responses from experts[21], qualitative data about each latent variable or each item were collected.

By reviewing the qualitative data of items with 0.8 or higher I-CVI, 16 items identified for revision were edited, and the content validity experts were asked to check whether the edited items represented their content well. Items with I-CVI lower than 0.8 were items about 'manual skills' and 'psychological skills', and their I-CVI was 0.5 each. These questionnaire items were edited by reviewing the qualitative data first, after which the representativeness, clarity, and relativeness of individual items were measured with a 4-point Likert scale again. Through additional comments from experts, the item 'potential for future development of KM' was added as a latent variable about participants' interest in Korean medicine. The item 'Making policies and performing social activities related to KM' was added as a latent variable regarding careers. The representativeness, clarity, and relativeness of the new questionnaire items were then measured with a 4-point Likert scale. Therefore, a total of 24 questionnaire items were created.

Face validity and pre-test

Measuring face validity involves asking people who are related to a subject group whether the questions appear to be valid and gathering the respondents' oral opinions about the questionnaire[22]. Measurement for assessing the face validity can include cognitive interview process [23]. Because medical first and second year students had experienced premedical second year, they were selected as participants for face validity tests. One group of seven medical first year students and another group of six medical second year students participated in focus group interviews. The coding criteria in the interviews examined the proper implementation of the researchers' intentions[24]. Therefore, the researcher introduced the intention of each questionnaire item to the groups and let them freely discuss their feelings. The process of face validity includes identifying and editing questionnaire items that participants have difficulty understanding, then checking whether they understand the edited questionnaire items. Through this process, the example written in the survey was edited for better understanding. Questionnaire items about 'examination scores' were also edited from 'because of the examination scores' to 'because examination scores are an important factor'. The final online survey questionnaire is described in Additional File 1(Additional file 1). Before the survey, a pre-test was conducted with premedical second year students.

Subjects and Survey Procedure

In the KM curriculum, students are separated into the premedical and medical levels. Premedical second year is a sophomore year in which students learn basic KM theory, basic medical science, and liberal arts. Considering recall bias, the survey did not target upper grades. As premedical first year students are freshmen, the researchers assumed that they do not have enough experience of KM college, so premedical second year students were selected as research participants. As there are several curriculum differences between each KM college, the research was conducted among all KM colleges in South Korea, with a total of 744 students. The survey was conducted over ten days, from April 8 to April 17, 2019. The online survey link was distributed via a message to student group leaders of each KM college's premedical second year students. Pre-participants were informed of the following contents before participating in the study: the background and aim of the research, the type of participants, methods, the dates of the study, benefits from participating in the research, the lack of

direct side-effects, rewards or costs, privacy of personal information, voluntary participation and how to end their participation, and contact details. Only participants who read this information and gave their online informed consent could participate in the study.

IRB approval and informed consent

This study was conducted after receiving approval from the Public Institutional Bioethics Committee designated by the MOHW (P01-201903-22-003). Personal information acquired by the study was protected using methods provided by the online survey platform SurveyMonkey™ (www.surveymonkey.com, LLC; Palo Alto, CA, USA) and IRB institution. The personal information collected consisted only of a cellular phone number that was used to provide participants with a \$1 reward. Participants were informed about the collection of this information before they participated in the study. Participants who wanted to stop participating were free to do so at any time. To this end, the online survey provided two researchers' phone numbers and e-mail addresses. After the survey was conducted and the rewards were distributed, the personal information was completely destroyed.

Data analysis and statistical analysis

Responses from 420 students who participated in the survey among the 774 KM students were analyzed. The response rates and percentage of each response were described as well as the number of participants and response rates (ratio of participating students to total enrollment of KM college's premedical second year) of every KM college. Frequency, mean, and standard deviation (SD) of questionnaire items were analyzed on a 5-point Likert scale. To identify the correlation between entrance factors and present satisfactory levels, a Pearson's correlation test of questionnaire items and sub-questionnaire items was conducted. To determine the factors that affect KM college students' general level of satisfaction, a Pearson's correlation test was conducted between the questionnaire item 'I am satisfied with my current enrollment in the college/graduate school of Korean medicine' and the questionnaires of the five latent variables, as well as the questionnaire item 'If I were to restart my post-secondary education, I would choose the college/graduate school of Korean medicine again' and the questionnaires of five latent variables. The programs used for statistical analysis were Excel 2013 (Microsoft, Redmond, WA, USA), IBM SPSS Statistics 25 (SPSS Inc., Chicago, IL, USA) and Graphpad Prism 7 (GraphPad™ Software Inc., San Diego, California, USA).

Results

Content validity index

Professors who majored in KM rated questionnaire items about 'clinical skills' and 'psychological skills' relatively low (Table 1). They pointed out that 'manual skills' is an inappropriate questionnaire item, and they required respondents to include detailed examples in the questionnaire item.

The questionnaire items 'perform manual skills as a Korean medicine doctor' and 'perform psychological skills' were modified to 'learn to perform clinical skills (including acupuncture, moxibustion, and herbal medicine) myself' and 'perform psychological treatments'. After the modification, I-CVI was calculated as 1.0 (Table 2).

Two questionnaire items were developed based on qualitative data from experts, one of which states, 'I entered the college/graduate school of Korean medicine because I think Korean medicine has potential for future development', categorized into the latent variable 'interest in Korean medicine'. The other is the item stating 'I entered the college/graduate school of Korean medicine because I would like to make policies and perform social activities related to Korean medicine', categorized into the latent variable 'career'. The average I-CVI of the two items was 1.0 (Table 2).

Twelve questionnaire items that had 0.8 or higher I-CVI but required modifications according to qualitative data from experts were modified. After the revision, we determined whether the questionnaire items were adequate by showing the unmodified and modified questionnaire items to the experts (Table 2).

Basic characteristics of respondents and overall survey results

Table 1 I-CVI Score of Each Item

Title of Questionnaire Items	Experts						I-CVI
	□	□	□	□	□	□	
1. I entered the college/graduate school of Korean medicine because I think Korean medicine doctors are professionals with high social status.	3	4	4	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I think Korean medicine doctors are professionals with a stability.	3	4	4	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I expect high earnings as a doctor of Korean medicine.	3	4	4	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I am interested in the theory of Korean medicine.	3	4	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because my experiences or my family and my acquaintances' experience receiving Korean medicine treatment were positive.	3	4	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I am interested in treatment methods different from Western medicine.	3	4	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I think Korean medicine is based on modern science.	3	3	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I would like to carry out research.	2	4	4	4	4	4	0.83
1. I entered the college/graduate school of Korean medicine because I would like to perform clinical activities (opening a clinic or working at a hospital)	3	4	4	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because Korean medicine doctors interact with people.	2	4	3	4	4	4	0.83
1. I entered the college/graduate school of Korean medicine because I can perform manual skills as a Korean medicine doctor.	2	2	2	4	4	4	0.5
1. I entered the college/graduate school of Korean medicine because I can perform psychological skills, including counselling, as a Korean medicine doctor.	2	1	2	4	4	4	0.5
1. I entered the college/graduate school of Korean medicine because of my military duty (as a public health doctor or an army doctor).	3	4	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because of my college entrance examination scores (college scholastic ability test, high school records) at the time of college application.	3	4	3	4	4	4	1.0
1. I entered the college/graduate school of Korean medicine because I think it is my calling.	2	3	3	4	4	4	0.83
1. I entered the college/graduate school of Korean medicine because I or one of my family members have a disease.	2	4	3	4	4	4	0.83
1. My family influenced my decision to attend the college/graduate school of Korean medicine.	3	3	4	4	4	4	1.0
1. My acquaintances (including friends, teachers, and lecturers) influenced my decision to attend the college/graduate school of Korean medicine.	3	4	4	4	4	4	1.0
1. Mass media influenced my decision to attend the college/graduate school of Korean medicine.	3	4	3	4	4	4	1.0
1. I independently chose to attend the college/graduate school of Korean medicine.	3	4	4	4	4	4	1.0
1. I am currently satisfied with my enrollment in the college/graduate school of Korean medicine.	3	4	4	4	4	4	1.0
1. If I were to restart my post-secondary education, I would choose the college/graduate school of Korean medicine again.	3	4	4	4	4	4	1.0
Mean	2.73	3.63	3.36	4	4	4	0.92

*I-CVI: item-level content validity index **□□□: professors majored in Korean Medicine

***□□□: consultants for college entrance

Table 2 I-CVI Score of New Items And Edited Questionnaire Items

Title of modified questionnaire items								
(b) I entered the college/graduate school of Korean medicine because I think Korean medicine doctors are professionals with a stable incumbency.								
(c) I entered the college/graduate school of Korean medicine because I expect higher earnings as a doctor of Korean medicine than other professions after graduation.								
(f) I entered the college/graduate school of Korean medicine because I am interested in treatment methods found in Korean medicine different from Western medicine								
(h) I entered the college/graduate school of Korean medicine because I would like to carry out research related to Korean Medicine.								
(i) I entered the college/graduate school of Korean medicine because I would like to perform clinical activities (including working at a hospital or a Korean medicine clinic).								
(j) I entered the college/graduate school of Korean medicine because Korean medicine requires interaction with people who need examinations and treatments to be done by Korean medicine doctors.								
(m) I entered the college/graduate school of Korean medicine because I can fulfill my military duty (as a public health doctor or an army doctor) easier than other occupational groups								
(n) I entered the college/graduate school of Korean medicine because college entrance examination scores (college scholastic ability test, high school records) were important factors at the time of college application.								
(o) I entered the college/graduate school of Korean medicine because I think Korean medicine doctors and the related occupational scope of practice are closely related to my calling.								
(p) I entered the college/graduate school of Korean medicine because I or one of my family members have a chronic disease.								
(q) My family and relatives influenced my decision to attend the college/graduate school of Korean medicine. .								
(s) Mass media (including TV programs, the Internet, Korean medicine doctors as role models in the media) influenced my decision to attend the college/graduate school of Korean medicine.								
(u) I am satisfied with my current enrollment in the college/graduate school of Korean medicine.								
Title of newly added questionnaire items							Experts	I-CVI
							0	0
I entered the college/graduate school of Korean medicine because I think Korean medicine has potential for future development.							4	4
I entered the college/graduate school of Korean medicine because I would like to make policies and perform social activities related to Korean Medicine.							4	4
(k) I entered the college/graduate school of Korean medicine because I can learn to perform clinical skills (including acupuncture, moxibustion, and herbal medicine) myself as a Korean medicine doctor.							4	4
(l) I entered the college/graduate school of Korean medicine because I can perform psychological treatments, including counselling, as a Korean medicine doctor.							4	4

*I-CVI: item-level content validity index **□□□: professors majored in Korean Medicine ***□□□: consultants for college entrance

Table 3 Basic characteristics of respondents (N=420)

Characteristics	Frequency (%)			
Gender				
Male	209 (49.8%)			
Female	207 (49.3%)			
No reply	4 (1.0%)			
Age				
18~23	370 (88.1%)			
24~28	33 (7.9%)			
29~32	13 (3.1%)			
33 or more	3 (0.7%)			
No reply	1 (0.2%)			
Having a doctor, a dentist, or a Korean Medicine doctor in their family or siblings(Multiple choices)				
Doctor	28 (6.7%)			
Dentist	19 (4.4%)			
Korean Medicine Doctor	46 (10.7%)			
None	337 (78.2%)			
No reply	0 (0.0%)			
High school track choice				
Arts and humanities (liberal arts)	307 (73.09%)			
Natural sciences (natural sciences)	109 (25.95%)			
Not applicable (including not taking the test)	4 (0.095%)			
College	Number of respondents (A, N=420)	Total enrollment (B, N=744)	Response rate Per school (A/B) (%)	Frequency (%)
□	12	25	48.0%	2.9%
□	36	119	30.3%	8.6%
□	68	118	57.6%	16.2%
□	58	94	61.7%	13.8%
□	44	77	57.1%	10.5%
□	34	45	75.6%	8.1%
□	24	48	50.0%	5.7%
□	14	22	63.6%	3.3%
□	41	46	89.1%	9.8%
□	21	44	47.7%	5.0%
□	13	55	23.6%	3.1%
□	55	110	50.0%	13.1%
Overall	420	744	56.5%	

There were 209 male participants and 207 female participants. Of the 744 enrolled students, 420 participated. Therefore, the response rate was 56.5% (Table 3).

The highest mean for questionnaire items regarding entrance factors were related to stable incumbency (Mean: 4.08), examination scores (Mean: 4.03), clinical activities (Mean: 4.00), and military duty (Mean: 3.97). The highest mean for questionnaire items regarding students' satisfaction asked whether they were satisfied with their current enrollment in their KM college/graduate school (Mean: 3.90). The lowest mean for questionnaire items regarding entrance factors was related to chronic diseases of students or their family members (Mean: 2.18), mass media (Mean: 2.60), and the construction of policies and performance of social activities based on modern science (Mean: 2.65). The lowest mean for questionnaire items regarding students' satisfaction was related to chronic diseases of students or their family members (Mean: 2.18).

Pearson's correlation between questionnaires and sub-questions

The high correlation between questionnaire items and sub-questionnaire items implies a high influence of specific factors that contribute to students' college entrance choices and their current satisfaction with the school they attend. While all items had positive correlations, seven items had high positive correlations at 0.7 or higher. The following items were related to students' positive experiences receiving KM treatment (item 5, $r=0.751$), their interest in KM treatment methods (item 6, $r=0.731$), their enthusiasm for performing clinical skills (item 10, $r=0.712$), interaction with people who need examinations and treatments (item 12, $r=0.809$), the ability to learn to perform clinical skills (item 13, $r=0.712$), the ability to perform psychological treatment (item 14, $r=0.719$), military duty (item 15, $r=0.750$), and calling (item 17, $r=0.796$) (Figure 1). Detailed Pearson's correlation coefficients of all questionnaire items and sub-questionnaire items are included in Additional File 2(Additional file 2).

3.4. Pearson's correlation between participants' satisfaction, willingness to re-enter, and motivations

The questionnaire items or sub-questionnaire items that showed moderate high correlation with the questionnaire items related to students' satisfaction with their current enrollment were 'currently satisfied because I think Korean medicine doctors are professionals with high social status' (item 1-1, $r=0.5273$), 'currently satisfied because I think Korean medicine doctors are professionals with a stable incumbency' (item 2-1, $r=0.5622$), and 'currently satisfied because I independently chose to attend the college/graduate school of KM' (item 22-1, $r=0.6055$) (Figure 2).

The questionnaire item or sub-questionnaire item that showed moderate high correlation with the questionnaire item asking whether participants were willing to re-enter the KM college was item 22-1 ($r=0.5273$). Furthermore, questionnaire items or sub-questionnaire items with a 0.45 or more Pearson's correlation coefficient with the item about re-entry were not only item 1-1 ($r=0.4514$) and item 2-1 ($r=0.4873$), but also items stating 'currently satisfied because I am interested in the theory of KM' (item 10-1, $r=0.4712$) and 'currently satisfied because I think Korean medicine doctors and the related occupational scope of practice are closely related to my calling' (item 17-1, $r=0.489$) (Figure 2).

The questionnaire item asking whether college entrance examination scores (college scholastic ability test, high school records) were important factors at the time the students applied to college was the only item that had negative correlations with the questionnaire items about students' current satisfaction ($r=-0.0341$) and willingness to re-enter ($r=-0.1269$), but had low correlation (Figure 2).

Discussion

Analysis of content validity index

To interpret proper meaning from responses of questionnaire item, it is important to design rigorous questionnaire with high-quality [17]. If the questionnaire is poorly designed, it can effect on overall responses and fail to find out essential data from participants [17]. Therefore, we included the content validity test in the process of designing questionnaire.

The content validity experts who were professors gave relatively low scores to questionnaire items including the latent variable of 'requiring personal and clinical skills'. They reported that manual skills are not representative of KM treatment. This decision was made based on their real field experience as KM doctors. Medical practice is not simply related to manual skills, but includes all processes of examination, diagnosis, treatment, and teaching. Therefore, questionnaire items were modified with reference to the field-based medical practices. As a result, when the examples of acupuncture and moxibustion, which are KM medical practices, were included in the statement, the I-CVI scored much higher.

Analysis of questionnaire scores

The score of questionnaire items about stable incumbency was high (Mean±SD: 4.08±0.7) because in South Korea, professionals have relatively high job stability. Questionnaire items about high income also had high scores (Mean±SD: 3.93±0.8) because pay is an important factor when choosing a career. This is aligned with the results of previous studies that pay was a significant factor for medical and dental students in their career choice [7].

The score of the questionnaire regarding students' interest in KM theory was relatively low (Mean±SD: 2.99 ±1.1). As Korean medicine is a specific major that is taught only after students enter the KM college, it is rare for students to learn KM theory until graduating from high school. The score of this item increased slightly after students entered the college. Thus, students may have an increased interest in their major due to the experience of learning KM theory while attending college.

The score of the questionnaire item asking about the treatment method was low due to the lack of experience of KM theory learning (Mean±SD: 2.99±1.1). The score of its sub-questionnaire slightly increased (Mean±SD: 3.13±1.0), implying that students developed an interest in KM treatment methods during their education experience.

The score of the questionnaire item concerning students' perception that Korean medicine is based on modern science as an entrance factor was relatively low (Mean±SD: 2.65±1.0). As students have not yet learned extensively about KM, they may think that KM adopts inappropriate methodologies and has low-evidence, which in fact contradicts numerous KM research results[26]. The score of the sub-questionnaire item slightly increased, but the score was still low (Mean±SD: 2.90±0.9). The score of the questionnaire item asking whether KM has potential for future development was also low (Mean±SD: 3.48±1.0), and the score of its sub-questionnaire item remained almost unchanged (Mean±SD: 3.40±0.9).

Cutting-edge systemic biology research takes place in the field of KM, such as network pharmacology-based research. In vitro and in vivo research is also

Table 4 Mean and Standard Deviation of Each Questionnaire Item

Number and title of questionnaire items	Mean±SD
1. I entered the college/graduate school of Korean medicine because I think Korean medicine doctors are professionals with high social status.	3.85±0.8
1-1. My experience attending this school is satisfactory for the same reason as above.	3.66±0.8
2. I entered the college/graduate school of Korean medicine because I think Korean medicine doctors are professionals with a stable incumbency.	4.08±0.7
2-1. My experience attending this school is satisfactory for the same reason as above.	3.85±0.8
3. I entered the college/graduate school of Korean medicine because I expect higher earnings as a doctor of Korean medicine than other professions after graduation.	3.93±0.8
3-1. My experience attending this school is satisfactory for the same reason as above.	3.72±0.8
4. I entered the college/graduate school of Korean medicine because I am interested in the theory of Korean medicine.	2.99±1.1
4-1. My experience attending this school is satisfactory for the same reason as above.	3.13±1.0
5. I entered the college/graduate school of Korean medicine because my experiences or my family and my acquaintances' experience receiving Korean medicine treatment were positive.	3.21±1.2
5-1. My experience attending this school is satisfactory for the same reason as above.	3.44±1.0
6. I entered the college/graduate school of Korean medicine because I am interested in treatment methods found in Korean medicine different from Western medicine	3.10±1.1
6-1. My experience attending this school is satisfactory for the same reason as above.	3.23±1.0
7. I entered the college/graduate school of Korean medicine because I think Korean medicine is based on modern science.	2.65±1.0
7-1. My experience attending this school is satisfactory for the same reason as above.	2.90±0.9
8. I entered the college/graduate school of Korean medicine because I think Korean medicine has potential for future development.	3.48±1.0
8-1. My experience attending this school is satisfactory for the same reason as above.	3.40±0.9
9. I entered the college/graduate school of Korean medicine because I would like to carry out research related to Korean Medicine.	2.68±1.1
9-1. My experience attending this school is satisfactory for the same reason as above.	2.92±1.0
10. I entered the college/graduate school of Korean medicine because I would like to perform clinical activities (including working at a hospital or a Korean medicine clinic).	4.00±1.0
10-1. My experience attending this school is satisfactory for the same reason as above.	3.83±0.9
11. I entered the college/graduate school of Korean medicine because I would like to make policies and perform social activities related to Korean Medicine.	2.60±1.0
11-1. My experience attending this school is satisfactory for the same reason as above.	2.88±1.0
12. I entered the college/graduate school of Korean medicine because Korean medicine requires interaction with people who need examinations and treatments to be done by Korean medicine doctors.	3.62±1.1
12-1. My experience attending this school is satisfactory for the same reason as above.	3.55±1.0
13. I entered the college/graduate school of Korean medicine because I can learn to perform clinical skills (including acupuncture, moxibustion, and herbal medicine) myself as a Korean medicine doctor.	3.85±1.0
13-1. My experience attending this school is satisfactory for the same reason as above.	3.75±0.9
14. I entered the college/graduate school of Korean medicine because I can perform psychological treatments, including counselling, as a Korean medicine doctor.	3.44±1.1
14-1. My experience attending this school is satisfactory for the same reason as above.	3.44±1.0
15. I entered the college/graduate school of Korean medicine because I can fulfill my military duty (as a public health doctor or an army doctor) easier than other occupational groups.	3.97±1.1
15-1. My experience attending this school is satisfactory for the same reason as above.	3.94±1.0
16. I entered the college/graduate school of Korean medicine because college entrance examination scores (college scholastic ability test, high school records) were important factors at the time of college application.	4.03±0.9
16-1. My experience attending this school is satisfactory for the same reason as above.	3.70±0.9
17. I entered the college/graduate school of Korean medicine because I think Korean medicine doctors and the related occupational scope of practice are closely related to my calling.	3.44±1.1
17-1. My experience attending this school is satisfactory for the same reason as above(or still it is closely related to my calling)	3.51±1.0
18. I entered the college/graduate school of Korean medicine because I or one of my family members have a chronic disease.	2.18±1.1
18-1. I am satisfied attending school for the same reasons as above following my experience attending the school (the disease can still be a reason to attend school.)	2.49±1.2
19. My family and relatives influenced my decision to attend the college/graduate school of Korean medicine.	3.30±1.2
19-1. My experience attending this school is satisfactory for the same reason as above.	3.25±1.1
20. My acquaintances (including friends, teachers, and lecturers) influenced my decision to attend the college/graduate school of Korean medicine.	2.94±1.2
20-1. My experience attending this school is satisfactory for the same reason as above.	3.10±1.0
21. Mass media (including TV programs, the Internet, Korean medicine doctors as role models in the media) influenced my decision to attend the college/graduate	2.30±1.1

school of Korean medicine.

21-1. My experience attending this school is satisfactory for the same reason as above.	2.66±1.0
22. I independently chose to attend the college/graduate school of Korean medicine.	3.85±1.0
22-1. My experience attending this school is satisfactory for the same reason as above.	3.77±1.0
23. I am satisfied with my current enrollment in the college/graduate school of Korean medicine.	3.94±0.9
24. If I were to restart my post-secondary education, I would choose the college/graduate school of Korean medicine again.	3.74±1.1
Mean	3.38±1.0

*number of participants: 420

**the number of participants who answered both question 15 and 15-1 is 202

widely conducted [27, 28]. Still, the low scores of such questionnaire items (item 6, 6-1, 7, 7-1) implies that the knowledge of KM matriculants is at a superficial level even though they have decided to enter a KM college, as the public strongly insists the necessity of the scientificization and technological development of KM, and claims that herbal medicine has adverse effects [29]. Therefore, scientific research on KM must be promoted more actively to members of the public who show interest in KM, and the results of KM research must be widely informed to KM college students.

Only few students consider diverse career choices before their entrance by seeing KM college graduates who take diverse career path, including professors who conduct research on KM. In contrast, the score of the questionnaire item regarding students' willingness to conduct clinical activities was very high (Mean±SD: 4.00±1.0). Almost every KM doctor conducts clinical activities after their graduation [30]. Therefore, performing clinical activities in the clinical field as a KM doctor is a major factor of entrance. Contrasting performing clinical activities, the score of the questionnaire item related to the construction of policies and the performance of social activities related to KM was relatively low (Mean±SD: 2.60±1.0). This can be understood as the same context.

Nonetheless, the score of the sub-questionnaire item asking about students' willingness to research KM was slightly increased (Mean±SD: 2.92±1.0), and the score of sub-questionnaire item asking about policy making and performing social activities related to KM was slightly increased (Mean±SD: 2.88±1.0). In contrast, the score of the sub-questionnaire item asking about students' willingness to do clinical activities was slightly decreased (Mean±SD: 3.83±0.9). Many curricular experiences, including lectures, strongly influence students' career decisions [2]. Therefore, while they attend college, students become able to consider different career paths that are not limited to engaging in clinical activities.

The score of questionnaire items asking about students' interactions with people who need examinations and treatments as an entrance factor was relatively high (Mean±SD: 3.62±1.1), and that of learning to perform clinical skills as a Korean medicine doctor was also relatively high (Mean±SD: 3.85±1.0). Sub-questionnaire items (item 12-1, item 13-1) of each questionnaire item did not decrease compared to their related questionnaire items. However, the score of questionnaire items asking about performing psychological treatments was relatively low compared to former ones. Furthermore, after the entrance, the score of sub-questionnaire items asking about performing psychological treatments was further decreased (Mean±SD: 3.44±1.1). Even though the counselling ability of medical professionals is clearly important, the scores of these questionnaire item is low due to the little experience of clinical subjects due to the curriculum of KM colleges and low acknowledgement of psychological treatment, which is actually performed in the KM clinical field[31]. This coincides with previous research that has reported that the young generation considers acupuncture and herbal medicine as the major clinical skills of KM, and that the major area of KM clinical treatment is related to physical health conditions[32], while only 1% of participants reported that KM could treat psychological and behavioral disorders[33]. This is because the depth of KM college matriculants' knowledge of KM is substantially the same as matriculants of non-KM colleges. Therefore, even though neuropsychiatry is not a major subject of premedical students' educational curriculum, it would be worthwhile to introduce examples of psychological clinical skills and the department of Korean neuropsychiatry when teaching about the clinical skills of KM. KM college students would then focus more on those issues and will have more wide recognition range of KM clinical skills.

College entrance examinations as college entrance factors reflect realistic aspects of job incumbency rather than job characteristics as medical professionals. Many students want to go to the highest-ranking schools that are possible with their examination scores. Therefore, the examination score becomes their significant factor (Mean±SD: 4.03±0.9).

Mass media had a relatively low effect on students' college entrance choices (Mean±SD: 2.30±1.1). Many medical students meet a medical role model during their college life [34]. In contrast, premedical students lack this type of experience because of the relatively short time they have attended college. Mass media not only gives information for college major choices, it can change students' thoughts about their college major choice [35]. However, the mass media had a relatively low effect on college entrance choice, and the score of the questionnaire item asking about students' independent choices to attend college was relatively high (Mean±SD: 3.85±1.0). This is because there are relatively few chances to see KM doctors and KM in the mass media compared to other medical professionals. For this reason, KM should be promoted more actively in the media.

Analysis of correlation between entrance factors at entrance time and present satisfaction

The greater the correlation between questionnaire items and sub-questionnaire items, the greater the degree to which students' pre-admission perceptions of those factors affect them even after admission. For this reason, the items with high correlation coefficients could be interpreted as factors that have great significance for students' adjustment and satisfaction on current enrollment. These factors should be taken into consideration in students' college major choices.

A positive experience with KM treatment and interest in KM treatment methods can be interpreted as items related to the treatment of KM.. These experiences could be faced only when they enroll in KM college. Therefore, the high correlation coefficient of those items can imply that students who had interest in KM

theory, students who had interest during their education about KM theory and treatment, and those who experienced KM treatment can be satisfied with attending KM college for those reasons.

The high correlation coefficient of the questionnaire item and sub-questionnaire item about military duty can be interpreted as the same meaning of the high overall score of those items (items 15 and item 15-1). In South Korea, public health doctors can have an alternative role in military duty service system. Students who have not finished their military service may apply at an alternative military duty service and prefer to perform their activities as a KM doctor. Students who have to fulfil their military duty can replace their military duty with public health doctor duty when they have a KMD license; therefore, they seem to be satisfied with their current enrollment.

Analysis of Pearson's correlation between students' satisfaction, willingness to re-enter, and questionnaires asking their motivation

Students dropping out of educational institutions that aim to train and educate medical professionals deplete meaningful personnel resources beyond such students' lack of motivation to become medical professionals[36]. Therefore, it is clearly important to identify the factors that contribute to satisfaction with college enrollment and willingness to re-enter. For factors that have high correlation coefficients with satisfaction with current enrollment, that students who entered KM colleges due to such factors could be more satisfied than others.

Factors that affect students' satisfaction with their current enrollment in their KM college are related to social status (item 1-1) and stable incumbency (item 2-1). Students who independently chose to enter college seem to have high satisfaction levels. This high correlation coefficient is a consequence of their independent choice, not of others' opinions. Therefore, such students can be viewed as ones who wished to enter KM colleges before their enrollment.

Students may wish to re-enter a different major because their current major does not fit their vocation or they have a low interest in people [5]. Hence, students who consistently show interest in KMD's activities related to their job competency probably have a lower probability of dropping out. Factors related to re-entering the KM college can be considered factors that could bring interest to KMD's activities related to job competency. Therefore, factors with a high correlation coefficient with the item about re-entering KM college may be related to the aptitude for students' major or students' satisfaction.

Theory of KM, interest in clinical activity, and thinking of being a KMD as a calling are closely related to internal factors. Apart from the factor of calling, these factors are closely related to KM doctors' job competency and KM college curriculum. Previous research shows that medical students who enter college because of those internal factors show higher creativity and academic achievement [37]. Therefore, when guiding the college choices of students wishing to go to KM colleges, one should determine the extent to which they want to enter the school due to these internal factors.

The irrelevance of satisfactory level with one's examination score as the important factor corresponds with the results of previous research[18], in which participants who entered KM colleges because of their examination scores had lower satisfaction levels. Because of the characteristics of the College Scholastic Ability Test (CSAT), it is difficult for students to obtain scores in proportion to their interest in specific disciplines, and it is important in high school for students to focus on preparation for the CSAT[38]. Hence, students who mainly focused on CSAT scores probably selected their college major in reference to the score ranking of the college rather than internal factors, and those who are at the state of high career indecision probably had lower satisfaction with their current major[39]. Therefore, those students have less satisfaction with KM college enrollment.

Limitations and further studies

Although there are enough participants in this study for statistical analysis, there is always the possibility of gathering more participants. The limitations of this study are that the participation rate of students from different schools was not even. This could be overcome to some extent by delivering web survey links in a variety of ways, if further studies were conducted. Focus group interviews were conducted with medical first and second year students rather than premedical second years, and the contents of the questionnaires were modified slightly. Although the positive Pearson's correlation coefficient between questionnaires indicates students' satisfaction with their current enrollment, it may imply students' rationalization of their choices.

Further research could also be conducted on students who participated in this study at the time of admission, constructing a long-term study that examines changes in KM students' perceptions throughout their academic careers. The methodology used in this study can also be adopted in research on other types of medical students.

Conclusion

Previous research on KM colleges provided qualitative assessments of educational contents and methods but did not examine the factors attributed to KM college entrance. Thus, this study attempted to identify factors that contribute to students' satisfaction in KM colleges. The results of this research may guide students who are suitable for KM college entrance towards KM majors. Additionally, some factors may contribute to the increase of students' current satisfaction in their KM college enrollment. The identification of college entrance factors that are closely related to students' motivation to become KM doctors may increase the current academic satisfaction of KM students and decrease drop-out rates. Moreover, some college entrance factors that can be applied to college curriculum or subject teaching, such as interest in research on KM, should be prioritized in the curriculum in the future to increase students' overall satisfaction. Lastly, some responses to the questionnaires indicate that Korean medicine is perceived as an academic discipline. The results show low-scored factors that should be improved through the external promotion of KM.

Abbreviation

KM: Korean medicine; KMD: Korean medicine doctor; KCD-7: Korean Standard Classification of Disease 7th edition; ICD: International Classification of Diseases

Declarations

Ethics approval and consent to participate

This study has been approved by the Public Institutional Bioethics Committee designated by the MOHW (P01-201903-22-003. All participants could only respond to the online survey if they read the information about the contents of survey and gave their informed-consent online before taking part in the survey. The completion of survey was taken as implied consent.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interests.

Funding

There was no funding for this study.

Authors' contribution

HSK and HK planned the study, wrote the protocol, oversaw the study, and contributed to all components. HSK designed the primary questionnaire items, and HMK and UY edited the questionnaire items. HSK and JL conducted contents validity test and analyzed the data. HMK and UY revised the questionnaire item according to the result of the contents validity test. JL conducted face validity test and edited the questionnaire item according to the face validity result. UY collected the of group leaders' contact address and contributed to the message delivery. HSK and JL wrote the manuscript. HK thoroughly revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Additional Files

Additional file 1: Questionnaire used at the Survey. (DOCX 21kb)

Additional file 2: Pearson's Correlation between Questionnaire Items and Their Sub-questionnaire Items. (DOCX 17kb)

Figures

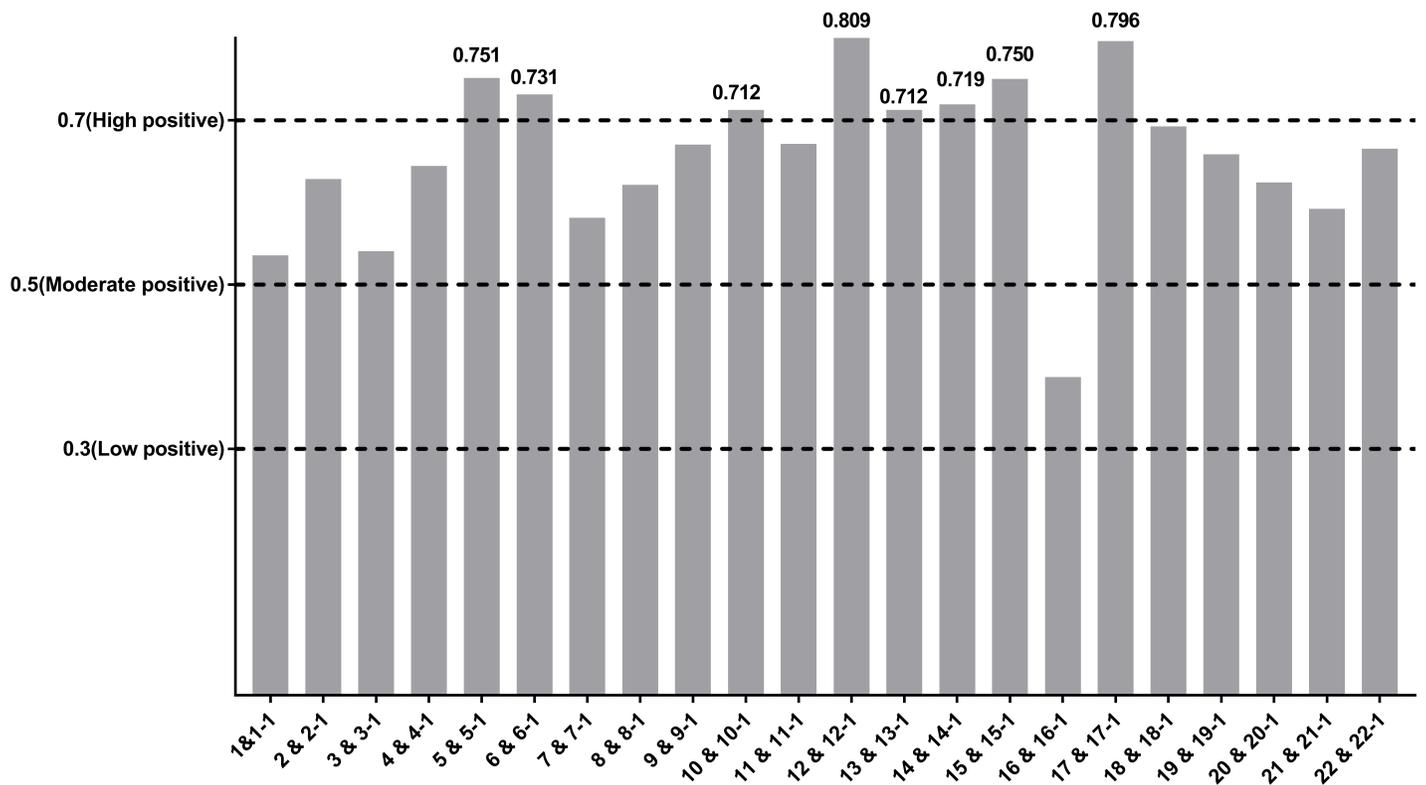


Figure 1

Pearson's correlation coefficient between questionnaire items and sub-questionnaire items. Among 22 items, 5 items had high positive correlation coefficient ($r \geq 0.7$).

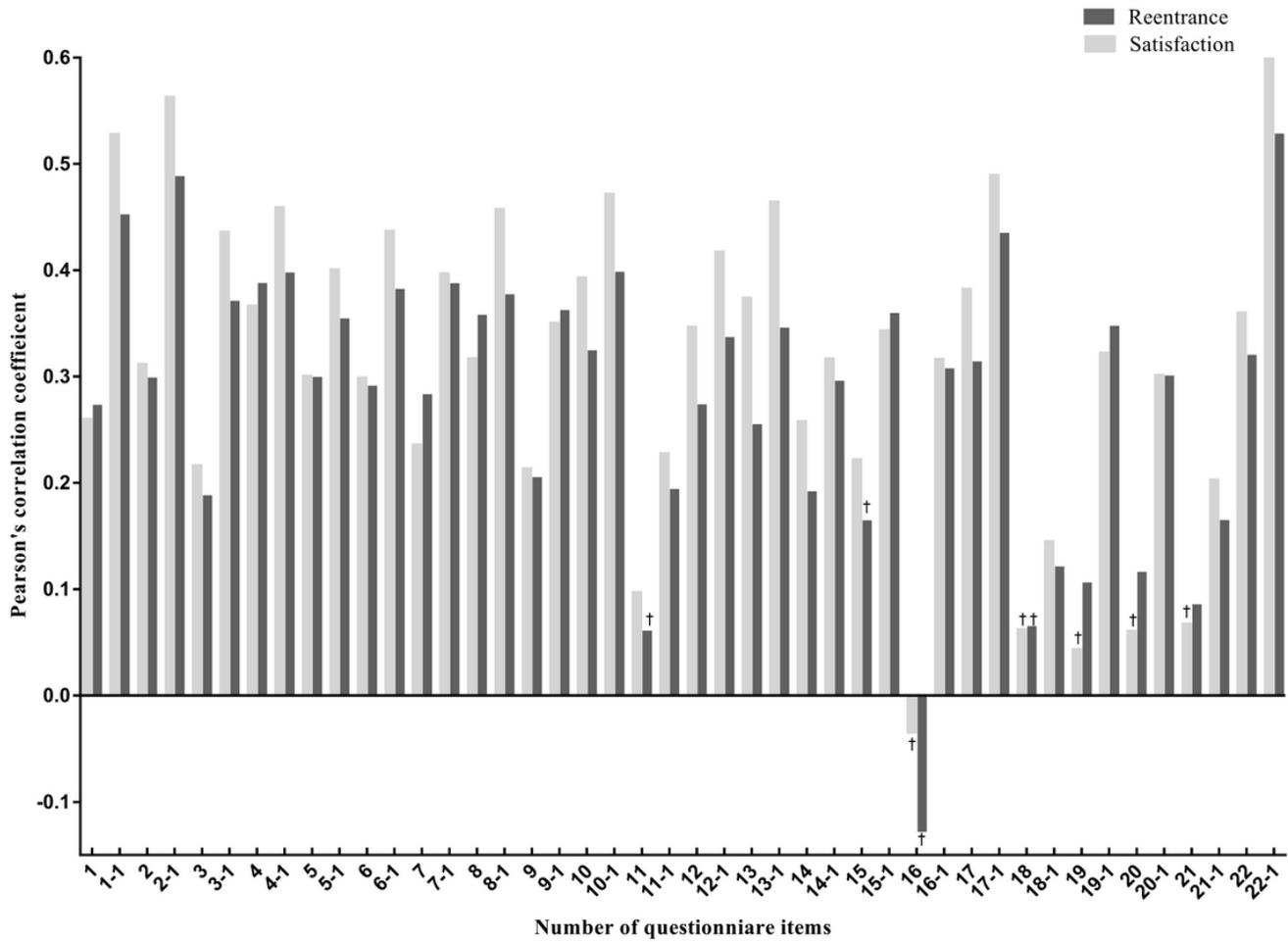


Figure 2

Figure 2. Pearson's correlation coefficient between questionnaire and sub-questionnaire items and items concerning students' satisfaction with their current enrollment (item 23), and questionnaire and sub-questionnaire items and items asking whether participants were willing to re-enter the KM college (item 24). †: correlation statistically insignificant ($p>0.005$)

Supplementary Files

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