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7Cs marketing mix factors in a dental school comprehensive care clinic: A confirmatory factor analysis

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Patient retention at dental school clinics is essential to provide a patient care continuum and dental education. Service marketing mix factors are marketing tools for understanding and planning to meet patients' needs and expectations.

Objectives: To analyze the marketing mix factors related to patients' expectations of dental school comprehensive treatment.

Materials and Methods: Three-hundred patients in a dental school comprehensive-care clinic were enrolled. The data was collected using self-administered questionnaires. Descriptive statistics were used to analyze the demographic and receiving dental treatment data, and the 7Cs marketing mix factors related to patients' expectations of a dental school comprehensive-care clinic. The independent t-test was used to determine significant differences between walk-in and appointed patients. A confirmatory factor analysis (CFA) was performed to validate the 7Cs marketing mix factors.

Results and Discussion: There were 183 walk-in patients and 117 appointed patients. The overall and individual items of the 7Cs marketing mix were crucial expectation factors. C5-Caring was the most crucial factor, followed by C1-Customer value, and C7-Completion. There were no significant differences in these factors between the walk-in and appointed patients. The following indices supported the CFA model of the 7Cs marketing mix factors: Chi-square goodness of fit=595.793 ($p<0.001$), GFI=0.907, CFI=0.931, TLI=0.914, RMSEA=0.092, and SRMR=0.039.

Conclusion: All 7Cs marketing mix factors were associated with the patients' expectations of dental school comprehensive treatment. C5-Caring, C1-Customer value, and C7-Completion were the most critical factors. The 7Cs marketing mix factors model is a valuable tool for assessing patients' perceptions of dental students providing comprehensive treatment.

Keywords: comprehensive care, decision, dental students, dental treatment, marketing mix factor, 7Cs

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Introduction

The comprehensive dental care model, rather than the numerical didactic disciplinary-based approach, is considered the preferable model for delivering care for clinical training and from the patient's perspective [1]. Since the 1990s, this model has been used in dental schools across the world [2-4]. The comprehensive care model, which encompasses all dimensions of a patient's needs, is considered patient-centered care [5]. At the initial screening appointment, a patient is assigned to a dental student who provides treatment as a general dentist; that student becomes the patient's primary dental care provider who provides most of the necessary care [3].

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Patient satisfaction with care is a multidimensional concept that plays a significant role in measuring the degree of satisfaction that includes the patient's education background, lifestyle, previous medical experience, and expectations [6]. Patient satisfaction has been used to measure the quality of care and provider-patient relationships in medicine and dentistry for several years [6-8]. It also measures the professional tasks associated with care delivery and enabling health system evaluation, including comparing different care delivery models.

Marketing management is communicating the value of a product or service to achieve customers' needs. Thus, the presentation of products, services, and marketing communication should be based on the customer's needs, and marketing should always start with the customer in mind. Kotler introduced the 4Ps for creating a marketing strategy in business. The 4Ps: P1-Product, P2-Price, P3-Place, and P4-Promotion are the marketing mix components, which are related to the collection of activities or strategies used to promote products or services [9, 10]. However, numerous other Ps, including packaging, positioning, people, and politics, are becoming increasingly important factors in the contemporary marketing mix. Marketers have introduced the service marketing mix factors consisting of P1-Product, P2-Price, P3-Place, P4-Promotion, P5-People, P6-Physical evidence, and P7-Process. In contrast, the customer perspective of the 4Ps was introduced, comprising customer value, cost, convenience, and communication. In addition, marketing scholars have presented numerous perspectives on people, physical evidence, and process. Caring, comfort, and completion were all introduced and examined in the 7Cs marketing mix [11-14].

A study in the Mahidol University dental clinic found that only 9% of patients preferred the services of dental students, whereas the majority of patients preferred to be treated in the faculty practice [15]. One of the main reasons that the patients did not want to be treated by dental students was that it was time-consuming [16]. However, the patients in the teaching clinics are crucial to the dental education system because they provide clinical practice experiences to the dental students that enable them to achieve the competencies required of a dentist [17]. Therefore, patient retention is a fundamental strategy of dental clinic management in dental schools, including completing the treatment needs of the patients and creating maximum satisfaction. Furthermore, knowing and understanding the needs of the patients in different areas will be beneficial for the marketing management plan to retain the patients [17, 18]. This information can also be used for acquiring new patients to receive services.

Patient expectations of health care must be recognized and quantified to maximize patient satisfaction and deliver patient-centered care [19]. Several studies have demonstrated that patient-centered care enhances overall satisfaction, improves outcomes, optimizes health status, and reduces care usage [20-22]. Similarly, numerous studies have examined patient satisfaction with dental care delivered by dental students [8, 23, 24]. Although the marketing mix factors model is acknowledged as a widespread expectation assessment model in marketing, there has been no investigation of this model regarding dental services. A previous study demonstrated that service expectations were highly influenced by a patient's perception of the dentist, physical indicators, situational circumstances, and patient satisfaction with previous service experiences. In comparison, marketing elements, such as price and advertising, had little effect [25].

The aim of this study was to examine the 7Cs marketing mix factors that influence patients' expectations in a dental school comprehensive treatment. The outcome will help the program and faculty administrators design various components in the dental clinics to meet the patients' needs. Additionally, patients will be retained through complete care that is connected to dental students' clinical experience and graduation due to continuous development.

Materials and Methods

The Ethics Committee of Rangsit University (RSU) approved this survey research (reference number RSUERB2020-12) as an exemption. The questionnaires related to the survey were distributed to 360 patients in a comprehensive dental care clinic at RSU in 2021. Informed consent was obtained from all respondents, and all the respondents were assured about the confidentiality of personal information.

The study population comprised 3,899 patients of dental students at the RSU comprehensive care clinic, with a sample size of 360 patients calculated using Yamane's method. The population in this study was numbered in the order of the students' ID and patients' HN. Next, statistical software was used to randomly select the population numbers. The patients with the chosen numbers were asked to complete the questionnaire. If the patient declined to participate in the study, the random selection was repeated.

The self-administrative questionnaire entailed three parts: 1) demographic data, 2) the data of receiving comprehensive treatment by dental students, and 3) the expectation of the 7Cs marketing mix factors perceived by patients in the comprehensive clinic performed by dental students. Identifying the 7Cs marketing mix factors was obtained using a five point Likert scale (1–5). The questionnaire was created following a literature review and identifying the inquiry items from the conceptual framework. After questionnaire construction, three experts used the item objective congruence index to determine the questionnaire's content validity. A pilot study was conducted on 30 patients to assess the reliability of the questionnaire. The Cronbach's alpha coefficient was 0.84, which indicated high reliability [26].

Data collection was conducted from January to March 2021. After the permission of the Dean of the College of Dental Medicine, Rangsit University was obtained; the researchers introduced the purpose and nature of the study to the participants.

The statistical analyses were conducted using STATA version 16.0 (StataCrop, Texas, USA). Descriptive analysis was performed to summarize the respondents' characteristics, data of receiving comprehensive treatment by dental students, and patients' expectation of the 7Cs marketing mix factors in the comprehensive treatment by dental students. In addition, comparing the expectation of the 7Cs marketing mix factors between walk-in and appointed patients was performed using the independent t-test.

Confirmatory Factor Analysis (CFA) is a subset of structural equation modeling that reproduces observed relationships between observed and latent variables (factors). CFA is used to confirm the factor's number of underlying dimensions and the pattern of item-factor correlations referred to as factor loading. A measurement model is created in the CFA in the form of a path diagram, with the latent variable or factor specified in the oval and the observed variable specified in the rectangle with an arrow pointing from the latent variable to the observed variable, indicating factor loading and covariance between factors and measurement errors (e) [27].

In this study, the CFA with the maximum likelihood method was performed to validate the 7Cs marketing mix factors in a comprehensive care clinic. Unstandardized, standardized estimates, and R^2 were reported. The model was evaluated using model fit statistics by χ^2 goodness of fit (p>0.05); comparative fit index (CFA, >0.95); goodness of fit index (GFI, >0.90); standardized root mean square residual (SRMR, <0.08); and root mean square error of approximation (RMSEA, <0.06) [28-30]. The unstandardized and standardized model displayed the covariance between factors, factor loading, square multiple correlation, and residuals.

Results

Three-hundred respondents participated in this cross-sectional survey with an overall response rate of 83.33%. The respondents comprised 198 females (66.00%), and 102 males (34.00%). Table 1 illustrates the characteristics of the patients receiving comprehensive treatment by dental students. There were 183 walk-in patients and 117 appointed patients. The appointed patients came to the comprehensive care clinic and specific dental students provided treatment to them. These patients were dental students' relatives, friends, or acquaintances.

We found that the marketing mix factors were at a high level both overall and each C (Table 2). The most crucial marketing mix factor was C5-Caring. In each item, the most crucial marketing mix factor was the service mind of the dental student (C5-2), followed by the quality and safety of treatment (C1-2), and the appropriation of an appointment (C7-5). In contrast, the most negligible marketing mix factor was the channel of feedback to the dental clinic (C4-2).

Comparing the walk-in and appointed group, the walk-in group rated C5-Caring as the most critical 7Cs marketing mix factor followed by C2-Convenience, and C7-Completion; whereas the appointed group who were the dental students' relative, friend, or acquaintance expected C1-Customer value, C5-Caring, and C7-Completion. These results indicated that the least important marketing mix factor was C4-Communication in both groups. Furthermore, there was no significant difference in the 7Cs marketing mix factors between the walk-in and appointed groups.

We determined the unstandardized and standardized estimates of the 21 items of the 7Cs marketing mix factors in comprehensive care clinics as expected by the patients (Table 3). The results for the standardized estimates ranged from β = 0.704–0.905 (p < 0.001). The standard errors and $R^2$of each item are displayed.

Figure 1 demonstrates the model with unstandardized estimates, whereas Figure 2 represents the model with standardized estimates. The Chi-square statistic for goodness of fit was significant (χ^2 = 595.793, d.f = 168, p = 0.000). Although the Chi-square statistic was significant, this test can be affected by model fit and frequently rejects models with a large sample or model. Based on the limitations of the Chi-square test, the model fit was determined using the following multiple indices: CFI, IFI, TLI, RMSEA, and SRMR. The results were within acceptable limits, indicating that the model of the 7Cs marketing mix was validated.

The standardized factor loadings in all items were higher than 0.50 and significant at p<0.05, i.e. there was a high degree of correlation between the observed and latent variables [31]. The R^2 values were higher than the cutoffs that all items were related to the 7Cs marketing mix factors in the moderate to large amounts of variation explained (0.496–0.820).

Discussion

The comprehensive treatment model is widely recognized as a patient-centered clinical dental education. Patients' opinions and satisfaction are the key components to maintaining them in the dental clinic until completing their treatment [32]. After patient registration and screening, they are assigned to a dental student for their oral examination, taking intra- and extra-oral photography, taking an impression for preparing the study model, creating the treatment plan, performing the treatments, and evaluating treatment outcomes. These procedures are time-consuming in the number of appointments and the duration of treatment. Thus, patient satisfaction with the care or previous treatments received is vital, which mainly depends on the provided service.

Table 1 Patients receiving dental treatment characteristics

Patients receiving dental treatment	Overall		Walk-in group		Appointed group	
	n	%	n	%	n	%
Previous dental service						
Never	36	12.00	17	9.29	19	16.24
Government hospital	95	31.67	67	36.61	28	23.93
Private clinic or hospital	154	51.33	91	49.73	63	53.85
Other	15	5.00	8	4.37	7	5.98
Source of dental clinic information						
Dental student and family	117	39.09	0	0.00	117	100.00
Word of mouth	161	53.67	161	87.98	0	0.00
Social network and public relation	22	7.33	22	12.02	0	0.00
Frequency of appointment						
More than 1 time a week	81	27.00	51	27.87	30	25.64
Once a week	120	40.00	78	42.62	42	35.90
1 to 2 times in a month	60	20.00	39	21.31	21	17.95
Irregular	39	13.00	15	8.20	24	20.51
Duration to treatment						
Less than 6 months	74	24.67	40	21.86	34	29.06
6 months to 1 year	100	33.33	54	29.51	46	39.32
More than 1 year	126	42.00	89	48.63	37	31.62
Payment method						
Self-paid	210	70.00	145	79.23	65	55.56
National securities	18	6.00	9	4.92	9	7.69
Paid by the dental student	72	24.00	29	15.85	43	36.75

Table 2 The 7Cs marketing mix factors related to receiving treatment by the dental student.

Marketing mix factors		Overall		Walk-in		Appointed		t-test
		mean	SD	mean	SD	mean	SD	Sig.
C1	Customer value	4.25	0.72	4.21	0.74	4.32	0.70	0.238
C1-1	- Quality and safety of treatment	4.20	0.83	4.18	0.86	4.22	0.79	0.670
C1-2	- Quality of material and equipments	4.36	0.75	4.32	0.78	4.43	0.70	0.215
C1-3	- Meeting the treatment needs	4.21	0.82	4.15	0.79	4.30	0.85	0.119
C2	Cost	4.21	0.81	4.18	0.81	4.26	0.83	0.405
C2-1	- Inexpensive of treatment cost	4.24	0.89	4.21	0.86	4.29	0.95	0.465
C2-2	- Worth to the time spending	4.18	0.86	4.15	0.84	4.23	0.88	0.414
C3	Convenience	4.22	0.76	4.23	0.76	4.21	0.76	0.764
C3-1	- Appropriation of operation time.	4.23	0.80	4.20	0.79	4.28	0.82	0.371
C3-2	- Convenient location	4.21	0.85	4.27	0.84	4.13	0.87	0.168
C4	Communication	4.13	0.79	4.14	0.82	4.12	0.76	0.870
C4-1	- Accessibility of information	4.20	0.84	4.18	0.84	4.24	0.84	0.552
C4-2	- Channel of feedback to the dental clinic	4.06	0.87	4.10	0.90	4.01	0.84	0.386
C5	Caring	4.30	0.71	4.29	0.72	4.31	0.71	0.748
C5-1	- Knowledge and ability of the dental student	4.21	0.83	4.22	0.81	4.21	0.88	0.892
C5-2	- Service mind of the dental student	4.39	0.78	4.37	0.79	4.42	0.76	0.568
C5-3	- Communication of the dental student	4.32	0.78	4.31	0.78	4.35	0.77	0.629
C5-4	- Communication of the clinical instructor	4.27	0.84	4.26	0.82	4.28	0.89	0.801
C6	Comfort	4.16	0.75	4.16	0.74	4.16	0.78	0.935
C6-1	- Appropriate and sufficient of the waiting area	4.12	0.83	4.11	0.82	4.12	0.84	0.960
C6-2	- General environment of the dental clinic	4.18	0.84	4.17	0.83	4.19	0.87	0.895
C6-3	- Appropriate and sufficient restrooms	4.19	0.87	4.20	0.80	4.16	0.97	0.701
C7	Completion	4.24	0.74	4.22	0.75	4.27	0.72	0.544
C7-1	- Short waiting time	4.19	0.84	4.14	0.84	4.27	0.85	0.189
C7-2	- Complication or time-consuming treatment	4.12	0.85	4.14	0.84	4.10	0.86	0.735
C7-3	- Availability of cleaning aids	4.24	0.84	4.20	0.84	4.29	0.84	0.374
C7-4	- Participation in treatment plan	4.26	0.85	4.28	0.81	4.24	0.92	0.696
C7-5	- Getting an appointment	4.36	0.80	4.32	0.80	4.44	0.78	0.207
Overall marketing mix factors		4.21	0.76	4.21	0.69	4.25	0.65	0.663

Table 3 Estimation in the CFA model results.

Factor	item	Unstandardized estimate	Standardized estimate	SE.	R^2
C1-Customer value	C1-1	1.000	0.831***	0.021	0.691
	C1-2	0.944	0.864***	0.019	0.747
	C1-3	1.032	0.866***	0.018	0.750
C2-Cost	C2-1	1.000	0.846***	0.021	0.715
	C2-2	0.970	0.854***	0.021	0.730
C3-Convenience	C3-1	1.000	0.876***	0.021	0.768
	C3-2	0.939	0.774***	0.027	0.599
C4-Communication	C4-1	1.000	0.868***	0.021	0.754
	C4-2	1.006	0.836***	0.023	0.698
C5-Caring	C5-1	1.000	0.857***	0.018	0.734
	C5-2	0.944	0.867***	0.017	0.752
	C5-3	0.967	0.893***	0.015	0.797
	C5-4	0.905	0.767***	0.026	0.588
C6-Comfort	C6-1	1.000	0.704***	0.031	0.496
	C6-2	1.308	0.905***	0.014	0.820
	C6-3	1.340	0.896***	0.015	0.802
C7-Completion	C7-1	1.000	0.860***	0.016	0.740
	C7-2	0.980	0.840***	0.018	0.706
	C7-3	0.925	0.801***	0.022	0.641
	C7-4	1.022	0.872***	0.015	0.761
	C7-5	0.966	0.881***	0.014	0.776

***$p<0.001$

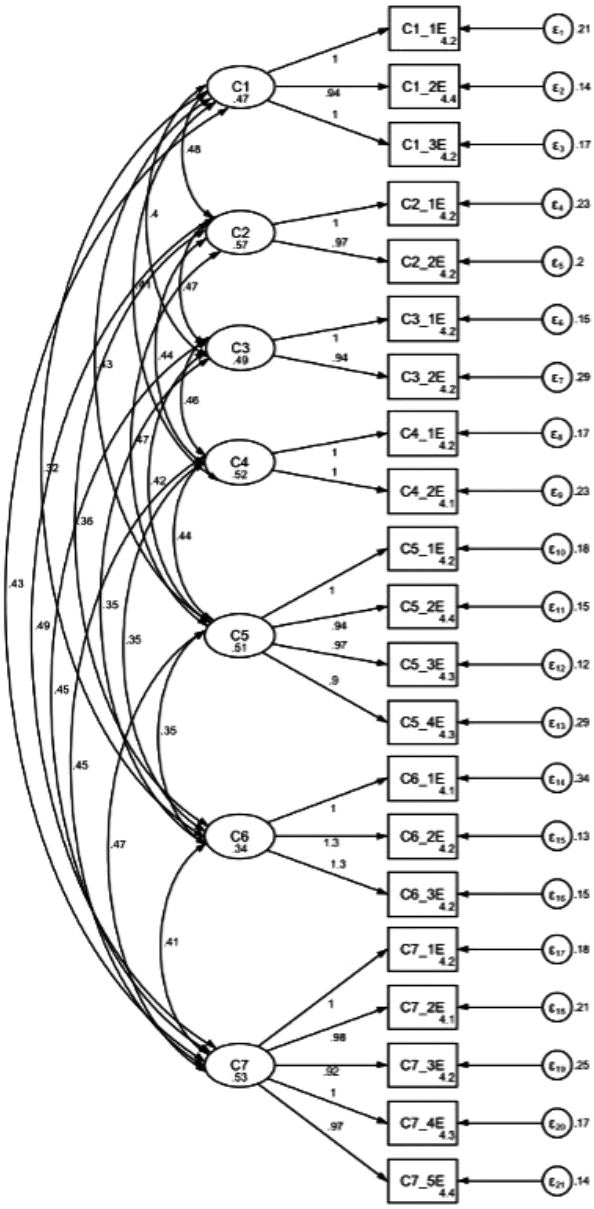

Figure 1 CFA Model for 7Cs marketing mix factors with unstandardized estimates

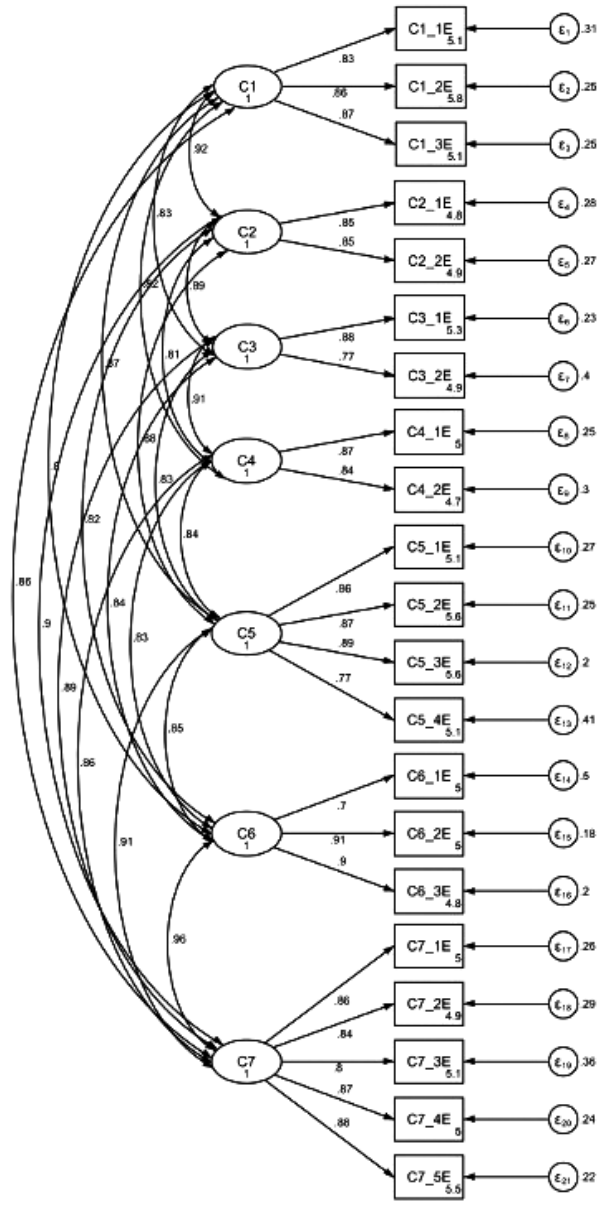

Figure 2 CFA Model for 7Cs marketing mix factors with standardized estimates Chi-square goodness of fit ($\chi 2$ = 595.793, d.f = 168, p = 0.000); GFI = 0.907; CFI = 0.931; TLI = 0.914; RMSEA = 0.092; SRMR = 0.039.

The comprehensive treatment model is beneficial for the dental students in developing the required competencies and simulates working as a general practice dentist in a private clinic. Moreover, this model has been found to provide the treatment that satisfies the patients' needs. However, treatment by a dental student is time-consuming; the number of appointments and duration of treatment both cause patients to stop coming for treatment. Patient retention at a dental school clinic is critical to providing a patient care continuum and dental education. Losing patients during treatment decreases the student's opportunities to learn the progress of the treatment and can result in dental students' not meeting their graduation requirements [18].

From a business perspective, marketing management is an important organizational function that aims to create, communicate, and deliver product and service value to customers. It can be used in the strategic management of dental care, including patient education [33, 34]. We focused on the 7Cs marketing mix factors to evaluate the expectations of the patients treated by the dental students in the dental school comprehensive care clinic, which consists of customer value, cost, convenience, communication, caring, comfort, and completion. Although the concepts of caring, comfort, and completion came from the various perspectives of marketing scholars, they were developed from people, physical evidence, and process from a customer perspective.

Our results indicated that all the marketing mix factors were essential expectations of the patients at a high level incredibly caring, customer value, and completion that transformed from people, product, and process in the 7Ps, respectively. In addition, a previous study found that customer value and caring were the most crucial marketing mix related to the selection of private hospital services [35]. However, there has been no study of marketing mix factors from the perspective of dental service recipients in Thailand. Studies on deciding factors for choosing dental health services in Thailand found that trust, service, and personnel were influential factors [15, 36]. In another study, the marketing mix factors were investigated from the perspective of health service providers in private hospitals [35]. Studies in a Chinese Medicine Clinic and beauty clinics found that the health service provider was the factor in the service recipient's first impression [37, 38]. Factors influencing the decision of foreign service recipients are marketing promotion, personal need responses, and service quality and price [39].

Our results indicated that caring is the patients' perspective of the quality of the health care providers, which were dental students and clinical instructors. Our results indicated that caring was the most crucial marketing mix factor. A previous study revealed that the highest expectation of a patient in dental services was the personal attention in listening to the patient's complaint, which was one of the items in empathy [40]. This finding implies that the personnel in the clinics are involved in maintaining and creating loyalty in the patient [8].

In our study, all of the marketing mix factor scores were at a high level, indicating that the customer expected to receive high-quality dental care services. These results also reveal that every factor in the marketing mixes is essential. All service providers should be equally concerned about all the elements to provide the best service to the customers. For the dental service, most of the patients reported their expectation of caring, which is the dental service provider's behavior towards their patients. Furthermore, it was related to the concept of humanized care, which is communication and interaction aimed at self-transformation among individuals. Dentists should show empathy toward their patients, their families, and the situation being experienced. Empathy is a complex matter that may influence the success or failure of the treatment [41, 42].

Lafont *et al*. found that the most frequently reported reason for being a patient in dental school was cost [43]. In contrast, our study found the cost was not the most crucial factor in deciding to be a patient in a comprehensive care clinic. The Thai Government has provided universal health coverage services since 2002 [44], including dental health, that increases accessibility and reduces inequitable dental care delivery in all age groups [45, 46]. Therefore, the population is entitled to access oral health services, including health promotion, disease prevention, treatment, and rehabilitation. However, the distribution of utilization at various facilities across the different socioeconomic status groups is unequal [47]. Thus, providing accessible service to the population is one of the roles of dental public health administrators.

Patients in the dental school clinic are a significant component of clinical dental education. Therefore, understanding patient expectations and needs are essential and must be satisfied to generate positive word of mouth [48]. However, treatment provided by dental students takes a long time and requires many visits until the treatment is completed compared with a private clinic. This study found that the critical factor related to the decision of the patient to receive treatment was the caring obtained from the dental students and clinical instructors, which was the patient's view of people in health care service, especially the willingness to serve. Therefore, having a service mind, and interpersonal and communication skills are necessary for students before practicing in the clinic.

All 7Cs marketing mix factors contributed to 87.27% of the overall variance shift. The model was tested and validated via CFA using several indices for Goodness fit: GFI, AGFI, CFI, RMSEA, and SRMR as recommended [28]. It is essential to use multiple model fit indices, and if this indicates a good fit, there is a possible good fit [49]. Our results imply that the empirical data was consistent with the established model. Therefore, the correlation of the observed variables, which indicates latent variables, confirm the 7Cs marketing mix factors model as a valuable tool to assess patient's perception of the decision to receive comprehensive dental treatment by the dental students. Improving the 7Cs marketing mix factors might promote patient satisfaction in receiving comprehensive dental care by dental students.

This study examined the opinions of patients receiving dental services by dental students about the marketing mix that the patients expected from their services. However, the needs of consumers will change based on the social context. Surveying dental service recipients' expectations and satisfaction should be performed on an ongoing basis. At the same time, the survey results should be used to plan for service management to meet the highest customer needs, which will result in positive word of mouth and loyalty. Moreover, the present study only evaluated the expectations of dental service recipients. Therefore, the perception or satisfaction of patients with dental services by dental students should be investigated to achieve the needs of the patients and retain them as patients.

Conclusion

In conclusion, all of the marketing mix factors were related to the decision of the patient to receive comprehensive treatment by a dental student. The most critical factors were caring, customer value, and completion. There was no significant difference in each marketing mix factor, and improving the various services related to patient needs might increase maintaining the patient in the dental clinic. The 7Cs marketing mix factors model is a valuable tool to assess patients' perception of receiving comprehensive dental treatment by dental students.

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