Do Social Media Convey Right Quality Information in Medical Aesthetic Industry?

-- Evidence from SoYoung

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Abstract

In recent years, the Chinese medical aesthetic market has developed rapidly, becoming the world's second-largest cosmetics market. Social media has emerged as one of the most important channels to disseminate quality information to consumers in this emerging industry. However, critics doubt the credibility of the online platform as a reliable information channel and its influence on consumer choices of beauty services. Do social media convey the "right" quality information to the public? Are the prices of online appointments an illusion? We seek to answer these questions by studying the SoYoung platform, the leading online platform for medical aesthetic services. We apply the method of NLP technics to extract keywords from doctors' short biographies and use linear regression to measure the effect of prices on discount rates. We observe that the ratings and number of ratings presented on the Soyoung business page are inconsistent with those on the doctor page, with a pretty weak correlation. Moreover, a price increase has a negligible impact on the discount rate, implying that the platform almost uses a unified discount pricing strategy.

Keywords

Online consumer reviews; Medical aesthetics; Pricing strategy; Healthcare.

1. Introduction

In recent years, China's medical aesthetic industry has grown rapidly, becoming the world's second-largest cosmetics market. According to Chinese Aesthetic Treatment Industry White Paper 2020, jointly released by Aesthetic Medical International Holdings (AIH) and Forbes China, points out that the market size of the Chinese aesthetic treatment industry has reached more than USD 30 billion by 2020, though the overall market penetration is still far behind that of developed countries. (See https://www.prnewswire.com/news-releases/chinese-aesthetic-treatment-industry-white-paper-2020-jointly-released-by-aih-and-forbes-china-301224499.html) As the iResearch reported, the overall market value of the medical aesthetic industry would reach about 177 million by 2023. (See http://report.iresearch.cn/report/201910/3459.shtml) The significant success of the medical aesthetic industry contributes to the fast-growing demand side. More and more people accept medical beauty. According to the data of the SoYoung platform in 2020, consumers ages 20-25 have played as the main force of the medical aesthetic consumption, and consumers ages 18-19 increase by 3.5% year on year, implying that the medical aesthetic may have penetrated the

post-00s' generation. The steady growth in income further incentives the population to spend on medical aesthetic products.

Social media has emerged as one of the most popular information channels to disseminate quality information to consumers in medical aesthetic services. Among them, SoYoung, founded in 2013, is one of the most well-known online platforms in China. In Q4 2020, the average monthly active users of the SoYoung mobile APP have reached 8.9 million, and about 4,700 certified medical beauty facilities have offered appointments and consulting services on SoYoung. The quarter income has reached about 6.5 million dollars, an 18.6% increase year to year. (See https://finance.sina.com.cn/stock/usstock/c/2021-03-22/doc-ikkntiam6284016.shtml) On the SoYoung platform, consumers can review and rate a doctor on a scale of one (lowest) to five (highest) and uploads photos to share their experiences after surgery by day. From the doctors' side, SoYoung cooperates with doctors and helps them to manage their online appointments. Moreover, a doctor can build up her reputation on the platform by launching his/her community. The doctor can then share her perspectives on her specialty area, ask the medical beauty questions, and even communicate with those potential consumers.

Despite its popularity, critics question the credibility of SoYoung as a reliable information channel and its influence on consumer choice. First, the platform charges private hospitals or intuitions for advertising, which accounts for 70% of its total revenue. (See https://xueqiu.com/8582238639/145136479) As a result, false and misleading advertising is found on the platform. Second, the whole medical aesthetic industry is still under rapid growth and causes a lack of comprehensive regulation. The platform thus cannot judge the true quality of facilities, though all facilities listed on the platform are so-called "certified". Third, many doctors offer online appointments and require the consumers to pay the expense when booking the appointments. Interestingly, almost all doctors apply the discounted pricing strategies. It remains unclear to the public whether the original prices are simply an illusion.

The goal of our research is two-fold. First, we would like to understand, in the context of the medical aesthetic industry, whether SoYoung, as a proxy of social media, conveys accurate quality information to the public. Second, we would like to explore the doctors' pricing strategies of services on the platform. The exploration would enable us to identify whether the price is "truly" discounted.

2. Data Sources and Sample Construction

Table 1. The definition and summary statistics

Variable	Definition	Obs.	Mean	SD
Discount Rate	One minus ratio of price and discount price	173,098	0.529	0.221
Price	Pirce (Yuan in thousands)	173,098	11.386	15.569
Discount Price	Discount Price (Yuan in thousands)	173,098	5.588	8.399
Service_Eye	Eye Surgery	173,098	0.090	0.287
Service_Nose	Rhinoplasty	173,098	0.069	0.254
Service_Ear	Otoplasty	173,098	0.002	0.040
Service_Lip	Lipoplasty	173,098	0.016	0.126
Service_Tooth	Dentistry	173,098	0.065	0.247
Service_Face	Facial contouring	173,098	0.164	0.370
Service_Breast	Breast surgery	173,098	0.031	0.173
Service_Intimate	Intimate surgery	173,098	0.039	0.193
Service_Skin	Skincare	173,098	0.253	0.434
Service_Body	Body Contouring	173,098	0.086	0.281
Service_Semipermanent	Semi-permanent makeup	173,098	0.008	0.091
Service_Acid	Hyaluronic acid	173,098	0.107	0.309
Service_Wrinkle	Wrinkle	173,098	0.003	0.058
Service_Fat	Fat fillers	173,098	0.050	0.217
Service_HairTransplant	Hair transplantation	173,098	0.031	0.174
Service_HairRemoval	Hair Removal	173,098	0.039	0.193

Statistic	N	Mean	St. Dev.		Min	Pctl(25)	Pctl(75)
discount_rate	173,098	0.529	0.221	-17.819	0.4	0.671	0.96
item_price_discount	173,098	5.588	8.399	0.001	0.88	6.8	49.8
item_price	173,098	11.386	15.569	0.01	1.98	12.9	89.4
item_eyesurgery	173,098	0.090	0.287	0	0	0	1
item_rhinoplasty	173,098	0.069	0.254	0	0	0	1
item_otoplasty	173,098	0.002	0.040	0	0	0	1
item_lipoplasty	173,098	0.016	0.126	0	0	0	1
item_dentistry	173,098	0.065	0.247	0	0	0	1
item_facialcontouring	173,098	0.164	0.370	0	0	0	1
item_breastsurgery	173,098	0.031	0.173	0	0	0	1
item_intimatesurgery	173,098	0.039	0.193	0	0	0	1
item_skincare	173,098	0.253	0.434	0	0	1	1
item_bodycontouring	173,098	0.086	0.281	0	0	0	1
item_semipermanent	173,098	0.008	0.091	0	0	0	1
item_hyaluronicacid	173,098	0.107	0.309	0	0	0	1
item_wrinkle	173,098	0.003	0.058	0	0	0	1
item_fatfiller	173,098	0.050	0.217	0	0	0	1
item_hairtransplant	173,098	0.031	0.174	0	0	0	1
item_hairremoval	173,098	0.039	0.193	0	0	0	1

We collect data from SoYoung, a well-known online platform providing medical aesthetic information to consumers. We search the keyword "mainland China" and collect doctors' information including name, rating, affiliation, consumer ratings, appointments, etc. We collect 11,019 doctors listed on SoYoung. We restrict our final sample to 7,131 doctors (65%), who have provided appointments on SoYoung by 2021. Table 1 provides the definition and summary statistics of key variables used in our main sample.

3. Analysis

In this section, we present our main analysis of SoYoung. In Section 3.1, we focus on doctors' basic characteristics. In Section 3.2, we utilize NLP techniques to extract valuable information from doctors' self-introductions. In Section 3.3, we analyze doctors' appointment strategies, particularly the pricing strategies, on SoYoung.

3.1. Doctors' Characteristics and Ratings

In this section, we provide some basic characteristics including doctors' expertise, ratings, and the number of reviews. Our dataset consists of 7,131 doctors, affiliated with 2,649 different hospitals. 5,884 (80%) out of them choose to display their title on the business pages and personal pages. In China, each doctor is assigned a technical title based on their technical skills and working experience. The rank is nationally unified into four levels, from Resident Physician (most junior), Attending Physician, Associate Physician to Chief Physician (most senior). Table 1(a) shows the distribution of doctors' titles. About 1,200 doctors are assigned the title of associate physician or higher. On SoYoung, each doctor can also choose up to three expertise among 32 specialty areas. Table 1(b) display the distribution of doctors' expertise based on their top expertise. We restrict our attention to the top 15 most selected specialty areas on SoYoung, i.e., eye surgery, skincare, facial contouring, orthodontics, rhinoplasty, cosmetic dentistry, dental treatment, intimate surgery, hair transplantation & care, anti-aging, body contouring, breast surgery, dental implants, ophthalmology, and obstetrics & gynecology. We find that 30% of doctors focus on eye surgery and 15% of doctors are experts on dental-related surgery.

The existing online word-of-mouth literature has shown that consumer ratings can significantly influence consumer demand on credence goods, e.g., healthcare services. Moreover, a sufficient

number of ratings can improve the credibility of consumer ratings. However, both ratings and the number of ratings displayed on the business page are not consistent with those on the doctors' pages. Figure 2(a) presents the distribution of doctors' individual ratings on both pages. 40% of doctors are given a medium rating (3-star) on the business page, but almost all doctors are labeled as excellent doctors (5-star) on their homepages. Analyzing the relationship between both ratings reveals that the correlation between them is extremely weak — The correlation coefficient is 0.36 (p-value < 0.001). A similar pattern can be found in the number of doctors' ratings, as shown in Table 2(b). And the correlation coefficient of two numbers is 0.33 (p-value < 0.001). These observations suggest that the presentation of SoYoung seems unclear to consumers, and we recommend that the SoYoung operators should proactively improve the presentation of the platform, ensuring that accurate quality information is disclosed to the public.

3.2. Doctors' Biographies

On SoYoung, doctors can choose to provide a short biography to exhibit their personality and elaborate their expertise. We apply the NLP techniques to better extract qualitative characteristics (i.e., the frequently mentioned topics) from the text content of doctors' introduction. For each introduction, we use JiebaR, a Chinese word segmentation tool, to tokenize the sentences and delete meaningless stopwords. We then manually classify them into four categories: body, educational background, adjective, and technical words. The body category (e.g., ears, eyes, face) represents the surgery types the doctors are experts at. Technical words, instead, focus on the corresponding surgery technics. The educational background includes professional titles and affiliated facilities.

The words associated with teeth, skincare, and nose are the most frequently mentioned words in biographies. Specifically, words related to teeth appear more than 6000 times, and many doctors mention that they are experts in orthodontics, especially for children. Tooth extraction and whitening are services the doctors would frequently mention in their biographies. Second, words related to skincare are mentioned more than 5000 times. Among them, skin, skin whitening, and anti-aging are mentioned more than 2000 times. Doctors use new technologies such as laser and line carving to achieve their goals. Some doctors offer services related to skin diseases and skin injuries (e.g., scars, acne, and burns), implying that the medical beauty industry has covered some traditional medical projects. Third, rhinoplasty, a surgery that changes the shape of the nose, is mentioned up to 3000 times. We further observe that this surgery has been classified into different styles, such as Korean rhinoplasty and Dallas rhinoplasty.

Doctors also prefer to provide their educational backgrounds and working experience. Among them, more than 1000 doctors mention that they own a master's degree or above.

3.3. Doctors' Online Appointments

On SoYoung, doctors can choose to offer appointments of medical aesthetic services to consumers. The prices vary and depend on doctors' experience, interaction with consumers, medical aesthetic areas, etc. In this section, we study the factors that affect doctors' pricing strategies. The unit of observation in our analysis is an appointment (of a medical service) offered by a doctor. Our model is specified as follows

$$discount_{ij} = \alpha_0 + \alpha_1 price_{ij} + \sum_{s \in S} \alpha_s service\_s_{ij} + \theta_j + \epsilon_{ij}.$$

The dependent variable, $discount_{ij}$, represents the discount rate of doctor j's service i. The explanatory variable, $price_{ij}$, represents the price (Yuan in thousands) of doctor j's service i. There is a set of control variables in the model. Specifically, $service_{s_{ij}}$ is a binary variable that equals 1 if service i is classified to specialty area $s \in S$, where $S = \{eye,\ nose,\ ear,\ lip,\ tooth,\ face,\ breast,\ intimate,\ skin,\ body,\ semipermanent,\ acid,\ wrinkle,\ fat,$

$hairtransplant$, $hairremoval$} and equals 0 otherwise. For example, $service\_eye_{ij}$ represents whether doctor j's service i belongs to the eye surgery. We shall note that some services may belong to multiple specialty areas, while others do not belong to any aforementioned areas due to their scarcity. Thus, we do not omit an area to serve as a benchmark area. In addition, we include doctor j's fixed effect (θ_j) to control for its time-invariant factors including working experience, the number of fans, the number of posts on SoYoung, etc. ϵ_{ij} is the error term. We cluster standard errors by doctors.

We now examine the effect of the price on the discount rate, as shown in Table 2. Column 1 shows the base result. The coefficient of $price$ is 0.001, indicating that a thousand yuan increase in price only leads to a negligible decrease in discount, though significant. This implies that the price does not affect the discount rate. Column 2 shows the result when involving more control results, and the results are consistent with those shown in Column 1. We deduce that the platform uses a "uniform" discount pricing strategy on service pricing.

Table 2. The price on the discount rate

	Discount Rate	Discount Rate
	(1)	(2)
Price (thounsand Yuan)	-0.001***	-0.0004***
	(0.0001)	(0.0001)
Service_Eye		-0.014***
		(0.003)
Service_Nose		-0.041***
		(0.003)
Service_Ear		-0.063***
		(0.012)
Service_Lip		-0.024***
		(0.004)
Service_Tooth		-0.018***
		(0.005)
Service_Face		-0.010***
		(0.002)
Service_Breast		-0.045***
		(0.004)
Service_Intimate		-0.022***
		(0.005)
Service_Skin		0.031***
		(0.002)
Service_Body		-0.007**
		(0.003)
Service_Semipermanent		0.007
		(0.006)
Service_Acid		-0.028***
		(0.003)
Service_Wrinkle		0.025***
		(0.008)
Service_Fat		-0.007*
		(0.004)
Service_HairTransplant		-0.017**
		(0.007)
Service_HairRemoval		0.092***
		(0.005)
Observations	173,098	173,098
R-square	0.203	0.215

Standard errors in parentheses clustered by nursing home
*p<0.1; **p<0.05; ***p<0.01.

	Dependent paste0(reg1, (1)	variable: | doc_id| 0| doc_id) (2)	paste0(reg2,
item_price	-0.001***	-0.0004***	
	(0.0001)	(0.0001)	
item_eyesurgery		-0.014***	
		(0.003)	
item_rhinoplasty		-0.041***	
		(0.003)	
item_otoplasty		-0.063***	
		(0.012)	
item_lipoplasty		-0.024***	
		(0.004)	
item_dentistry		-0.018***	
		(0.005)	
item_facialcontouring		-0.010***	
		(0.002)	
item_breastsurgery		-0.045***	
		(0.004)	
item_intimatesurgery		-0.022***	
		(0.005)	
item_skincare		0.031***	
		(0.002)	
item_bodycontouring		-0.007**	
		(0.003)	
item_semipermanent		0.007	
		(0.006)	
item_hyaluronicacid		-0.028***	
		(0.003)	
item_wrinkle		0.025***	
		(0.008)	
item_fatfiller		-0.007*	
		(0.004)	
item_hairtransplant		-0.017**	
		(0.007)	
item_hairremoval		0.092***	
		(0.005)	
Observations	173,098	173,098	
Adjusted R2	0.203		0.215
Note:	*p<0.1;	**p<0.05;	***p<0.01

4. Conclusion

The goal of this study is to explore whether social media convey valuable information to consumers in the context of the medical beauty industry. To achieve this goal, we study the

consumer ratings and pricing policy on the SoYoung platform, one of the leading online platforms focusing on medical beauty.

One of our key findings is that the presentation of SoYoung seems unclear to consumers, particularly, the ratings and number of ratings presented on the Soyoung business page are inconsistent with those on the doctor page. Moreover, the platform uses a "uniform" discount pricing strategy on service pricing, say, the original price does not have an impact on the discount rate.

Due to the recent reports on medical beauty, the public has generated mistrust of the online platform. Therefore, the platform must take action to restore the public's perception of the information disclosed. We believe that it might be helpful for the platform to collaborate with the government to standardize its rating system.

References

[1] Chatterjee, Patrali, "Online Reviews Do Consumers Use Them?" ACR 2001 Proceedings, eds. M. C. Gilly and J. Myers-Levy, Provo, UT: Association for Consumer Research (2001).

[2] Yan,R.L.,Pei,Z.,.Retail services and firm profit in adual-channel market. Journal of Retailing and Consumer Services 16(4) (2009).

[3] Kristopher Floyd, Ryan Freling, Saad Alhoqail, Hyun Young Cho, Traci Freling, How Online Product Reviews Affect Retail Sales: A Meta-analysis, Journal of Retailing (2014).

[4] Barbara Bickart, Robert M. Schindler, Internet forums as influential sources of consumer information, Journal of Interactive Marketing (2001).

[5] Sylvain Senecal, Jacques Nantel, The influence of online product recommendations on consumers' online choices, Journal of Retailing (2004).

[6] Cheol Park, Thae Min Lee, Information direction, website reputation and eWOM effect: A moderating role of product type, Journal of Business Research (2009).