

# Patient Value Co-creation Behavior Scale Based on the DART Model

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Value co-creation emphasizes customer participation and interaction with the supplier, with the aim of reaching an outcome that benefits both sides.<sup>1,2</sup> McColl-Kennedy et al<sup>3</sup> defined patients' value co-creation as the benefit that patients and medical service providers create through interaction and resources integration; they integrate operational resources (eg, knowledge and skills) and objective resources (eg, equipment, drugs, and financial resources) together to achieve common benefits. With the development of science and technology, patients have greater medical awareness through the internet. The information asymmetry between doctors and patients is shrinking. Patients can discuss and even question disease treatment plans with doctors instead of accepting them passively.<sup>1</sup> Hau et al<sup>4</sup> pointed out that whereas physicians are experts about diseases, patients are experts about their particular conditions and play an important role in improving treatment effects. Relevant studies showed that patients' participation in value co-creation can inspire doctors to actively provide patients with high-quality medical services,<sup>5,6</sup> let patients comply with treatment plans, and increase the benefits of treatment.<sup>7</sup>

Value co-creation is closely related to participants' behavior. Thus, many instruments focus on this aspect. However, little quantitative evidence has been obtained other than that from case studies and qualitative approaches.<sup>8</sup> Many studies adopt a multidimensional approach to capture participants' value co-creation behavior and consider it to consist of various distinctive components,<sup>9-12</sup> whereas other studies use only a few items to measure it.<sup>4,13</sup>

Prahalad and Ramaswamy<sup>1</sup> proposed the DART model (Dialogue, Access, Risk assessment, and Transparency) to apply the concept of value co-creation in the business services field. It is a valuable attempt to indicate the range of companies' capabilities necessary to work with customers effectively, and it remains the most popular framework to guide implementation of customer value co-creation.<sup>8</sup>

The DART model specifies 4 main building blocks: *Dialogue* refers to the process of communication and sharing of knowledge between customers and providers; *Access* refers to customers obtaining experience and information via information tools without having the ownership of products; *Risk assessment* refers to the risks that

## ABSTRACT

**OBJECTIVES:** Value co-creation focuses on customer participation and co-creates value with suppliers. Patients' support and cooperation can improve the quality of medical care. Value creation is closely related to participants' behavior. The DART (Dialogue, Access, Risk assessment, Transparency) model is widely used in commercial research because it defines and classifies value co-creation behavior clearly and systematically. However, there is little research using the DART model in the field of health care. This study aimed to develop and evaluate the psychometric properties of a scale measuring patient value co-creation behavior based on the DART model.

**STUDY DESIGN:** The Delphi technique was used to determine the scale content with a panel of 17 experts. A cross-sectional survey was administered to 356 outpatients and inpatients of a hospital in Guangzhou, China.

**METHODS:** Internal consistency reliability and composite reliability (CR) were used to estimate the scale's reliability. Validity was assessed using convergent and discriminant validity.

**RESULTS:** Three rounds of expert consultation were completed before a final consensus was reached regarding scale content. The patient value co-creation behavior scale was composed of 23 items and 4 dimensions. The overall Cronbach's  $\alpha$  was 0.934, and the CRs of the 4 DART dimensions were 0.843, 0.872, 0.911, and 0.884, respectively, showing satisfactory reliability. The average variance extracted ranged from 0.473 to 0.659, and the  $\chi^2$  difference between constrained and free models was significant, indicating convergent and discriminant validity.

**CONCLUSIONS:** The scale exhibited acceptable reliability and validity and could serve as an evaluation tool for patient value co-creation behavior.

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enterprises and customers are likely to face during value co-creation; and *Transparency* means that consumers can get a substantial amount of information through technology tools; thus, prices, costs, and profits shall not be kept opaque by the enterprises that make profit. Because the DART model defines value co-creation behavior concisely, many scholars have compiled relevant scales to measure value co-creation activities based on it.<sup>8,14-16</sup> However, most of them have been verified in the commercial field.

In general, systematic measurement scales for value co-creation have not been developed yet in the field of health care. Although the DART model has been used in the commercial field, it has not been introduced into the field of health care extensively. During the treatment process, while doctors are bound to provide medical services, the active participation of patients in the disease treatment process can greatly improve the effectiveness of the treatment (eg, high self-motivation to search for medical information before treatment, active interaction with doctors on treatment options). Therefore, we introduce the DART model in our study, develop a patient value co-creation behavior scale (PVCBS) based on the DART model, and evaluate its psychometric properties in order to propose its use as a research and scientific evaluation tool about patient value co-creation behavior.

## METHODS

### Scale Development

The preliminary concept of patient value co-creation behavior was defined by referencing related literature<sup>1-3</sup> and discussion within the research group. Based on the preliminary connotation and considering the characteristics of the medical field, a review of the relevant instruments<sup>5,9,15,17,18</sup> was performed to identify suitable items that could be included in the scale. After revising the items, a pool of 43 items was developed based on the DART model.

We used the Delphi technique to develop the concept of patient value co-creation behavior and the scale content. The Delphi technique is a process by which consensus for a specific purpose is arrived at through facilitation by an expert panel.<sup>19</sup>

We sent emails to approximately 140 experts who had conducted related research, published related papers, or had related working experience, in which we asked their willingness to be a consultant. If the expert agreed to participate, the questionnaire was sent by email with the instructions to evaluate the preliminary concept of patient value co-creation behavior based on the DART model and assess the items' suitability for the scale. The experts had to rank their agreement or disagreement with each item using a 5-point Likert scale (*less important to very important*). If experts disagreed with the item, they indicated whether it should be modified or deleted. Experts could also suggest any modifications and make comments.

### TAKEAWAY POINTS

This study aimed to develop and evaluate the psychometric properties of a scale measuring patient value co-creation behavior based on the DART (Dialogue, Access, Risk assessment, Transparency) model.

- ▶ The findings indicate that the DART model and value co-creation theory are applicable to the medical field.
- ▶ The patient value co-creation behavior scale based on the DART model was satisfactory, providing a reliable tool to evaluate patient value co-creation behavior more accurately and systematically.
- ▶ Hospitals or doctors can enact relevant strategies to improve patient value co-creation behavior according to D, A, R, and T dimensions, so that patients can gain related information and improve their ability to participate in treatment discussions with their doctors.

Their responses were returned via email, and the data were collated, coded, and analyzed using SPSS software version 20.0 (SPSS Inc).

The expert panel consisted of 17 experts, drawn from universities, research institutes, and hospitals in China and abroad, based on their professional reputation and research domains. It included 5 scholars specializing in health management; 8 in marketing, business, and service management; 3 physicians; and 1 CEO of a research institute. The experts' mean age was 49.93 years, mean work experience was 23.08 years, and all had a master's degree or higher educational qualification.

The final concept of patient value co-creation behavior was constructed when agreement from more than 80% of the experts was obtained. Items were retained if more than 80% of the panel indicated agreement, or provisionally retained for the next testing rounds if the panel did not achieve consensus but less than 20% of panel members disagreed (ie,  $\geq 80\%$  of panel members agreed, strongly agreed, or were unsure).<sup>20,21</sup> Items were further modified or deleted as deemed appropriate based on the comments provided by the expert panel and discussion among the research group. Three Delphi rounds were required to reach a final consensus on the concept of patient value co-creation behavior and the items to be included in the scale.

In terms of the final concept of patient value co-creation behavior, *Dialogue* refers to patients communicating and sharing knowledge with their doctors. *Access* means patients obtaining medical services and information about disease treatment through relevant channels or tools. *Risk assessment* means that patients evaluate and manage the potential dangers during treatment; it includes risk disclosure, risk selection, and risk management. *Transparency* refers to patients disclosing information on their conditions, and it emphasizes information authenticity and disclosure.

In terms of selection of the items, as the first-round consultation was aimed at developing a preliminary understanding of experts' advice, most of the items were retained. We revised the items according to experts' suggestions and discussions within the research group. Following the second round of consultation, 51 items (8 new items) were shortlisted. Twenty-eight items were deleted because they received less than 80% agreement or most of the experts thought them inappropriate, and 6 items were

## METHODS

**TABLE 1.** Participants' Characteristics (N=356)

	Frequencies (n)	Percentage (%)
Type		
Outpatient	185	52.0
Inpatient	171	48.0
Gender		
Male	184	51.7
Female	172	48.3
Age group in years		
18-40	228	64.0
> 40	128	36.0
Marital status		
Single	129	36.2
Married	227	63.8
Educational level		
Junior high school and below	101	28.4
More than junior high school	255	71.6

modified. Eleven of the deleted items were in the D (Dialogue) domain, 6 were in A (Access), 8 were in R (Risk assessment), and 3 were in T (Transparency). The expert panel found that they had little relevance to their respective dimension, and most of them were common behaviors that most patients could do.

The modified instrument was submitted to a third Delphi round to reach a final consensus. The modifications were generally minor and aimed to clarify items. For example, "I choose appropriate treatment plans provided by the doctor" was revised to "I choose treatment plans suggested by the doctor," and "The condition that I share with my doctor is true" was revised to "I truthfully disclose my condition to the doctor." The final instrument on the PVCBS based on the DART model contained 23 items ([eAppendix A](#) and [eAppendix B](#) [available at [ajmc.com](http://ajmc.com)]).

### Scale Testing

**Participants.** A cross-sectional study was conducted in October 2019 in a tertiary hospital in Guangzhou, China. The inclusion criteria were (1) outpatients and inpatients, (2) 18 years or older, and (3) able to express their opinions. These patients were invited to participate in questionnaire investigation. Patients with dementia, psychosis, or cognitive or communicative impairments were excluded.

**Investigation tool.** A questionnaire was developed using the preliminary draft of the scale. It consisted of 2 parts: general information and self-evaluation of value co-creation behavior. A 5-point Likert scale was used to indicate agreement from 5, *strongly agree*, to 1, *strongly disagree*. Demographic information about respondents was collected, such as gender, age, marital status, and educational level.

**Data collection.** Because the PVCBS based on the DART model contained 23 items, we planned to collect 460 questionnaires (the product of 20 times 23). The outpatient and inpatient departments were surveyed according to the following classification by

department: internal medicine, surgical, and others. At least 230 questionnaires were collected for inpatients and outpatients each, and about 70 questionnaires were collected across each of the 3 classified departments. Additionally, about 20 questionnaires were collected from 3 subdepartments under the 4 classified departments for inpatients and outpatients, respectively.

Prior to completing the survey, all respondents provided written informed consent, and each respondent was free to discontinue participation at any time. The questionnaires were distributed and collected in person by trained investigators. The respondents completed the questionnaires individually, and the interviewers provided explanations for any unclear items. The answers were double-checked before submission. Respondents were asked to correct or complete any missing answers. Ethical approval had been obtained from the ethics committee of the authors' institution.

**Data management.** We distributed 393 questionnaires, and 378 were collected back. Data from 22 participants were excluded for 2 reasons: (1) missing responses to more than 5 items of the scale (valid questionnaire:  $\geq 80\%$  items were completed; invalid questionnaire:  $\geq 20\%$  items had missing responses) or (2) the respondent had not responded to the questionnaire seriously (eg, scores outside the normal variation or a majority of *strongly agree* or *strongly disagree* responses).<sup>21</sup>

Thus, data from 356 valid questionnaires (response rate, 90.59%) were analyzed in this study.

**Statistical analysis.** The reliability and validity of the PVCBS based on the DART model were evaluated. To test the internal consistency reliability, we calculated Cronbach's  $\alpha$  values for all constructs. A Cronbach's  $\alpha$  coefficient greater than 0.70 was considered satisfactory.<sup>22,23</sup> Composite reliability (CR) and convergent and discriminant validity were tested through confirmatory factor analysis (CFA) using Amos 21.0 (IBM). The CFA model was evaluated by goodness-of-fit index (GFI) and adjusted GFI (AGFI) greater than 0.9 and root mean square error of approximation (RMSEA) values less than 0.08.<sup>8</sup> CR is used to evaluate the consistency of latent construct indicators, namely showing the degree about measurement indicators sharing the latent variables; a CR greater than 0.70 was considered satisfactory.<sup>22</sup>

The average variance extracted (AVE) means the variation degree to which latent variables can explain the measurement indicators. It was used to determine convergent validity. When AVE reaches 0.50 or higher, the indicator variable can effectively reflect its latent variable.<sup>4,24</sup> To check for discriminant validity, we conducted  $\chi^2$  difference tests for each pair of constructs in a series of 2-factor confirmatory models. For all pairs, this research compared the constrained model, which constrained the phi coefficient to equal 1, with a free model without this constraint. In all cases, the  $\chi^2$  difference was significant, indicating discriminant validity.<sup>22</sup>

All valid questionnaires were entered in duplicate into the database by 2 independent postgraduate students using the EpiData software version 3.1 (EpiData Association). Any discrepancy between the 2 operators was resolved by cross-checking the duplicate data manually and using the computer. In this study, 80% of

the scale's response rate can be considered acceptable. Missing values were replaced by mean item scores. The raw score for patient value co-creation behavior was derived by summing the item scores and converting it to a value from 0 to 100.<sup>25</sup> It was then recalculated across the dimension as follows:

Transformed score = ([Actual raw score – Lowest possible raw score] / Possible raw score range) × 100

## RESULTS

### Participant Characteristics

Among the participants in this study, 185 (52.0%) were outpatients, and 171 (48.0%) were inpatients; 184 (51.7%) were men, and 172 (48.3%) were women. The ages of the participants ranged from 18 to 80 years (mean [SD], 37.79 [14.99] years). The overall education level of the participants was relatively high: 71.6% had received junior high school education or above (Table 1).

### Reliability and Validity of the Scale

The Cronbach's  $\alpha$  of the 4 latent variables ranged from 0.771 to 0.886 (the total investigation was 0.934), and all exceeded 0.70, indicating satisfactory internal consistency reliability.

We set the CFA model based on the theoretical structure of the scale. The  $\chi^2$  was 640.495; *df*, 224; GFI, 0.843; AGFI, 0.807; and RMSEA, 0.072 with a 90% CI of 0.066 to 0.079. Most indexes met or were near the criteria; thus, the model was acceptable. The fit indices suggested an adequate fit of the model to the data (Figure).

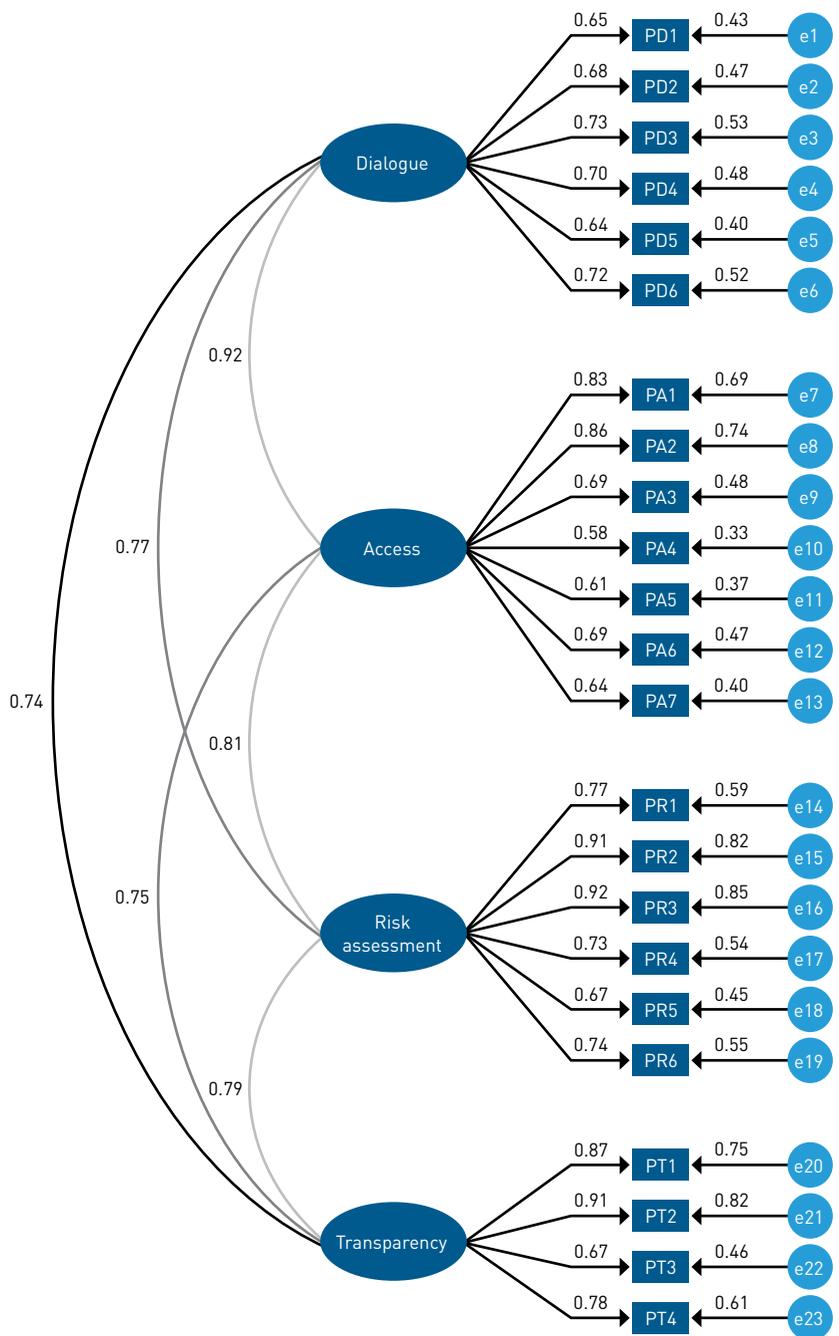
CRs ranged from 0.843 to 0.911, exceeding 0.70. The AVEs of the 5 latent variables ranged from 0.473 to 0.659, with most being near or above 0.50.

For assessing discriminant validity, a  $\chi^2$  difference test was performed on the constrained model, which constrained the phi coefficient to equal 1, with a free model without this constraint. In all cases, the  $\chi^2$  difference was significant, indicating satisfactory discriminant validity (Table 2 and Table 3).

### Scores of Patient Value Co-creation Behavior

Table 4 shows the values of patient value co-creation behavior scores. The mean value

**FIGURE. CFA Model of Patient Value Co-creation Behavior Scale Based on the DART Model\***



CFA, confirmatory factor analysis; e, error; PA, item of measuring patient access dimension; PD, item of measuring patient dialogue dimension; PR, item of measuring patient risk-assessment dimension; PT, item of measuring patient transparency dimension.

\*Latent variables: Dialogue, Access, Risk assessment, Transparency; observed variables: patient self-evaluation data (5-point Likert scale from 5, strongly agree, to 1, strongly disagree) of items PD1 to PD6, PA1 to PA7, PR1 to PR6, and PT1 to PT4.

Values between 4 latent variables are correlations; values between 4 latent variables and their observed variables are standardized regression weights; the other values (such as 0.43, 0.47, 0.53) are squared multiple correlations (it was used to reflect the error degree of observed variables; when it is small, the error is large) of 23 observed variables.

## METHODS

**TABLE 2.** Cronbach's  $\alpha$ , CRs, and AVEs of the Scale

Description of the items	Standard loading	Cronbach's $\alpha$	CR	AVE
D (Dialogue)		0.788	0.843	0.473
D1. Fully cooperate during inquiry and answer any questions	0.654			
D2. Discuss treatment plans proactively	0.683			
D3. Discuss with doctor when suggested treatment plans do not match what I learned from internet, relatives, or friends	0.729			
D4. Spend time and energy to share ideas on improving medical services with the doctor	0.696			
D5. Tell the doctor about problems faced during treatment	0.635			
D6. Discuss with doctor if I think another treatment plan is better	0.723			
A (Access)		0.837	0.872	0.498
A1. Search disease information through internet, friends, etc, before seeing a doctor	0.833			
A2. Learn about various medical institutions and doctors through internet, friends, etc, before choosing a doctor	0.860			
A3. Seek disease information from doctor proactively	0.690			
A4. Ask for doctor's contact information proactively	0.577			
A5. Seek treatment information from patients with same disease	0.606			
A6. Inquire, learn about, and use the tools available for medical convenience	0.688			
A7. Choose treatment plans suggested by the doctor	0.636			
R (Risk assessment)		0.886	0.911	0.634
R1. Ask doctor about potential risks during treatment proactively	0.768			
R2. Choose treatment plans by weighing potential risks	0.908			
R3. Choose treatment plans by weighing benefits	0.923			
R4. Follow doctor's advice	0.733			
R5. Be willing to undertake risks that may arise during treatment	0.672			
R6. Take responsibility for my own health	0.742			
T (Transparency)		0.771	0.884	0.659
T1. Disclose condition to the doctor truthfully	0.866			
T2. Answer doctor's questions truthfully	0.906			
T3. Ask doctor about the costs of treatment plans proactively	0.675			
T4. Ask doctor for as much information about disease conditions as possible	0.782			

AVE, average variance extracted; CR, composite reliability.

of the total score of patient value co-creation behavior was 83.16, and the average scores of all dimensions were higher than 70. The highest mean value (87.69) was observed for Transparency, followed by Risk assessment, Dialogue, and Access.

## DISCUSSION

Many relevant studies indicate that the quality of medical care can be improved through joint efforts by doctors and patients.<sup>4-7</sup> Although the DART model has been widely accepted in the commercial field, relevant studies in the field of health care are few.

In this study, we introduce the value co-creation theory and DART model into the field of health care. After 3 rounds of Delphi consultation with 17 experts, we established the 23-item PVCBS based on the DART model. A cross-sectional study was conducted with patients (both inpatients and outpatients) at a tertiary-level hospital in Guangzhou, China, to evaluate the applicability of the scale.

The reliability (internal consistency reliability and CR) and validity (convergent and discriminant validity) of the scale were tested. To test the internal consistency reliability, we calculated Cronbach's  $\alpha$  values, for which a value greater than 0.7 is acceptable.<sup>22,23</sup> The study results show that Cronbach's  $\alpha$  correlation coefficients of the whole questionnaire (0.934) and the 4 dimensions (Dialogue, 0.788; Access, 0.837; Risk assessment, 0.886; Transparency, 0.771) meet the criterion. The CRs of the D, A, R, and T dimensions were 0.843, 0.872, 0.911, and 0.884, respectively, and fulfilled the minimal criterion of 0.70,<sup>22</sup> indicating good CR. The AVEs of the 4 dimensions were near or above the criterion of 0.50.<sup>4,24</sup> This is comparable with that seen when enterprises implement a value co-creation process based on the DART model.<sup>14,15</sup> In all cases, the  $\chi^2$  difference was significant, indicating acceptable convergent and discriminant validity. Similar results were found in a survey about customers' value co-creation behavior<sup>22</sup> and a survey about value co-creation activities of enterprises based on the DART model.<sup>16</sup> Therefore, the

**TABLE 3.** Chi-Squared Difference Test Between Constrained Models and Free Models

Each pair of the constructs	Free model			Constrained model			$\chi^2$ difference of the 2 models	df difference of the 2 models	P
	$\chi^2$	df	P	$\chi^2$	df	P			
D and A	240.049	64	<.001	1604.504	65	<.001	1364.455	1	<.001
D and R	226.180	53	<.001	1977.869	54	<.001	1751.689	1	<.001
D and T	204.832	34	<.001	3355.161	35	<.001	3150.329	1	<.001
A and R	303.515	64	<.001	680.076	65	<.001	376.561	1	<.001
A and T	237.510	43	<.001	1592.329	44	<.001	1354.819	1	<.001
R and T	236.936	34	<.001	1729.266	35	<.001	1492.330	1	<.001

D, dialogue; A, access; R, risk assessment; T, transparency.

PVCBS based on the DART model demonstrates proper repeatability and validity, indicating that the DART model is acceptable to measure patient value co-creation behavior.

The total score of patient value co-creation behavior was 83.16. The mean scores of dimensions D, R, and T were higher than 80. Self-evaluation scores of patient co-creation behavior were high, which might be related to most of the respondents being young (18-40 years) and well educated (junior high school education or higher). Most of them could participate in value co-creation actively. This is similar to the results from related studies which showed that patients who are young and with high educational background will participate in the treatment process actively.<sup>26-28</sup> In terms of dimension scores, that of Transparency was the highest, whereas that of Access was the lowest. The Transparency dimension emphasizes information authenticity and disclosure, such as patients disclosing their condition and answering doctor's questions truthfully or asking doctors about their health care (eg, reasons for taking drugs, prices of the services). The results showed that most of the patients were willing to disclose their condition and answer questions truthfully. Access refers to patients obtaining medical services and information through relevant tools, such as consulting with doctors and other patients actively to gain more information about diseases. The lowest evaluation score showed that patients still need to improve related behavior.

The findings suggest that hospitals or doctors aiming for patient satisfaction can pursue this based on the 4 dimensions. For instance, they can organize health lectures to increase patient medical literacy, so patients can improve their ability to participate in treatment discussions with their doctors. During treatment, doctors can communicate with patients frequently in order to encourage them to cooperate actively.

### Limitations

There were a few limitations to this study. First, although the interviewers received uniform training, their explanations of the questionnaire items may have influenced the results. Second, because the subjects were selected from only 1 tertiary hospital, the results cannot be generalized to the entire population of patients in mainland China. Therefore, further studies should be conducted in multiple regions and in different types of hospitals to evaluate patient value co-creation behavior more fully.

**TABLE 4.** Total and Dimensions' Score of Patient Value Co-creation Behavior Based on DART Model

	Skewness	Kurtosis	Mean	SD	Ranking
Dialogue	-0.50	-0.21	81.67	13.57	3
Access	-0.76	0.36	79.19	15.16	4
Risk assessment	-0.90	0.57	86.26	13.63	2
Transparency	-1.17	1.51	87.69	13.25	1
Total score	-0.78	0.33	83.16	12.19	

DART, Dialogue, Access, Risk assessment, Transparency.

## CONCLUSIONS

Our study defined the concept of patient value co-creation behavior systematically, which lays a theoretical foundation for empirical research. The psychometric properties of the PVCBS based on the DART model were satisfactory, suggesting that the scale provides a reliable tool to evaluate patient value co-creation behavior accurately. However, further large-scale investigations are necessary before the findings can be applied widely to specific interventions.

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**eAppendix A. Patient Value Co-creation Behavior Scale Based on DART Model (Chinese version)**

条 目	非常 同意	比较 同意	一 般	比较 不同 意	非常 不同 意
1.我积极配合医生问诊，回答医生的提问	5	4	3	2	1
2.我能够积极、主动地和医生商讨疾病治疗方案	5	4	3	2	1
3.当治疗方案与我通过网络、亲戚朋友等途径了解到的不一样时,我会主动和医生商讨	5	4	3	2	1
4.我能够花时间和精力与医生分享关于改进医疗服务的想法和建议	5	4	3	2	1
5.当我在诊疗过程中遇到问题时，我会告知医生	5	4	3	2	1
6.如果我认为另一种治疗方案更适宜，我会和医生商讨	5	4	3	2	1
7.诊疗前,我通过网络、新闻、报纸、亲戚朋友等途径查找有关疾病成因、治疗方法等信息	5	4	3	2	1
8.诊疗前，我通过网络、亲戚朋友介绍等途径了解相关医疗机构、医生，以便作出选择	5	4	3	2	1
9.我主动向医生了解疾病相关信息	5	4	3	2	1
10.我主动询问医生的联系方式以便于日后咨询疾病相关信息	5	4	3	2	1
11.我主动向有相同疾病的患者了解疾病诊疗的相关信息	5	4	3	2	1
12.我会主动询问、学习和使用方便就诊的工具	5	4	3	2	1
13.我从医生提供的多个诊疗方案中进行选择	5	4	3	2	1
14.我主动向医生了解疾病诊疗过程中可能存在的风险	5	4	3	2	1
15.我通过权衡风险选择疾病治疗方案	5	4	3	2	1
16.我通过权衡收益选择疾病治疗方案	5	4	3	2	1
17.我能够遵从医嘱，如：按时服药、注意饮食、定期复诊等	5	4	3	2	1
18.我知道诊疗方案存在风险，愿意承担诊疗过程中可能出现的风险	5	4	3	2	1
19.我能承担健康责任，如：注意饮食、积极锻炼身体等	5	4	3	2	1
20.我如实告知医生病情	5	4	3	2	1
21.我如实回答医生的提问	5	4	3	2	1
22.我主动向医生了解治疗方案的价格信息	5	4	3	2	1
23.我让医生提供尽可能多的疾病相关信息	5	4	3	2	1

**eAppendix B.** Patient Value Co-creation Behavior Scale Based on DART Model (English version)

Items	strongly agree	agree	general	disagree	strongly disagree
1. I fully cooperate with the doctor during inquiry and answer any questions.	5	4	3	2	1
2. I discuss treatment plans with the doctor proactively.	5	4	3	2	1
3. When treatment plans are different from what I learn from the Internet, my relatives or friends, I discuss them with the doctor.	5	4	3	2	1
4. I am willing to spend time and energy to share ideas and suggestions on improving medical services with the doctor.	5	4	3	2	1
5. When I have any problems during the treatment, I tell the doctor about it.	5	4	3	2	1
6. If I think that another treatment plan is better for me, I will discuss with doctor.	5	4	3	2	1
7. To get prepared for seeing a doctor I look for disease information like causes and treatment methods through the Internet, publications, relatives, friends, etc.	5	4	3	2	1
8. Before choosing a doctor, I consider various options of institutions and doctors basing on Internet, recommendation of relatives and friends, etc.	5	4	3	2	1
9. I seek information from the doctor about my disease proactively.	5	4	3	2	1
10. I proactively ask for the doctor's contact information for the convenience of more consultation in the future.	5	4	3	2	1
11. I proactively seek information about disease treatment from the patients with the same disease.	5	4	3	2	1
12. I inquire, learn about and use the tools available for medical convenience.	5	4	3	2	1
13. I choose treatment plans suggested by the doctor.	5	4	3	2	1
14. I ask my doctor about potential risks during treatment proactively.	5	4	3	2	1
15. I choose my treatment plans by weighing potential risks	5	4	3	2	1
16. I choose my treatment plans by weighing benefits	5	4	3	2	1
17. I am able to follow my doctor's advice, such as taking medicine on time, paying attention to diet, having regular follow-up.	5	4	3	2	1

18. I understand that there are always some risks connected with medical treatment and I am willing to undertake risks that may arise during treatment.	5	4	3	2	1
19. I take responsibility for my own health, such as paying attention to diet and doing exercise actively.	5	4	3	2	1
20. I truthfully disclose my condition to the doctor.	5	4	3	2	1
21. I answer the doctor's questions truthfully.	5	4	3	2	1
22. I ask the doctor about the costs of treatment plans proactively.	5	4	3	2	1
23. I ask the doctor for as much information about my conditions as possible.	5	4	3	2	1