

The Effect of Social Norms on Physicians' Intentions to Use Liver Cancer Screening: A Cross-Sectional Study Using Extended Theory of Planned Behavior

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Background: Liver cancer is a globally acknowledged threat to public health, and there is a critical and urgent need to determine factors associated with the use of liver cancer screening and to further promote its use.

Purpose: To examine whether the extended theory of planned behavior (TPB) incorporating social norms predicts physicians' intentions to use liver cancer screening and to identify the associated factors quantitatively, using contrast-enhanced ultrasound (CEUS) as an example.

Methods: A research framework was established by adding social norms to the TPB, based on which the questionnaire for this study was developed. Through multistage random sampling, a cross-sectional questionnaire survey was conducted among 292 physicians in Fujian and Jiangxi provinces. Due to the multicollinearity problem of the data, ridge regression was applied to determine the influencing factors of physicians' intentions to use CEUS.

Results: Most participants (87.30%) reported that they were willing to use liver cancer screening in their clinical practice. The scores of TPB variables were generally higher than those of social norms variables. Ridge regression results indicated that the proposed model was explanatory, which has accounted for 73.5% of the total variance in physicians' intentions. Analyses also illustrated the significant role of TPB variables (attitude and perceived behavioral control) and social norms variables (personal norms, organizational norms, and industrial norms) on physicians' intentions to use CEUS.

Conclusion: The study extended the TPB by including the concepts of social norms, which is not only conducive to expanding the knowledge of factors associated with physicians' intentions to use liver cancer screening, but also provides implications for developing strategies to promote the use of certain health services or products, such as playing the role of core members, holding panel meetings, and establishing information push systems.

Keywords: social norms, intention, liver cancer, screening, physicians

Introduction

With its incidence on the rise over the past few decades, liver cancer is one of the most serious malignant tumors globally, as well as the current second leading cause of cancer-related deaths.¹ Worse of all, once clinical manifestations appear, most patients are already in advanced stages, where has a low 5-year survival rate, poor quality of life, and unaffordable burden of disease.^{2,3} The situation is particularly acute in China, which accounts for more than half of the world's new liver cancer cases and deaths each year.⁴ Under the critical situation of liver cancer prevention and treatment, it is urgent to promote the use of liver cancer screening, which will facilitate early diagnosis and treatment of liver cancer, further improve patients' survival rate and quality of life, and reduce the burden on the health system. Although a growing body of research aims at better understanding and increasing the use of cancer screening^{5,6} and the fact that a fairly large number of cases can avoid advanced cancer through screening is well-established,⁷ it remains

challenging for researchers and policymakers to persuade or motivate the public (including patients and physicians) to adopt cancer screening. In order to design targeted measures that promote the use of cancer screening, it is of great theoretical and practical significance to identify the influencing factors that can be intervened. It is to this end that this study hopes to provide some clues.

Researchers have been trying to use various theories and models to explain the rational mechanisms of human behaviors, such as the Theory of planned behavior (TPB) developed by Ajzen,⁸ which is a representative theory in the field of technology or behavior adoption and is one of the most influential and widely used theories to predict behavioral intentions.⁹ It presumes that people's particular behavior can be predicted and explained via their intentions. In turn, the intentions are functioned by three elements, namely, attitude, subjective norms, and perceived behavior control.⁸ Attitude reflects the perception or evaluation of performing a particular behavior. Perceived behavior control is defined as the perception of the controllable extent of performing a specific behavior. Subjective norms are perceived social pressures that whether people important to individuals think the behavior should be performed. To date, the TPB has been applied in considerable research about health professionals' intentions,¹⁰ including the acceptance of innovative health technology,^{11,12} and the adherence to clinical guidelines.¹³ Moreover, numerous TPB studies have explained over fifty percent of the total variance of intentions.^{14–16}

According to Ajzen, "TPB is principally open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance".⁸ That is, the additional predictors are allowed in the TPB to improve the explanatory power in intentions. For instance, social environment, not least in the context of current concerns about the social environment factors of health issues.^{17,18} In addition to the direct application of TPB, several studies have shown that TPB has been extended in different areas with success.^{19–23} To some extent, subjective norms in the TPB are virtually a kind of social norm.^{24,25} Social norms shape people's motivation and behavior based on the social environment.²⁶ It can be understood as the perceived prevalence of others' behavior and the perceptions of how others think about or evaluate a behavior,²⁷ which may come from multiple resources, such as the people, organizations, or industries around us. The perceptions from those around us are personal norms, namely subjective norms, which have been addressed in the TPB. The influence of the perceptions from the organization and the industry on the individual can be called the organizational norms and the industrial norms, representing the behavioral readiness of the whole members of the hospital and the competition pressure from the peers in the industry, respectively. In general, it's hard to make decisions that are not influenced by the persons and various environmental elements around us, and people adjust their behavior and conform to the social expectation by information learned from observing others.²⁸

To the best of our knowledge, the research object and content were relatively single and fixed in previous studies about cancer screening intentions. On the one hand, previous studies mainly look at the patient level, as a number of studies have been conducted to investigate the intentions to use screening of different cancer groups, such as cervical cancer,²⁹ breast cancer,³⁰ prostate cancer,³¹ and colorectal cancer,³² etc., but rarely focus on the health services provider (ie, physicians). On the other hand, in a few studies of cancer screening intentions for physicians, they have focused more on individual-level internal factors (ie, physicians' attitudes, beliefs, knowledge,^{33,34} and nonprofessional experiences³⁵) than on the influence of organizational and industry settings on individuals, which can fall under the scope of social norms. It's noteworthy that although recently the social norms have received particular attention as the determinants of the adoption of certain behaviors, including cancer screening,^{6,36} most studies set forth only a single level of social norms: either personal normative beliefs and mimetic pressures at the level of the personal norms,^{37,38} or institutional pressures and organizational culture at the level of the organizational norms,^{39,40} or industry competition at the level of the industrial norms.⁴¹ The comprehensive consideration of these three aspects is necessary, especially for the physicians in public hospitals,⁴² given the strong reliance of public hospital physicians on their hospitals and the industrial environment may lead to the internalization of organization norms and industrial norms that contribute greatly to their decision-making.⁴³

Therefore, given the value of cancer screening intention studies for cancer prevention and control practices, coupled with on the paucity of such studies targeting physicians and lack of discussion of perceived norms other than the individual, this study aims to determine the predictors of the intentions to use liver cancer screening from the physicians' perspective and the influence of the potential social norms from the personal, organizational and industrial level. To make

the study more pertinent and focused, contrast-enhanced ultrasound (CEUS), one of the confirmed effective screening technology for liver cancer, will be taken as an example to conduct the survey. This study is promising for bridging the literature gap about the factors affecting physicians' intentions to use liver cancer screening from the perspective of health services providers. The findings will not only provide direct guidance for giving full play to the role of social norms in promoting the use of CEUS and other liver cancer screening, but also have several implications for expanding the use of other health services/products.

Materials and Methods

Theoretical Framework

Based on the existing literature and the context of CEUS use, we developed a research framework that originated from the TPB and the concepts of social norms, as shown in Figure 1. The TPB includes some important elements such as attitude, perceived behavioral control, and subjective norms. Social norms are explained by three aspects: personal norms (namely the variable of “subjective norms” mentioned above, it is the intersection of TPB and social norms), organizational norms (“hospital culture” and “technology sharing” were seen as measurement variables because both of which reflect the overall tendency exhibited by the hospital as an organization and in accordance with the connotation of social norms), and industrial norms (“industry pressure” was chosen as the measurement variable because industry pressure is the physicians' perception of technical tendencies projected from the industry environment, and it also conforms to the connotation of social norms). Demographic characteristics such as province, gender, age, education level, professional title, administration position and years in practice, were included as covariates.

Survey Instrument

For the data collection, a structured questionnaire with 28 items was developed on the basis of our research framework. Questions were derived from the previous literature, which are rationalized in this paper to fit the characteristics of CEUS. The questionnaire was divided into four parts: (1) demographic characteristics of participants, including six items such as sex, age, education, professional title, department, and years in practice. (2) Intentions to use CEUS.⁸ To measure the behavioral intentions, physicians were asked three items about the degree to which they would be willing to use, learn, and recommend CEUS in their practice. (3) The scale of TPB.⁸ Nine items proposed by the TPB were used to capture attitude, subjective norms, and perceived behavioral control, and the items were restated to fit the practical context of CEUS. (4) The scale of social norms.^{44–46} For the subjective norms that had been included in the TPB scale for measurement, this part of ten questions focused on measuring organization norms and industrial norms. Organizational norms were measured by two dimensions of hospital culture and technology sharing, while industrial norms were measured by the dimension of industry pressure. Items in part 2 to part 4 were rated on a five-point Likert



Figure 1 The research framework of physicians' intentions to use liver cancer screening.

scale ranging from 1 (strongly disagree) to 5 (strongly agree). [Table 1](#) provides the number of items of the dimension, sample questions, and Cronbach's α for the dimensions and the questionnaire. The detailed questionnaire is available in [Supplementary File](#). The results of the reliability and validity test showed that the questionnaire has satisfactory reliability and validity. Specific results are also available in [Supplementary File](#).

Sample and Data Collection

From February to August 2019, we conducted a cross-sectional survey in China using a multistage sampling method. Firstly, based on the latest average incidence of liver cancer in China (26.92/100,000),⁴⁷ Fujian and Jiangxi province were randomly selected from the provinces with a high and low incidence of liver cancer, respectively (the incidence of liver cancer in Fujian and Jiangxi were 32.18/100,000 and 23.80/100,000, respectively).^{48,49} Secondly, since almost all health institutions are included in different medical alliances under the context of the implementation of hierarchical health system in China, we listed all medical alliances in each province as the sampling frame. Two medical alliances were randomly selected from each province. Thirdly, a sampling frame was made to list all health institutions of the four included medical alliances. Half of the health institutions within each medical alliance were randomly selected. Finally, physicians in these health institutions who meet the following criteria were included as the participants: (1) work in liver disease-related departments, such as the department of hepatology, oncology, infection, gastroenterology, interventional medicine, radiotherapy, general surgery, and traditional Chinese medicine, (2) have knowledge of CEUS, (3) agree to participate in this study. With the support of selected health institutions, the distribution of the questionnaires was accompanied by a trained coordinator to introduce the study purpose. Participation in the study was voluntary and anonymous, and informed consent was obtained from all participants.

Each medical alliance was expected to investigate 5~8 health institutions, and four medical alliances in two provinces would include 20~30 medical institutions. Each health institution would investigate 10~20 physicians on average. At least a total of 200 physicians were approached, which can meet the sample size requirement that at least five times the survey question.⁵⁰

Table 1 Dimensions and the Sample Questions of the Questionnaire

Dimension	Items	Sample Question/Statement	Cronbach's α
Intention	3	I would like to use CEUS for liver cancer screening.	0.946
Attitude	3	I think it's a wise choice to use CEUS for liver cancer screening.	0.917
Perceived behavior control	3	Using CEUS can increase my confidence in diagnosing liver cancer.	0.935
Subjective norms	3	People who are important to me have a positive attitude to use CEUS for liver cancer screening.	0.933
Hospital culture	3	The hospital advocates technical innovation to improve the clinical outcomes for patients.	0.964
Technology sharing	3	The hospital is willing to share the experience of CEUS use with other institutions.	0.980
Industry pressure	4	CEUS has been widely used for liver cancer screening in the medical industry.	0.901
The whole questionnaire (not counting demographic questions)	22		0.959

Abbreviation: CEUS, contrast-enhanced ultrasound.

Statistical Analysis

Invalid questionnaires, including those that were incomplete or provided the same responses for all items or with many missing values, were eliminated. SPSS 21.0 software program was used as the main statistical tool to analyze the data. Firstly, the characteristics of the participants were described. Descriptive analyses were performed to represent categorical variables by frequencies and percentages, and continuous variable scores were represented by means and standard deviations (SD). Independent *t*-tests were used in the comparison of physicians' intentions scores of two groups for demographic characteristics; variance analyses were performed in the comparison of three or more groups, and further post-hoc tests were performed when the results showed significant differences, with the Tukey method chosen if the number of cases between groups was equal and Scheffe method chosen if the number of cases between groups was not equal. The dimension score was calculated as the sum of the scores of each item divided by the number of items, and the percentage with a positive score of each dimension was obtained by dividing the number of participants who scored above 3 of this dimension by the total participants. Secondly, Pearson correlation was used to assess the relationship between physicians' intentions to use CEUS and its potential determinants. Also, correlation analysis results are the basis of collinearity diagnostics. When the correlation coefficient is greater than 0.7, multicollinearity can be considered.^{51,52} Finally, if multicollinearity exists, ridge regression rather than traditional multiple linear regression, a proper technique enabling regression coefficients more stable in the case of multicollinearity,⁵³ will be chosen to produce the estimates in the next analysis to determine the influencing factors of physicians' intentions to use CEUS. Statistical significance was set at $P < 0.05$.

Patient and Public Involvement

Patients and the public were not involved in the design of the study, or in the recruitment to and conduct of the study.

Results

Characteristics of the Sample

A total of 329 questionnaires were distributed. After excluding invalid questionnaires, 292 were included in the analysis, with a valid response rate of 88.75%. The characteristics of the participants are presented in Table 2. Among the participants, 65.07% were males, 86.64% were under 45 years old, 93.84% reported having a bachelor's degree or above, 76.37% had a junior or intermediate title, and 82.88% had no administration role. Participants with less than 15 years of practice accounted for 87.33%. *t*-tests and variance analyses showed that no statistically significant effect of characteristics other than age on physicians' intentions to use CEUS ($P > 0.05$). Post-hoc analysis further revealed that physicians aged 35~44 years scored significantly higher on intentions to use CEUS than those under the age of 35.

Of the participants, 87.30% reported that they intended to use liver cancer screening in their clinical practices, meaning 87.30% of potential adopters. The scores (mean \pm SD) for each variable and the percentage of participants who had positive scores are presented in Table 3. The majority of participants had a positive score on all dimensions. Attitude and perceived behavior control scored 4.21 ± 0.83 and 4.21 ± 0.80 . Subjective norms, hospital culture, technology sharing and industry pressure respectively scored 4.02 ± 0.95 , 4.07 ± 1.07 , 4.04 ± 1.09 and 3.78 ± 0.93 . The scores of TPB variables were generally higher than those of social norms variables. Among them, the attitude has the highest proportion of positive responses, while industry pressure has the lowest proportion of positive responses.

Relationships Between the Intentions and Its Potential Determinants

As shown in Table 4, all potential determinants were positively correlated with physicians' intentions to use CEUS ($r = 0.462$ to 0.860 , $P < 0.01$). Some predictor variables were highly correlated (including attitude and perceived behavior control, attitude and subjective norms, perceived behavior control and subjective norms, hospital culture, and technology sharing), reaching the common threshold of multicollinearity of 0.7.^{46,47}

Table 2 Characteristics of the Sample Physicians and Variance Analysis of Physicians' Intentions to Use CEUS (n=292)

Characteristic	Frequency (%)	Intentions to Use CEUS	t/F	P value
Sex			-0.340	0.734
Male	190 (65.07)	4.24 ± 0.86		
Female	102 (34.93)	4.27 ± 0.75		
Age (years)			4.329	0.014 ^a
Less than 35	148 (50.68)	4.14 ± 0.89		
35~44	105 (35.96)	4.43 ± 0.71		
45 or over	39 (13.36)	4.18 ± 0.78		
Education			1.646	0.179
Junior college or below	18 (6.16)	4.46 ± 0.67		
Bachelor	156 (53.42)	4.31 ± 0.77		
Master	112 (38.46)	4.12 ± 0.90		
Doctor	6 (2.05)	4.39 ± 0.71		
Professional title			1.202	0.302
Junior	107 (36.64)	4.17 ± 0.91		
Intermediate	116 (39.73)	4.34 ± 0.76		
Senior	69 (23.63)	4.21 ± 0.77		
Administration position			-1.175	0.241
No	242 (82.88)	4.22 ± 0.85		
Yes	50 (17.12)	4.37 ± 0.66		
Years in practice			2.377	0.052
< 5 years	73 (25.00)	4.18 ± 0.76		
5~10 years	94 (32.19)	4.15 ± 0.95		
11~15 years	88 (30.14)	4.44 ± 0.72		
16~20 years	31 (10.62)	4.28 ± 0.72		
> 20 years	6 (2.05)	3.67 ± 0.89		
Province				
Fujian	196 (67.12)	4.20 ± 0.85	-1.482	0.139
Jiangxi	96 (32.88)	4.35 ± 0.75		

Notes: ^aSince the ANOVA results showed significant differences, a Scheffe post-hoc test was then conducted and the comparison of intentions scores for groups with significant differences was 35~44 years old > less than 35 years old.

Abbreviation: CEUS, contrast-enhanced ultrasound.

Ridge Regression

The ridge regression model supported the assumptions in the proposed framework (Table 5). The overall model accounted for 73.5% of the variance in physicians' intentions to use CEUS. Although the effect of characteristics was not significant, physicians' attitude ($\beta = 0.227$, $P < 0.001$) and perceived behavior control ($\beta = 0.258$, $P < 0.001$) were

Table 3 Mean Scores for the Dimensions of the TPB Variables and Social Norms Variables

Dimension	Mean	SD	Minimum Score	Maximum Score	% of Participants Having a Positive Score
Attitude	4.21	0.83	1	5	87.70
Perceived behavior control	4.21	0.80	1	5	86.30
Subjective norms	4.02	0.95	1	5	79.50
Hospital culture	4.07	1.07	1	5	80.10
Technology sharing	4.04	1.09	1	5	76.00
Industry pressure	3.78	0.93	1	5	71.20
Intention	4.25	0.82	1	5	87.30

Abbreviations: TPB, theory of planned behavior; SD, standard deviation.

positively associated with their intentions to use CEUS, and all social norms variables (including subjective norms, hospital culture, technology sharing, and industry competition) were found to be significantly affect physicians' intentions to use CEUS ($P < 0.05$).

Discussion

The purpose of this study was to provide insights into the predictors associated with physicians' intentions to use liver cancer screening. The research framework developed from the TPB plus the social norms constructs was supported in this study. Additionally, the predictability of TPB variables and social norms variables on physicians' intentions to use CEUS was verified, including attitude, perceived behavioral control, subjective norms, hospital culture, technology sharing, and industry pressure. The findings of this study could provide a direct reference for promoting physicians' intentions and behaviors in the use of liver cancer screening.

Contrary to expectations, there was no significant difference in physicians' intentions to use CEUS in provinces with a high incidence of liver cancer (eg, Fujian) or low incidence (eg, Jiangxi). The reason may be that although the low incidence of liver cancer in Jiangxi compared with the national average, liver cancer is still the leading cause of death among the local residents. Thus, in the context of the great demand for medical services, physicians in Jiangxi would not use CEUS significantly less than physicians in Fujian for a technical service with specificity, sensitivity, and cost-effectiveness.

Consistent with previous research,^{54–56} attitude and perceived behavioral control are the important influencing factors of health professionals' intentions to use a certain service or product. TPB suggests that an individual's intentions and usage behaviors are the results of combined function of the internal factors. The consistency of behavior with attitude and motivation is the requirement for performing a specific behavior.⁵⁷ A favorable attitude toward liver cancer screening is indispensable feedback to a behavior. In addition, the results indicated that physicians' intention to use liver cancer screening was influenced by perceived behavioral control that could control or enhance their intention. More specifically, the perception of the obstacles, risks, or rewards associated with the use of liver cancer screening decreases or increases physicians' willingness to try to achieve it or to avoid it.

The influence of social norms on physicians' intention to use liver cancer screening was also confirmed in three aspects: personal norms, organizational norms, and industrial norms. Personal norms, namely subjective norms, refer to the perceived expectations or evaluations for particular behaviors by which people are important to us.⁸ In a work situation, these people are usually colleagues, superiors, and authorities.

An important reminder from the results was that even though those influential figures did not exert direct pressure on us to act, they play the exemplary and leading role that implicitly affects others' intentions and behaviors, especially for new members and marginal groups. In addition to personal norms, the effects of organizational norms and industrial norms were also significant in this study. Hospital culture and technology sharing represented the organizational norms. The former is the ensemble of values and beliefs accumulated by the members within a hospital over a long time,^{58,59} while the latter is the extent to which knowledge and information are shared with other health care institutions.^{60,61} Both of them reflected the hospitals' overall attitude and readiness for liver cancer screening at the spirit level in this study. As the invisible "public opinion environment", it's recognized that the organizational norms unavoidably affected

Table 4 Pearson Correlation Matrix of Physicians’ Intentions to Use CEUS and Its Potential Determinants (r)

Dimension	Attitude	Perceived Behavior Control	Subjective Norms	Hospital Culture	Technology Sharing	Industry Pressure	Intentions
Attitude	I						
Perceived behavior control	0.806***	I					
Subjective norms	0.766***	0.706***	I				
Hospital culture	0.399***	0.457***	0.404***	I			
Technology sharing	0.408***	0.444***	0.427***	0.847***	I		
Industry pressure	0.484***	0.542***	0.554***	0.432***	0.503***	I	
Intentions	0.825***	0.860***	0.719***	0.467***	0.462***	0.465***	I

Note: ***P < 0.001.
Abbreviation: CEUS, contrast-enhanced ultrasound.

Table 5 Ridge Regression Model for Influencing Factors of Physicians' Intentions to Use CEUS

Dimension	B	S.E.	β	T	P value
Characteristics					
Province	0.035	0.028	0.020	1.239	0.216
Gender	-0.052	0.028	-0.009	-0.544	0.587
Age	0.012	0.018	0.011	0.675	0.500
Education level	-0.027	0.020	-0.022	-1.352	0.178
Professional title	-0.015	0.138	-0.015	-1.049	0.295
Administration position	0.003	0.034	0.001	0.078	0.938
Years in practice	-0.003	0.011	-0.006	-0.256	0.798
TPB variables					
Attitude	0.226	0.013	0.227	17.215	< 0.001
Perceived behavior control	0.265	0.014	0.258	19.213	< 0.001
Personal norms					
Subjective norms	0.131	0.012	0.151	10.868	< 0.001
Organizational norms					
Hospital culture	0.051	0.010	0.067	4.929	< 0.001
Technology sharing	0.045	0.010	0.059	4.425	< 0.001
Industrial norms					
Industry pressure	0.033	0.013	0.038	2.468	0.014

Abbreviations: CEUS, contrast-enhanced ultrasound; S.E, Standard error.

physicians' intention to use liver cancer screening. In order to give full play to its role, it is necessary to attach the importance to the cultivation of hospital spirit,^{62,63} reach consensus beliefs within the hospital that encourage early diagnosis and treatment for liver cancer patients or high-risk populations via screening, and develop an atmosphere of advocating technology diffusion in a wider range to promote health.

Industrial norms referred to industry pressure in this study. Such pressure may be from surrounding hospitals, business partners, and standards in this industry.⁶⁴ In most cases, hospitals and physicians face competition from peers for more patients, and the pressure from the technology developers and suppliers will impact their expectations for investment returns.⁶⁵ The industry pressure would enhance physicians' intention to use liver cancer screening if they want to stay competitive.

Social norms interventions have received increased interest in "changing or promoting certain behaviors" in health professionals. Several strategies based on the compliance mechanism of social norms can be recommended to strengthen physicians' intentions and behaviors of using liver cancer screening.⁶⁶ The first strategy is core members take the lead. The wide acceptance and use of liver cancer screening by senior physicians and supervisors, who generally have a demonstration role for other physicians, are the best guides. For better expanding the use of liver cancer screening,

it is recommended to mobilize the senior individuals at first. The second is panel meeting. Through collective thinking, the meeting will be capable of reshaping norms and practices from a critical perspective.⁶⁷ Another strategy is information push system. By regularly and timely sending information and hot spots in the field of liver cancer diagnosis and treatment, physicians will be capable of making decisions on the basis of the knowledge of industry trends.

In addition to the implications, this study is also strengthened by some features. One of the strengths is the research framework developed by integrating the TPB with the concepts of social norms, which is conducive to identifying the influence of organizational norms and industrial norms in addition to those of individuals. The second strength is that the findings extend the corresponding knowledge of physicians' intentions to use cancer screening, this will be useful in providing approaches for future interventions. Another strength is that the application of ridge regression analysis avoids the problems caused by multicollinearity and makes the model more realistic. Inevitably, this study also has some limitations. First, since all of the variables were measured by self-report, social desirability bias, in which some physicians may tend to make more positive responses, cannot be ruled out. Second, some potential factors may not have been considered and should be studied more comprehensively. Third, due to limited time and funding, the representativeness of research data may be a concern and the sample size needs to be expanded in future work. Finally, the cross-sectional study design does not allow for causal inferences.

Conclusion

This study enriches the knowledge in the field of technology diffusion and utilization, especially by increasing the understanding of the associated factors of physicians' intentions to use liver cancer screening. In addition to internal factors including attitude and perceived behavioral control in TPB, this study identified that physicians' intentions to use liver cancer screening were predicted by physicians' perceived social norms at three levels: personal, organizational, and industrial norms. It is concluded that appropriate social norms interventions should be integrated to improve physicians' intentions and usage behaviors. Furthermore, some specific measures, such as playing core members' roles, holding panel meetings, and establishing information push systems, are proposed for future practice.

Abbreviations

TPB, Theory of Planned Behavior; CEUS, contrast-enhanced ultrasound.

Ethical Statement

This study did not involve patients or public. Ethical permission was granted for this study from the Ethics Committee of Fujian Medical University (No. 2017-17). The entire process of this study was conducted under the Declaration of Helsinki. A formal letter of cooperation was written to the directors of each selected medical institution, and permission was obtained. All participants were informed of the study purpose, participation was voluntary, and all responses were anonymous. Participants were considered to have given informed consent if they completed and returned the questionnaire.

Consent for Publication

All participants provided written informed consent to publish this study.

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Disclosure

The authors declare that they have no competing interests in this work.

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