



# Online communication skill training of patients with cancer: A test of the behavioral intention predictive framework for communication skills

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## ARTICLE INFO

### Keywords:

Communication skills training  
Patient education  
Cancer communication  
Behavioral intention

## ABSTRACT

**Objective:** To assess the Behavioral Intention Predictive Framework's utility in explaining variation in cancer patients' strong behavioral intention (SBI) to use LEAPS (Listen, Educate, Assess, Partner, Support) communication skills after viewing training videos.

**Methods:** Ninety-eight patients were enrolled through anonymized online platforms to view LEAPS training videos, complete background and communication questionnaires and report their SBI to use LEAPS skills.

**Results:** On average, patients indicated SBI to use 6 of 13 skills and 46% of patients expressed SBI across individual skills. The framework explained 27.7% of the adjusted variance in SBI with significant predictors of frequent past use of LEAPS-related shared decision-making behaviors, poor emotional health, being rarely accompanied to visits and positive ratings of narrative videos. Finally, 21.7% of the adjusted variance in problem communication was explained by infrequent use of LEAPS-related information behaviors, patient accompaniment of another adult and positive narrative scores.

**Conclusion:** Patients SBI to use multiple LEAPS skills and past problem communication were explained by framework predictors.

**Innovation:** Despite theoretical and empirical evidence that behavioral intention significantly predicts behavior, it has not been studied in patient communication research. Application of the novel framework to LEAPS training videos contributes an innovative address of this research gap.

## 1. Introduction

Recognition that patient participation in medical visit dialogue affects care quality and patient outcomes has shifted from primary reliance on skilled clinician communication to include skillful patient communication [1-4]. To this end, patient training has focused on information exchange reflected in various forms of question prompts and decision aids [5-8]. However, a recent systematic review of communication training interventions by D'Agostino and colleagues concluded that the narrow informational focus evident in early systematic reviews of patient communication programs [9,10] has expanded in recent years

[11].

Instrumental to this expansion is the PACE (Presenting information, Asking Questions, Checking Understanding, Expressing Concerns) program developed by Cegala and colleagues [12] and subsequent PACE modifications [13,14]. Using the four PACE elements to thematically organize targeted skills in their review, D'Agostino and colleagues found that most interventions addressed more than one skill category [11]. While the interventions showed positive effects on general patient participation during medical visits, only one specific skill category, expression of concerns, showed significant evidence of a change in patient behavior. The authors were hard pressed to explain why the

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<https://doi.org/10.1016/j.pecinn.2024.100291>

Received 9 November 2023; Received in revised form 8 May 2024; Accepted 19 May 2024

Available online 27 May 2024

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evidence was so weak for use of specific skills and suggest that it may be related to the lack of theoretical grounding in intervention design. Despite the behavioral outcome measure of communication change used in the reviewed studies, none referred to a behavior change theory as guiding intervention design and only one study referenced any framework or theory at all. The authors also note insufficient attention to individual, cultural and contextual factors that could contribute to an understanding of patients' response to training.

The theoretical weakness evidence in the systematic review is not surprising as the extensive body of behavior change research shows little attention to medical visit communication behavior. A list of health behaviors addressed in 18 correlational meta-analyses did not include communication in medical visits [15], nor was it included in 2 meta-analyses of experimentally controlled health behavior change interventions [15,16]. Relevant to the current study, these analyses showed medium to large intervention effects on behavioral intention and small to medium effects on behavior. These studies and behavior change theorists have establishing behavioral intention as a significant precursor of behavior and a meaningful outcome for behavior change interventions [15-17].

The LEAPS (Listen, Educate, Assess, Partner, Support) approach to communication skill training is theory based in its content and method of skill delivery [18]. Content is addressed through a comprehensive set of skills organized by patient-centered communication domains of information exchange, shared decision making (SDM), treatment facilitation and interpersonal rapport widely used in clinician communication training and research [4]. The mode of skill delivery uses simulated video patients (SVPs) or clinicians consistent with vicarious modeling noted among health communication best practices [13]. The SVPs were scripted to reflect characteristics or experiences, situations and concerns of the target audience through brief narratives and demonstrations of skill examples designed to increase message credibility and influence.

The LEAPS training approach has been successfully used in separate patient and clinician training programs designed to increase patient-centered skill use within the context of cardiovascular health discussions in primary care [18]. Patients randomized to view program SVPs

demonstrating LEAPS skills reported more skill use across communication domains and higher overall satisfaction after a follow-up visit. Clinicians also reported increased skill use across communication domains relative to their baseline report after viewing clinician skill demonstrations. Another training program using the LEAPS approach was adapted for genetic counseling students by designing online modules for each of the LEAPS skill categories that included video demonstrations of skills by genetic counselors [19]. Students randomized to immediate relative to a delayed exposure group used more targeted behaviors based on coding of their performance in sessions with simulated patients following completion of the skill modules.

The current study addresses two related objectives. The first is to examine patients' strong behavioral intention (SBI) to use LEAPS skills at an upcoming medical visit and the second is to inform these findings through the study's novel behavioral intention predictive framework adapted to the context of patient communication skill training.

Fig. 1 presents the Behavioral Intention Predictive Framework for Communication Skills and its key elements. The framework is informed by health behavior change research and theoretical literature related to behavioral intention [15 -17] tailored to ratings of LEAPS communication training videos, contextual factors associated with patients' communication behavior during medical visits, past use of LEAPS-related behaviors and patient experience of past communication problem.

Guided by the framework and research findings related to patients' communication behavior, the following hypotheses are posed:

**Hypothesis 1a.** The skill content and delivery mode of the LEAPS training program influences patients' behavioral attitudes and norms which will predict patients' SBI to use LEAPS skills. Support for the hypothesis is provided by meta-analysis findings that interventions that influence attitudes, behavioral control and perceived norms are significant predictors of behavioral intention [15].

**Hypothesis 1b.** Contextual factors associated with patient communication behavior will predict patients' SBI to use LEAPS skills. Hypothesis support is provided by the medical visit communication literature that

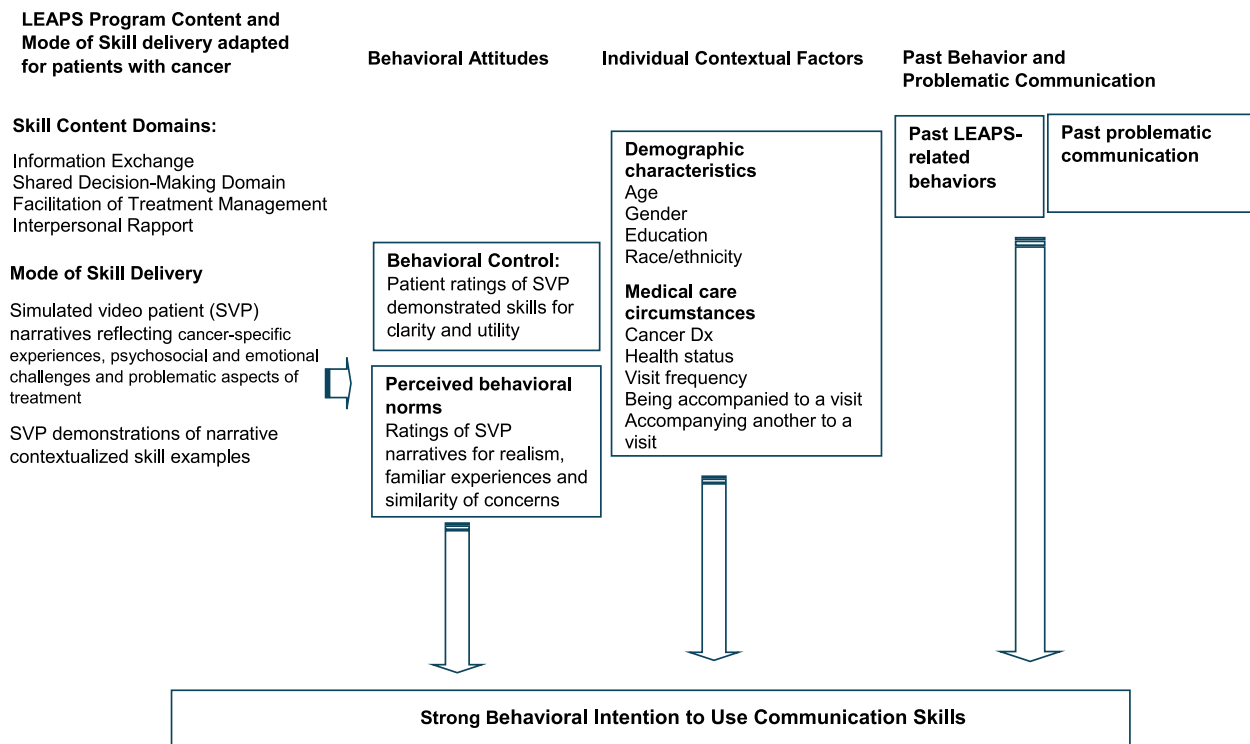


Fig. 1. The Behavioral Intention Predictive Framework for Communication Skills.

age, gender and education [2] and medical care circumstances of overall health and emotional health, frequency of medical visits, being accompanied to medical visits or typically accompanying an adult to medical visits are related to patients' communication behavior [20,21]. Cancer diagnosis was included because it was used as a basis for scripting cancer-specific SVPs narratives and skill examples in this study.

**Hypothesis 2.** Patients who are frequent past users of LEAPS-related behaviors will report SBI to use more LEAPS skills than patients who infrequently use these behaviors. This hypothesis is supported by behavior change theories [17] and meta-analyses findings showing the influence of attitudes and beliefs related to past behaviors on behavioral intention [15-17].

**Hypothesis 3.** Infrequent past use of LEAPS-related patient-centered behaviors will predict past problematic communication experiences. The hypothesis is supported by the face validity of the LEAPS-related behavior measure across the four patient-centered communication domains as a baseline measure of past engagement in patient-centered behaviors; infrequent use indicates low engagement while frequent use indicates high engagement. Empirical findings suggest that patients who are less engaged in the medical dialogue have more biomedically focused rather than patient-centered visits [2]. Biomedically focused visits are less satisfying for patients overall and particularly in regard to discussion of psychosocial and emotional issues [2,22], as it is during these discussions that emotional needs and concerns are explored and miscommunication and misunderstandings that arise may be addressed.

## 2. Methods

### 2.1. Study participants

COVID-related restrictions on in-person contact with clinic patients halted our clinic-based study and led to the use of CloudResearch which is an anonymized sourcing platform that coordinates recruitment of research participants across multiple online platforms. The Johns Hopkins School of Medicine IRB approved the original study protocol and changes to use anonymized recruitment platforms.

A total of 141 individuals accessed CloudResearch platforms with final enrollment of 98 patients who met eligibility criteria and whose survey responses passed quality control criteria. Inclusion criteria included self-reported current or prior diagnosis of breast, prostate, colon or lung cancer, being at least 50 years of age, and receipt of medical care in the United States. Quality control criteria included single use of an IP address, time stamped duration of at least 20 min on the study platform and a coherent pattern of question completion. CloudResearch received a set sum of \$29.00 for each completed patient survey and participants received compensation in the amount agreed to with the platform that they used to enter the study. Enrolled participants spent an average of 36 min on the survey's platform, (median 31.7; standard deviation 16.2; range 20.5–135 min).

After an initial test-run of several weeks, participant enrollment was completed over a 12-day period between January and February 2021. The 98 participants who met study and quality control criteria for enrollment in the study are hereafter referred to as patients.

### 2.2. Program elements and measures

#### 2.2.1. Participant background questionnaire

Questions addressing contextual factors related to patients' visit communication followed the consent page and included standard sociodemographic questions regarding (age, gender, education, race/ethnicity) and standard questions for overall and emotional health. Other medical care questions were original to the study but in keeping with standard measures. The wording of non-standard medical contextual questions and response frequencies for all background variables are

listed in [Table 1](#).

#### 2.2.2. Patient ratings of SVP narratives

Four cancer-specific (breast, prostate, colon, and lung) narratives were developed to capture cancer experiences, psychosocial and emotional challenges and problematic aspects of treatment relevant to each cancer. The specifics of the narratives were informed by the survivorship literature, discussions with members of the Johns Hopkins Cancer Advisory Group and input from clinical co-investigators who specialize in cancer and survivorship care. The actors were non-professional volunteers and the filming and editing of the narratives and skill demonstrations were done in-house.

The narratives were presented to patients prior to viewing skill demonstrations. Narrative duration averaged 1.75 min and were delivered by diverse actors including African American male and female actors representing SVPs with lung and breast cancer respectively, and white male and female actors representing SVPs with prostate and colon cancer respectively. Patients viewed all four narratives in the same sequence. After viewing each narrative, patients responded to three evaluative questions addressing SVP realism, relatability of the cancer experiences described and similarity of concerns to those of the patient (responses were not at all, somewhat or completely).

Appendix 1 provides the URL to the VIMEO playlist of the video narratives and skill demonstrations.

#### 2.2.3. Patient ratings of SVP skill demonstrations

To minimize respondent burden and maximize independence of skill ratings across SVPs, an automated Qualtrics scheme was used to randomly assign patients to one of the four SVPs. Each SVP was filmed demonstrating the same set of 13 LEAPS skills but with examples scripted to align with the SVPs' cancer-specific narratives. The skill examples were presented in 20 s video clips in which the skill was defined by a narrator and then enacted by the SVP producing a total of 52 video skill clips. Each skill clip was followed by three statements, the first two addressing the clarity of the skill definition and demonstration and the utility of the skills. The third statement asked about likely use of the skill at an upcoming medical visit. Response options ranged from strongly disagree through strongly agree for all statements. Strong agreement with the last of statement is the study indicator of SBI.

#### 2.2.4. Patients' past use of LEAPS-related visit behavior

A 13-item questionnaire was developed to conceptually link each LEAPS skill to related past visit behavior. The questionnaire was presented to patients after completing the background questionnaire with the instruction to think about their past typical communication in medical visits when responding to each item (3-point scale: never/rarely, sometimes, often/ always communicate this way). I do not remember was a final option and treated as a missing value. This measure is regarded as a baseline indicator of patient-centered communication behavior. Individual LEAPS-related communication behaviors organized by patient-centered domains are listed on the left side of [Table 3](#).

#### 2.2.5. Patient report of communication problems

A second 13-item questionnaire was similarly designed to conceptually link each LEAPS skill to a related communication problem. The questionnaire was presented to patients after viewing SVP narratives but before viewing SVP demonstrations of skill examples. Patients were instructed to think of a medical visit that did not go well when responding to each item (5-pt scale ranging from strongly disagree to strongly agree). Individual LEAPS-related communication problems organized by patient-centered domains are listed on the right side of [Table 3](#).

**Table 1**  
Patient demographic variables and medical care circumstances.

Contextual Sociodemographic Variables		
Mean Age in years (calculated birth date)	66.6	Range = 50–92
Gender	N	% of patients
Male	40	40.8%
Female	58	59.2%
Race/Ethnicity	N	% of patients
White	92	94%
African American	4	4%
Other Races/Ethnicities	2	2%
Education	N	% of patients
High School/GED	15	15.3%
Some College	31	31.7%
4-Year College Degree	27	27.6%
Post-Baccalaureate Education	25	25.5%
Workforce participation	N	% of patients
Full time work	19	19.4%
Part time work	5	5.1%
Retired	60	59.2%
Disabled	10	10.2%
Unemployed	6	6.1%
Contextual Medical Variables		
What is your cancer diagnosis?	N	% of patients
Breast	42	42.9%
Prostate	28	28.6%
Colon	16	16.3%
Lung	12	12.2%
How would you rate your overall health?	N	% of patients
Poor	4	4.1%
Fair	40	40.1%
Good	36	36.7%
Very Good	16	16.3%
Excellent	2	2.0%
How would you rate your emotional health?	N	% of patients
Poor	6	6.1%
Fair	33	33.7%
Good	27	27.6%
Very Good	21	21.4%
Excellent	11	11.2%
About how many doctor visits have you had over the past year?	N	% of patients
None	2	2.0%
1 Visit	5	5.1%
Between 2 and 5 Visits	52	53.1%
Between 6 and 10 Visits	19	19.4%
More than 10 Visits	20	20.4%
How frequently would you say you are accompanied to your medical visits since starting your cancer treatment?	N	% of patients
Never	31	31.6%
Rarely	15	15.3%
Occasionally	14	14.3%
Often	8	8.2%
Very often	13	13.3%
Always	17	17.3%

**Table 1 (continued)**

Contextual Sociodemographic Variables		
Mean Age in years (calculated birth date)	66.6	Range = 50–92
Do you typically accompany an adult patient to their medical visits?	N	% of patients
No	69	70.4%
Yes	29	29.6%

**2.3. Statistical analysis**

Descriptive statistics were used to present demographic and medical care contextual factors, ratings of SVP narratives and demonstration of skills and past use of LEAPS-related communication behaviors and experience of communication problems. Oneway ANOVA with planned contrasts were used to examine differences in patient ratings across SVP narratives and SBI associated with individual skills across SVP cancer-specific demonstrations and communication domains.

Regression analysis was conducted to test study hypotheses 1a and 1b and **hypothesis 2** using SBI as the dependent variable, calculated as a count of the number of LEAPS skills for which patients indicated strong agreement. **Hypothesis 3** was tested using LEAPS-related problem communication as the dependent variable, calculated as a count of problems patients agreed or strongly agreed they experienced when thinking of a medical visit that did not go well. The independent variables in these regressions included narrative ratings, frequent and infrequent past use of LEAPS-related behaviors across the four communication domains. Contextual variables reflecting demographic characteristics and medical care circumstances were also included as predictors in the regressions with nominal categories dichotomized when appropriate (see Appendix 2 for details).

**3. Results**

**3.1. Study participants**

As reflected in **Table 1**, 98 patients with cancer participated in the study. The most common cancer diagnosis was breast (43%), followed by prostate (28%), colon (16%) and lung cancer (12%). Patients averaged 66.6 years of age, ranging from 50 to 92. The majority of patients were female (59%) and most were white (94%). The sample was well-educated with more than half (53%) reporting a college degree or post-baccalaureate training. Patients’ overall and emotional health was rated as poor or fair by 45% and 40% of patients, respectively. Medical care utilization over the past year mostly ranged between 2 and 5 visits (53%) with the remainder split between 6 and 10 and more than 10. A sizeable minority of patients reported being accompanied to visits frequently (39%) or occasionally (14%) while almost half are accompanied rarely (47%). In addition, 29% of patients reported that they typically accompany an adult to their medical visits.

**3.2. Patient ratings of SVP narratives and skill demonstrations**

Narrative ratings were quite high ranging between 2.2 and 2.5 (on a 3-pt scale). Moreover, the 3 ratings were highly correlated within individual SVPs and across SVPs. Consequently, the ratings were combined to create a single narrative score that showed high internal consistency (Cronbach’s Alpha = 0.86). This measure was used as the study indicator of perceived behavioral norms.

Patient ratings of SVP skill demonstrations were high, averaging 4.25 (std dev 0.65) for clarity and 4.26 (std dev 0.67) for utility on a 5-point scale. These items were intended to be the study indicator of behavioral

control, but high correlation with SBI (intraclass correlation among the three items =0.88,  $p = .000$ ) suggests that these ratings may reflect positive attitudes toward demonstrated skills that also motivates SBI. Consequently, the items were not used in framework testing.

Regression analysis provided some support for Hypotheses 1a and 1b. poor emotional health (std Beta coefficient  $- 0.291, p = .003$ ) and positive narrative ratings (std Beta  $0.236, p = .015$ ) explained a total of 14.7% of the adjusted variance in SBI. Other contextual medical care and sociodemographic variables associated with communication behavior in other studies did not meet statistical criteria for inclusion in final models. (see Appendix 2 for fuller regression results.)

### 3.3. SBI to use LEAPS skills and past use of LEAPS-related behaviors

Patients indicated SBI to use of an average of 6.1 LEAPS skills (std dev 4.9, range 0–13), moderate intention to use 4.3 skills (std dev 3.6, range 0–13). Ambivalence (neither agreeing nor disagreeing) averaged 1.8 skills, and negative intention averaged less than 1 skill.

Frequent past use of LEAPS-related behaviors, defined as always through often use, averaged 8.4 (std. deviation 4.0, range 0–13) and

infrequent use averaged 4.2, defined as a combination of sometimes (mean = 3.4, std. deviation 3.1, range 0–11) and never/rare use (mean 0.9 std. deviation 2.2, range 0–13).

Table 2 displays a summary of SBI and the frequency of past LEAPS-related behaviors across the cancer-specific SVPs and by communication domains. The lower portion of the table displays the number of patients who expressed SBI to use individual skills after viewing cancer-specific SVPs. The rates of SBI ranged from 37% to 60% with 45 (46%) of study patients expressing SBI across SVPs. As noted in the table footnote, SBI was higher for viewers of the Lung cancer SVP than other viewers for 2 of 13 skills based on Oneway ANOVA.

Patients who reported frequent past use of LEAPS-related behaviors indicated SBI almost three times more often (74%) than infrequent users of these behaviors (26%); this same ratio is replicated across communication domains.

Addressing Hypothesis 2, regression analysis was conducted with SBI as the dependent variable and predictor variables of frequent past use of LEAPS-related behaviors within each of the four communication domains, along with narrative ratings and contextual factors. The final model explained 27.7% of the adjusted variance in SBI ( $R^2 = 0.306, R =$

**Table 2**  
SBI rates across individual skills and rates of SBI with frequent and infrequent past LEAPS-related behavior by cancer-specific SVP demonstrations.

Cancer-Specific SVP Skill Demonstrations						
	Breast SVP	Prostate SVP	Colon SVP	Lung SVP	All SVPs	
N viewing each SVP	27	29	25	17	98	
N (%) patients expressing SBI	12 (52%)	12 (40%)	10 (43%)	11 (61%)	45 (46%)	
SBI with frequent past use	8 (66%)	8 (73%)	8 (77%)	9 (79%)	33 (74%)	
SBI with infrequent past use	4 (34%)	4 (26%)	2 (23%)	2 (21%)	12 (26%)	
Patient-Centered Communication Domains						
	Information Exchange N (%)	Shared Decision-Making N (%)	Treatment Facilitation N (%)	Interpersonal Rapport N (%)		
SBI	50 (51%)	42 (44%)	47 (48%)	39 (40%)		
SBI/frequent use	37 (74%)	31 (74%)	34 (72%)	29 (74%)		
SBI/infrequent use	13 (26%)	11 (26%)	13 (28%)	10 (26%)		
Patients SBI in the Information Exchange Domain						
		N (%)	N (%)	N (%)	N (%)	
LISTEN skill: Restate complicated explanations in your own words to be sure that you understand what the doctor said		18 (67%)	14 (48%)	14 (56%)	13 (76%)	59 (60%)
LISTEN skill: Ask the doctor to be clear and use everyday words when you hear unfamiliar terms		14 (52%)	17 (59%)	13 (52%)	12 (71%)	56 (57%)
LISTEN skill: Prepare questions to get the information you want		14 (52%)	14 (48%)	9 (36%)	9 (53%)	46 (47%)
EDUCATE skill: Check that the doctor understands what you said to avoid being misunderstood		11 (41%)	8 (28%)	10 (40%)	11 (65%)	40 (41%)
Patients SBI in the Decision-Making Domain						
		N (%)	N (%)	N (%)	N (%)	
EDUCATE skill: Tell the doctor what you know and think about your cancer and treatment		9 (33%)	9 (31%)	8 (32%)	10 (59%)	36 (37%)
PARTNER skill: Set visit goals to be sure the problems you want to discuss are addressed		10 (37%)	10 (35%)	11 (44%)	6 (35%)	37 (38%)
ASSESS skill: Ask follow-up questions about tests, medications and lifestyle to understand why they are recommended		14 (52%)	11 (38%)	8 (32%)	10 (59%)	43 (44%)
PARTNER skill: Be an active partner in making treatment decisions by discussing risks, benefits and alternatives		16 (59%)	17 (59%)	11 (44%)	11 (65%)	55 (46%)
Patients SBI in the Treatment Facilitation Domain						
		N (%)	N (%)	N (%)	N (%)	
EDUCATE skill: Summarize next steps in your treatment so you and your doctor are on same page about what needs to be done after the visit		18 (67%)	15 (52%)	12 (48%)	12 (71%)	57 (58%)
EDUCATE skill: Discuss problems you have following treatment and lifestyle recommendations		9 (33%)	12 (41%)	12 (48%)	13 (76%)	46 (47%) <sup>a</sup>
ASSESS skill: Work with the doctor to brainstorm ways to overcome treatment problems and make changes		11 (41%)	10 (34%)	11 (44%)	7 (41%)	39 (40%)
Patients SBI in the Interpersonal Rapport Domain						
		N (%)	N (%)	N (%)	N (%)	
EDUCATE skill: Tell the doctor about your values and preferences so that you can be better understood as a person		7 (26%)	9 (31%)	10 (40%)	11 (65%)	37 (38%)
SUPPORT skill: Talk openly about your worries and concerns		14 (52%)	7 (24%)	8 (32%)	12 (71%)	41 (42%) <sup>b</sup>

<sup>a</sup> Significant difference between SBI rates among viewers of the Breast and Lung SVPs.

<sup>b</sup> Significant difference between SBI rates among viewers of the Prostate and Lung SVPs.

0.554) with significant predictors of SBI including frequent use of LEAPS-related behaviors in the SDM Domain (std Beta = 0.350,  $p = .000$ ), poor emotional health (std Beta =  $-0.304$ ,  $p = .001$ ), higher narrative ratings (std Beta = 0.212  $p = .019$ ) and being rarely accompanied to visits (std Beta =  $-0.183$ ,  $p = .039$ ). (See Appendix 2 for fuller regression results).

3.4. Infrequent past use of LEAPS-related visit behaviors and experience of problematic communication

Table 3 is designed to facilitate descriptive inspection of the parallels between infrequent past use of LEAPS-related visit behaviors (on the left side of the table) and the experience of communication problems on the right side. On average, 34% of patients (ranging from 19% to 43%) reported infrequent use of individual LEAPS-related behaviors and they infrequently used an average of 4.2 behaviors.

Patients reported experiencing an average of 4.0 (std. deviation = 4.2; range 0–13) communication problems and 31% of patients (ranging

**Table 3**  
Infrequent use of LEAPS-related visit behaviors and past communication problems.

Infrequent LEAPS-related behaviors by patient-centered domains	Patients N (%)	Past problem communication by patient-centered domains	Patients N (%)
Information Exchange	29 (31%)	Information Exchange	28 (28%)
I check I understand explanations the doctor gives me by putting them into my own words	34 (36%)	The doctor did not explain my medical problem in a way I could easily understand	24 (24%)
I ask for an explanation of medical terms I don't know	18 (19%)	The doctor used medical terms that were confusing	25 (26%)
I ask questions about my condition and treatment that arose since my last visit	32 (33%)	I was not comfortable asking the doctor questions	36 (37%)
I check that my doctor clearly understands information I give	33 (35%)	The doctor misunderstood things I said	26 (27%)
Shared Decision-Making	32 (34%)	Shared Decision-Making	33 (33%)
I tell my doctor what I know or think about my cancer and treatment	38 (37%)	The doctor was not aware of what I knew or thought about my medical problems	28 (28%)
I tell my doctor which problems are most important to discuss	25 (26%)	The doctor did not address the problems I wanted to discuss	48 (49%)
I let my doctor know when I have doubts about my treatment	41 (43%)	It was not easy to ask for details or express doubts about tests or treatment	29 (30%)
I ask about risks and benefits	23 (24%)	The doctor did not discuss risks, benefits, or alternatives	26 (27%)
Treatment Facilitation	34 (35%)	Treatment Facilitation	28 (29%)
I summarize key points, so I am sure I have it right	39 (41%)	I could not remember all I was supposed to do	31 (32%)
I talk about problems I have with treatment and taking care of myself	27 (28%)	The doctor did not consider difficulties I had following treatment recommendations.	25 (26%)
I talk with the doctor about ways to address problems with treatment and self-care	37 (38%)	The doctor did not help me identify workable ways to change everyday habits	27 (28%)
Interpersonal Rapport	34 (36%)	Interpersonal Rapport	33 (34%)
I tell the doctor things about myself to help him or her understand the kind of person I am	41 (43%)	The doctor did not have a good understanding of me as a person	27 (27%)
I talk with the doctor about my worries and concerns	28 (29%)	The doctor did not effectively address my fears and concerns	39 (40%)

from 24% to 49%) reported having experienced individual communication problems.

While there were differences in the frequency of individual LEAPS-related behaviors and communication problems displayed in the table, there were no significant differences across the patient-centered communication domains.

To test Hypothesis 3 and further explore the relationships presented in Table 3, regression analysis was conducted with the number of communication problems reported as the dependent variable with infrequent past use of LEAPS-related behaviors in each of the four communication domains, contextual factors and narrative scores as predictor variables. The final model explained 21.7% of the adjusted variance in communication problems ( $R^2 = 0.241$ ,  $R = 0.491$ ) which included infrequently used behaviors in the information exchange domain (std Beta 0.372,  $p = .000$ ), typical patient accompaniment of another to their visits (std Beta 0.250,  $p = .007$ ) and narrative score (std Beta 0.186,  $p = .043$ ) as significant predictors. (See Appendix 2 for fuller regression results.)

4. Discussion and conclusion

4.1. Discussion

Our study makes an innovative contribution to medical communication research by proposing and testing a behavioral intention predictive framework adapted to the context of the LEAPS patient communication skill training program. Modeling of SBI provided empirical support for the utility of the predictive framework by explaining 27.7% of adjusted variance in SBI. We interpret the findings as largely supportive of study hypotheses and consistent with theoretical reasoning and empirical work by Sheeran and colleagues [15] and others [16,17] demonstrating the significance of behavioral intention as a meaningful behavior change outcome.

The framework measure of behavioral control did not act as an independent predictor of SBI and consequently was not used in hypothesis testing. Sheehan and colleagues reported self-efficacy as the most common measure of behavioral control used in meta-analysis interventions [15] and we suggest that it be used in future framework studies. Interestingly, the authors also report that there was no additional benefit gained by interventions that changed norms, attitudes, and self-efficacy over those that changed only one of these. This observation leaves open the question of whether the framework prediction of behavioral intention would have been increased by use of self-efficacy as the behavioral control measure.

The LEAPS mode of skill delivery used the study's targeted cancers to tailor four cancer-specific SVP narratives and sets of skill examples to enhance the credibility and influence of the tailored SVP messages. We did not find that patients rated cancer-specific narratives that reflected their diagnosis any differently than other narratives. It is possible that enrollment of unequal numbers of patients with targeted diagnoses diminished statistical power needed to uncover diagnosis differences that may be present. The non-finding does not necessarily mean that narrative tailoring was unsuccessful, considering high narrative ratings across the board, but may indicate that the normative behavioral messages regarding positive effects of communication engagement was equally perceived across all narratives.

Patients reported SBI to use multiple LEAPS skills; on average patients indicated SBI to use 6 of the 13 demonstrated skills and 46% of patients expressed SBI across individual LEAPS skills. We also found that the number of patients expressing SBI to use LEAPS skills was roughly three times greater for patients who frequently used LEAPS-related behaviors in the past than infrequent users. As far as we know, this finding is the first description of the effect of past communication behavior on SBI to use training targeted skills. The regression findings identified frequent past use of SDM related behaviors as a significant predictor of SBI. While we did not see significant differences in the frequency with

which patients used SDM related behaviors relative to other domains, it is possible that wide access to decision aids and public discourse around treatment trade-offs may have increased the salience of these skills and motivated patients to use more skills in this domain as well as skills across other domains in future medical visits.

We hypothesized that infrequent past use of LEAPS-related behaviors would predict communication problems and found this was the case for information exchange behaviors. Behaviors in this domain capture what George Engel refers to as the core patient need to know and understand and to feel known and understood [23]. We can add that infrequent use of these behaviors is also related to problem communication. These problems can be meaningful as they sometimes appear as exacerbating factors in formal patient complaints in the litigation literature as clinician failures to listen, inform, answer questions and provide clear explanations, among others [24].

More communication problems were reported by patients who typically accompany another adult to their medical visits and this may be related to the complex medical problems and polypharmacy of patients who are commonly accompanied. Identification of communication problems in these visits may reflect apprehension that miscommunication or misunderstanding of instructions could be life threatening [25]. It was also positively related to narrative scores, perhaps reflecting greater attentiveness and identification with patients facing common cancer experiences.

The measure of behavioral control is a study limitation. Additional limitations include on-line recruitment and data collection and while it is efficient and produces participant data consistent with information gathered through traditional collection [26–28], it relies on unverified participant report of selection criteria. This also limits generalizability to clinic populations that are less educated and more ethnically diverse than individuals who participate in online studies. Finally, presenting SVP narratives to patients in the same order may have introduced an unmeasured source of bias in narrative ratings.

#### 4.2. Innovation

There is strong theoretical and empirical support to consider behavioral intention as a meaningful outcome for communication training programs, however it has not been studied in patient communication research. The use of LEAPS training videos to test the behavioral intention framework addresses this gap and makes an innovative contribution to research and evaluation of communication training programs. The study findings also have theoretical and methodological implications for program development and identification of factors associated with positive patient response to training. These factors include past use of related visit behaviors that may influence self-selection for study participation because of perceived deficits or strengths in the area; either way, it is important to understand how past behaviors influence pathways to training program success.

#### 4.3. Conclusion

Viewing of the LEAPS training videos resulted in patients' SBI to use multiple LEAPS skills. Analysis guided by the study's predictive framework produced novel insight into the pathways through which SBI was achieved. The study also provides novel insights into the relationship between patients' experience of communication problems and infrequent use of patient-centered visit behaviors.

#### Funding sources

This publication was made possible by support from the Merck Foundation and the Johns Hopkins Clinical Research Network (JHCRN), part of the Johns Hopkins Institute for Clinical and Translational Research (ICTR), which is funded in part by Grant Number UL1 TR003098 from the National Center for Advancing Translational

Sciences (NCATS) a component of the National Institutes of Health (NIH). Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the Merck Foundation, Johns Hopkins ICTR, JHCRN, NCATS or NIH.

#### CRedit authorship contribution statement

**Debra L. Roter:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Marielle Bugayong:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology. **Chenery Lowe:** Writing – review & editing, Writing – original draft, Validation, Software, Project administration, Methodology, Investigation. **Robert L. Joyner:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration. **Anna-Maria Howard:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Investigation. **Jennifer Wenzel:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Adrian S. Dobs:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Investigation, Funding acquisition.

#### Declaration of competing interest

Debra Roter reports financial support was provided by Merck Foundation. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Acknowledgements

We acknowledge the valuable input on content and navigation of the skill program website by members of the Johns Hopkins Cancer Advisory Group and help with scripting of the program narratives and skill examples from clinical co-investigators Drs. Kimberly Peairs, Zachary Burger, Sydney Dy, Craig Pollack and Youngjee Choi. We also appreciate the time and patience of our volunteer actors, Drs. Roland Thorpe, Janice Bowie, Amelia Buttress, Danetta Sloan, Elliot Tolbert and Mrs. Anne Heyman and Mr. Harvey Heyman.

An earlier version of this manuscript was presented at the International Conference for Communication in Healthcare (ICCH virtual meeting) in October 2021.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pecinn.2024.100291>.

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