

Adaptation and Validation of a Questionnaire to Measure Satisfaction With Telephone Care Among Individuals Living With Inflammatory Bowel Disease

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Abstract

Background: Individuals with inflammatory bowel disease (IBD) require routine medical follow-up. The usage of telephone care (TC) appointments increased because of the coronavirus disease 2019 (COVID-19) pandemic. We aimed to adapt a questionnaire to evaluate satisfaction with TC use and validate it among IBD individuals.

Methods: A committee of experts adapted the Telehealth Usability Questionnaire to the TC context and validated its use in individuals with IBD. This committee included three IBD gastroenterology care providers (GCPs), two IBD-patient partners, and two healthcare researchers. The committee evaluated the content validity of the adapted items to measure TC satisfaction. A pilot study assessed the readability and usability of the questionnaire. Individuals with IBD in Saskatchewan completed an online survey with the adapted questionnaire between December 2021 and April 2022. Data were analyzed using descriptive and correlational techniques. Psychometric analyses were conducted to examine the reliability and validity of the questionnaire.

Results: The committee of experts developed the Telephone Care Satisfaction Questionnaire (TCSQ patient), with 16 items and one overall item for TC satisfaction. After the pilot, 87 IBD individuals participated in the online survey. A strong correlation was observed between the 16-item standardized level of TC satisfaction and the overall item, $r = 0.85$ (95% CI 0.78–0.90, $p < 0.001$). The TCSQ patient had optimal internal reliability ($\alpha = 0.96$). Two dimensions were identified in the exploratory factor analysis (i.e., *TC usefulness and convenience*).

Conclusion: The TCSQ patient is a valid and reliable measure of TC satisfaction among individuals with IBD. This questionnaire demonstrated excellent psychometric properties and we recommend its use.

Key words: telephone care; virtual care; inflammatory bowel disease; patient experience; quality of care; patient satisfaction.

Introduction

Virtual care (VC) has been defined as “any interaction between patients and/or members of their circle of care, occurring remotely, using any forms of communication or information technologies with the aim of facilitating or maximizing the quality and effectiveness of patient care”.¹ VC involves different forms of remote interactions between a patient and a health care provider which include telemedicine, telehealth, video conferencing, telemonitoring, and telephone care (TC).^{2,3} Individuals living with inflammatory bowel disease (IBD) residing in rural areas face barriers to accessing specialized care, especially those living in remote communities.⁴ The different VC options could help patients living in remote areas to receive care without having to travel long distances.⁵ VC could increase access to health care and reduce travel costs.⁶ By accessing healthcare services through VC, patients

can avoid fuel and parking expenses, time off of work, and eliminate travel time.^{7,8}

The coronavirus disease 2019 (COVID-19) pandemic affected access to specialized care and added a considerable strain to healthcare systems.⁹ Continuity of care and patient safety were considerable challenges. This issue led to a rapid transition from in-person care to VC worldwide.² Canada was amongst the countries that saw a rise in demand and use of VC during the COVID-19 pandemic.^{10,11} TC was the major form of VC used in certain regions,^{11–13} such as in Saskatchewan and Canada.^{14,15} Several studies have evaluated satisfaction with TC.^{16–18} Although, these studies have limited data on the psychometric properties of the used satisfaction scales.

Questionnaires have been developed and validated to assess satisfaction with VC.^{19,20} The Telemedicine Satisfaction Questionnaire (TSQ)²¹ and Telemedicine Satisfaction and

Usefulness Questionnaire (TSUQ)²⁰ were developed in the early 2000s, but these questionnaires were intended to evaluate videoconferencing technologies only. More recently, validated questionnaires that measure satisfaction with different forms of VC, including telemedicine and videoconferencing, were developed such as the Telehealth Usability Questionnaire (TUQ).^{19,20} Despite the considerable number of TC appointments observed during the last years,^{11–15,22} none of these questionnaires were specifically designed to assess satisfaction with TC. An example of the remarkable proportion of TC visits is the UK where 14% of the over 23 million general practice appointments were conducted by telephone in 2019, compared to the 0.5% completed through video conference.²² In addition, a study from Ontario, Canada, reported that most of the VC visits (91.2%) were TC visits during 2020.¹¹ Consequently, a validated and multidimensional questionnaire to evaluate satisfaction with TC is needed. In this study, we aimed to adapt a questionnaire to evaluate satisfaction with TC use and validate it among individuals with IBD in Saskatchewan, Canada.

Methods

Questionnaire adaptation

With the permission of the principal author, the TUQ was adapted to the context of TC by a committee of experts. The TUQ is a 21-item questionnaire with a 7-point Likert scale designed to evaluate the usability of telehealth implementation and services with robust evidence of its validity and reliability. The development of the TUQ considered existing questionnaires for the evaluation of VC technologies.¹⁹ The TUQ was selected due to its multidimensional structure (i.e., usefulness, ease of use, effectiveness, reliability, and satisfaction) and capacity to measure the quality of VC interactions and services. In addition, the TUQ was recently used to evaluate VC satisfaction among IBD patients and Gastroenterology Care Providers (GCPs) in a Canadian province.¹⁶

A committee of experts (including three IBD GCPs, two IBD-patient partners, and two healthcare researchers) assessed and adapted each item of the TUQ.²⁰ The committee agreed and adapted a TC satisfaction questionnaire for individuals with IBD (TCSQ patient). Content validity was also assessed by this committee of experts to determine if they were representative of the TC experience.

After adaptation, the usability and readability of the TCSQ-patient items were assessed in a pilot. After the pilot, the committee of experts revised the items of TCSQ patient and made some wording adjustments. The final version of the questionnaire was then approved by the committee of experts.

Questionnaire validation

Between December 2021 and April 2022, individuals diagnosed with IBD, 18 years of age or older, residing in Saskatchewan, and with an outpatient visit with a GCP from 4 gastroenterology clinics (two in Saskatoon and two in Regina) received an invitation to participate in an online survey. The survey included the TCSQ patient and demographic questions. Data were collected anonymously via SurveyMonkey. Study participants were required to have at least one TC visit with a GCP during the last year and a previous in-person visit. Ethical approval was obtained for

this study from the University of Saskatchewan Ethics Board (Beh-REB 2704). All the study participants gave their consent before completing the online survey.

Descriptive statistics were obtained for each item of the TCSQ patient (i.e., mean, standard deviation [SD], median, skewness, kurtosis, and variance). We computed standardized levels of satisfaction with TC by adding scored levels per item and dividing them by the total number of items on the scale, producing levels of TC satisfaction between 1.00 and 7.00.

We calculated the inter-item correlations, as well as Pearson's correlation and corresponding 95% confidence interval (95%CI) between the standardized score and the overall TC satisfaction item. Pearson correlation values range between -1 and 1 , where 0 is no correlation; a correlation value of 0.7 and above was interpreted as an adequate item relationship.²³

The internal consistency of the TCSQ patient was assessed by computing Cronbach's alpha coefficient to evaluate the correlation among the questionnaire items. Cronbach's alpha coefficients range from 0 to 1 ; a coefficient of 0.7 and above was considered acceptable internal consistency.²⁴

To examine the underlying structure of the adapted questionnaire, an exploratory factor analysis (EFA) with varimax rotation was completed. Observations with missing data were excluded from the EFA. In addition to providing evidence of the construct validity of the TCSQ patient, the factor analysis was used to explore the underlying dimensions that explain the relationships between the questionnaire's items and facilitate the interpretation of the measure.²⁵ An EFA was selected to explore the structure of the TCSQ patient, expecting modifications to the original factors or dimensions of the TUQ due to the inherent adaptation to the TC context and elimination of certain items. We first tested sample adequacy and conditions for completing an EFA using the Kaiser–Meyer–Olkin (KMO) and Bartlett's sphericity tests.²⁶ Subsequently, item factor loadings were obtained from the EFA. Each dimension was evaluated for stability in case the scale had more than one dimension. Each dimension should have at least three items to be considered stable. If an item was loaded in more than one dimension and the difference in loadings was ≥ 0.20 , then the item was included in the dimension that had the highest factor load.^{27,28}

After conducting the EFA, the identified dimensions were given a name. The name of each dimension was decided based on the concepts captured in each of the items included in the given dimension. Standardized levels of TC satisfaction were also computed for the dimensions identified in the EFA, as well as Cronbach's alpha coefficients for each dimension.

Results

Questionnaire adaptation

Using the TUQ, the committee of experts developed the TCSQ patient. This questionnaire assesses satisfaction with TC among IBD individuals through 16 items and one overall item for assessing TC satisfaction. As per the TUQ, the TCSQ patient has a 7-point Likert scale from $1 =$ strongly disagree to $7 =$ strongly agree.

In the pilot, 13 individuals living with IBD were recruited. The participants of the pilot identified that ten items were usable and seven required minor wording adjustments. After the pilot, the committee of experts revised the items of TCSQ

patient and made some wording adjustments. The final version of the questionnaire was then approved by the committee of experts, see [Supplementary Table](#).

Questionnaire validation

In total, 87 individuals living with IBD participated in the online survey and completed the TCSQ patient. As presented in [Table 1](#), most of the participants had Crohn's disease (64.3%), were women (61.6%), were between 41 and 59 years old (43.5%), and lived in urban centres (69.8%).

[Table 2](#) shows the descriptive statistics of the TCSQ-patient items and inter-item correlations. [Table 3](#) presents the Pearson correlations among the items of the TCSQ patient with their corresponding 95% CIs. All the items were significantly correlated ($p < 0.001$). The TCSQ patient had an optimal internal consistency reliability ($\alpha = 0.96$).

The overall mean standardized level of TC satisfaction for the 16-item-TCSQ patient was 5.70 (SD = 0.94) on a scale from 1.00 to 7.00. A strong correlation was observed between the 16-item standardized level of TC satisfaction and the overall item of TC satisfaction $r = 0.85$ (95%CI 0.78–0.90, $p < 0.001$).

Both the Bartlett sphericity test ($\chi^2 = 1311.4$, $p < 0.001$) and the KMO sample adequacy measure of 0.924 showed sample adequacy and suitability for completing a factor analysis. Subsequently, two dimensions were identified in the EFA

using orthogonal with varimax rotation to maximize the distance between factors ([Table 4](#)). Items 1, 3, 6, 9, 10, 12, 13, 14, 15, and 16 were classified under dimension 1, titled *TC usefulness*. Usefulness could be understood as the individuals' perception that TC works and that it has a positive effect on their health care, including how comfortable an individual feels with using a telephone to access care, preference for using TC (in comparison with in-person care), willingness to use TC again, improvement of access to care, and the ability of TC to meet health care needs. Item 11 had cross-loading between the dimensions. However, this item was retained under dimension 1 as this item was focused on resolving technical issues when using TC, had a higher loading in dimension 1 compared to dimension 2, and because all items within this dimension were strongly correlated with this item.

Dimension 2 included items 2, 4, 5, 7, and 8. This dimension focused on satisfaction with *TC convenience*. *TC convenience* could be defined as the perception of being able to use TC with comfort and little effort or difficulty. *TC convenience* involves ease of use, ability to communicate effectively, time saving, and simplicity to solve issues when using TC.

The means by dimensions were 5.52 (SD = 0.98) for *TC usefulness* (dimension 1), and 6.15 (SD = 0.84) for *TC convenience* (dimension 2). *TC usefulness* had a high correlation with the overall TC satisfaction item $r = 0.87$ (95%CI 0.81–0.92, $p < 0.001$), while *TC convenience* had a moderate correlation with the overall TC satisfaction item $r = 0.64$ (95%CI 0.50–0.75, $p < 0.001$). The Cronbach's α reliability coefficients for the dimensions were also optimal (*TC usefulness*: 0.95 and *TC convenience*: 0.90).

Table 1. Descriptive characteristics of the individuals living with IBD who participated in the online survey ($n = 87$).

Variables	n (%)
Gender*	
Women	53 (61.6)
Men	33 (38.4)
Age group**	
18–40 years	25 (29.4)
41–59 years	37 (43.5)
≥ 60 years	23 (27.1)
Place of residence*	
Urban centre (population > 15,000 people)	60 (69.8)
Rural area (population < 15,000 people)	26 (30.2)
Type of disease***	
Crohn's disease	54 (64.3)
Ulcerative colitis	28 (33.3)
Indeterminate colitis	2 (2.4)
Years living with IBD	
≤ 5	15 (17.2)
6–10	38 (43.7)
≥ 11	34 (39.1)
Medications for IBD*	
Biologics, immunomodulators, or both	53 (61.6)
5-ASA or 5-ASA and corticosteroids	25 (29.1)
None	8 (9.3)
IBD under control within the past 12 months*	
Yes	58 (67.4)
No	28 (32.6)

IBD: inflammatory bowel disease. Data not available for all subjects: *one missing value, **two missing values, ***three missing values.

Discussion

We generated a questionnaire to evaluate TC satisfaction and validated it among individuals living with IBD. The development of the TCSQ patient included rigorous steps, including

Table 2. Descriptive statistics of the Telephone Care Satisfaction Questionnaire for IBD patients (TCSQ patient), $n = 87$.

	Mean (SD)	Median	Skewness	Kurtosis	Variance	Inter-item correlation
Q1	5.74 (1.13)	6	-0.67	2.93	1.28	0.76
Q2	6.29 (1.01)	7	-1.83	6.83	1.02	0.58
Q3	5.39 (1.34)	6	-0.92	3.68	1.79	0.87
Q4	6.12 (0.95)	6	-1.21	4.08	0.89	0.76
Q5	6.17 (0.86)	6	-1.04	3.68	0.74	0.71
Q6	5.71 (1.30)	6	-1.31	4.75	1.69	0.92
Q7	6.07 (1.04)	6	-1.33	4.32	1.09	0.83
Q8	6.09 (1.09)	6	-1.55	4.89	1.20	0.79
Q9	5.72 (1.27)	6	-1.36	4.69	1.61	0.87
Q10	5.04 (1.48)	5	-0.47	2.29	2.19	0.83
Q11	4.85 (1.19)	4	0.72	1.89	1.41	0.47
Q12	5.95 (1.23)	6	-1.97	7.31	1.50	0.86
Q13	5.56 (1.23)	6	-1.09	4.66	1.51	0.85
Q14	6.15 (0.96)	6	-1.23	4.07	0.92	0.88
Q15	4.73 (1.53)	5	-0.41	2.41	2.35	0.75
Q16	5.81 (1.19)	6	-1.33	4.59	1.41	0.91
Q17	5.82 (1.98)	6	-1.11	3.68	1.44	0.87

an interdisciplinary committee that adapted the TUQ to the TC context and a pilot that assessed the questionnaire's readability and usability. The committee included researchers, GCPs, and individuals with IBD, who evaluated the content validity of the TCSQ patient before and after the pilot. In addition, we obtained evidence of the questionnaire's validity and reliability within a sample of individuals living with IBD. The items of the TCSQ patient were related, as per the strong correlation among all the items of the questionnaire, and the construct was confirmed by a strong correlation found between the 16-item standardized score of the TCSQ patient and the overall TC satisfaction item.

The adaptation process in our study could be compared to a study from Australia in the field of ophthalmology where the Mobile Health App Usability Questionnaire (MAUQ), a 21-item scale, was adapted to measure the usability of the Fitbit mobile app. The researchers of that study generated the m-MAUQ to evaluate the usability of a mobile app for the promotion of eye donation. Similar to our study, the MAUQ was adapted to the m-MAUQ by a committee of experts (made up of a panel of academics with expertise in ophthalmology, human-computer interaction, and health informatics) who evaluated the content validity of the questionnaire. Pilot testing of the adapted questionnaire was completed among ten patients from an eye clinic, followed by adjustments of the final questionnaire by the committee of experts. After these steps, the researchers documented the questionnaire's validity and reliability ($\alpha = 0.93$).²⁹ Other adaptation steps similar to our study have been reported in the field of public primary health care among long-term stroke survivors and in the field of pharmacy assessing patient satisfaction with pharmacy services in general hospitals.^{30,31}

The EFA revealed two dimensions of the TCSQ patient. Dimension 1 focused on *TC usefulness* (11 items) and Dimension 2 focused on *TC convenience* (5 items). The factor loadings for the 16 items of the TCSQ patient exceeded the minimum cut-off of 0.35, indicating that items were representative of underlying dimensions.³² Item 11 "If there were technical issues when using telephone care, they were easily resolved" had a cross-loading on both dimensions 1 and 2. After careful consideration of these findings, we decided that these loadings were a more accurate reflection of dimension 1. Furthermore, the 16-item questionnaire, as well as its two dimensions, demonstrated a very good internal consistency reliability given that all Cronbach's alpha coefficients were greater than 0.9.³³ Overall, the TCSQ patient demonstrated excellent psychometric properties.³³

As expected, the dimensions of the TUQ changed in the adaptation process to the TC context. There are differences and similarities between our scale dimensions and those of the TUQ. The TUQ has five dimensions (i.e., usefulness, ease of use and learnability, effectiveness, reliability, and satisfaction) with 23 items to assess users' perspectives on telehealth care. On the other hand, the TCSQ patient has two dimensions (i.e., convenience and usability) with 16 items and one overall item that evaluates IBD users' perspectives on TC. However, a direct parallel could still be drawn between the "Usefulness" and "Ease of Use" dimensions of the TUQ and the "Usefulness" and "Convenience" dimensions of the TCSQ patient. The constructs of these dimensions are related and have evidence of good internal consistency. These two dimensions have relevance as a research tool to identify what factors are associated with high levels of TC usability

or with TC convenience. In a clinical setting, the dimension of the TCSQ patient could also help identify if patients who followed TC are less satisfied with its usability or convenience. Then, quality improvement programs in outpatient clinics could focus on improving TC by focusing on one of these two concepts.

The dimensions that we identified in the TCSQ patient (i.e., *Usefulness* [$\alpha = 0.95$] and *Convenience* [$\alpha = 0.90$]) could also be contrasted with the dimensions of the TSQ developed by Yip et al.²¹ The TSQ is a 14-item questionnaire with two dimensions (i.e., information exchange and patient comfort) which have adequate internal consistency reliabilities (i.e., $\alpha = 0.88$ and $\alpha = 0.81$, respectively).²¹ The TSUQ is another questionnaire that also has two dimensions with high internal consistency (i.e., video visits [$\alpha = 0.96$] and use and impact [$\alpha = 0.92$]).³⁴ Notwithstanding, it is important to highlight that the TUQ, TSQ, and TSUQ were developed and validated to assess satisfaction with videoconferencing technologies, not TC.

In our study, we measured the levels of satisfaction with TC among individuals living with IBD. The mean satisfaction with TC was high, 5.70 (SD = 0.94). Similarly, the mean levels of TC satisfaction by dimensions were high, 5.52 (SD = 0.98) for TC usability and 6.15 (SD = 0.84) for TC convenience, especially the latter. These results were similar to the study in Alberta among IBD individuals evaluating the usability of telehealth where 84.3% of the study participants were satisfied with VC experiences.¹⁶ These high rates of satisfaction with virtual IBD care could be attributed to the convenience of both telehealth and TC.

Given that in certain provinces and regions of Canada TC is more commonly used than other VC options like telehealth or video conferencing,^{11,13-15} as in the case of IBD follow-up visits in Saskatchewan, the presented questionnaire to measure TC satisfaction could be used to monitor the satisfaction of patients using TC. Along with other clinical indicators, low levels of patient satisfaction with TC could trigger the need to switch to an alternative format for delivering care such as video conference or in-person visits. Furthermore, among IBD individuals who are in remission and followed via TC, the dimensions of the TCSQ patient could help identify if individuals are less satisfied with the usability (i.e., it works well for accessing care) or convenience (the perception of being able to use it with comfort and little difficulty) of using TC. These measurements could inform quality improvement initiatives in outpatient clinics to improve TC processes. Finally, further studies could explore the factors associated with high levels of TC satisfaction, including gender, age, area of residence, type of IBD, disease activity, perceived quality of life, etc. These evaluations can help identify target groups of patients that should be followed via telephone, and conversely, those for whom TC may not be appropriate.

This study has some limitations that should be acknowledged. We could not evaluate other psychometric properties of the TCSQ patient, such as test-retest reliability, predictive validity, or discriminant validity. Follow-up measurements and other tools within the survey are needed to evaluate these properties. Follow-up measurements and a longer survey could significantly impact response rates. In addition, the relatively small sample size of the study may not fully represent all individuals with IBD. However, this sample was adequate to obtain evidence of the questionnaire's validity and reliability. Also, there could be recall bias since the study

Table 3. Person correlations among the items of the Telephone Care Satisfaction Questionnaire (TCSQ patient) with their corresponding 95% confidence intervals, *n* = 87.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	
Q1	1															
Q2	0.49*	1														
	(0.30-0.64)															
Q3	0.67*	0.54*	1													
	(0.53-0.77)	(0.37-0.68)														
Q4	0.50*	0.46*	0.54*	1												
	(0.32-0.65)	(0.22-0.62)	(0.36-0.67)													
Q5	0.41*	0.45*	0.84*	0.57*	1											
	(0.22-0.58)	(0.62-0.61)	(0.40-0.70)	(0.76-0.89)												
Q6	0.70*	0.51*	0.84*	0.68*	0.58*	1										
	(0.58-0.79)	(0.34-0.66)	(0.76-0.89)	(0.54-0.78)	(0.41-0.70)											
Q7	0.61*	0.49*	0.63*	0.79*	0.69*	0.74*	1									
	(0.45-0.73)	(0.31-0.64)	(0.48-0.88)	(0.55-0.79)	(0.62-0.82)											
Q8	0.52*	0.44*	0.58*	0.79*	0.73*	0.69*	0.88*	1								
	(0.34-0.66)	(0.25-0.60)	(0.41-0.71)	(0.70-0.86)	(0.61-0.82)	(0.56-0.79)	(0.82-0.92)									
Q9	0.60*	0.46*	0.71*	0.64*	0.54*	0.75*	0.77*	0.69*	1							
	(0.44-0.72)	(0.27-0.61)	(0.58-0.80)	(0.49-0.76)	(0.37-0.68)	(0.63-0.83)	(0.67-0.85)	(0.56-0.79)								
Q10	0.66*	0.39*	0.73*	0.52*	0.48*	0.71*	0.58*	0.55*	0.79*	1						
	(0.05-0.76)	(0.19-0.56)	(0.61-0.82)	(0.34-0.66)	(0.29-0.63)	(0.58-0.80)	(0.42-0.71)	(0.38-0.69)	(0.69-0.86)							
Q11	0.30*	0.21*	0.34*	0.36*	0.37*	0.30*	0.31*	0.35*	0.44*	0.37*	1					
	(0.08-0.49)	(-0.02-0.41)	(0.52-0.12)	(0.15-0.54)	(0.16-0.55)	(0.15-0.54)	(0.08-0.49)	(0.08-0.59)	(0.14-0.53)	(0.24-0.60)						
Q12	0.58*	0.47*	0.75*	0.62*	0.58*/	0.85*	0.70*	0.77*	0.64*	0.37*	0.37*	1				
	(0.41-0.71)	(0.28-0.62)	(0.63-0.83)	(0.47-0.74)	(0.42-0.71)	(0.78-0.90)	(0.57-0.79)	(0.54-0.77)	(0.66-0.84)	(0.49-0.75)	(0.15-0.55)					
Q13	0.61*	0.41*	0.74*	0.57*	0.47*	0.78*	0.63*	0.77*	0.64*	0.37*	0.76*	0.76*	1			
	(0.45-0.73)	(0.21-0.58)	(0.63-0.83)	(0.39-0.69)	(0.28-0.62)	(0.67-0.85)	(0.41-0.74)	(0.46-0.74)	(0.61-0.82)	(0.59-0.81)	(0.16-0.55)	(0.66-0.84)				
Q14	0.69*	0.50*	0.79*	0.65*	0.60*	0.85*	0.66*	0.74*	0.67*	0.33*	0.83*	0.75*	0.75*	1		
	(0.55-0.78)	(0.32-0.65)	(0.69-0.86)	(0.50-0.76)	(0.44-0.72)	(0.77-0.89)	(0.52-0.77)	(0.45-0.73)	(0.62-0.82)	(0.53-0.78)	(0.12-0.52)	(0.74-0.88)	(0.63-0.83)			
Q15	0.58*	0.32*	0.66*	0.46*	0.39*	0.69*	0.51*	0.63*	0.71*	0.31*	0.52*	0.67*	0.61*	0.61*	1	
	(0.41-0.71)	(0.11-0.50)	(0.52-0.77)	(0.28-0.62)	(0.19-0.56)	(0.56-0.79)	(0.33-0.65)	(0.26-0.61)	(0.48-0.75)	(0.58-0.80)	(0.09-0.49)	(0.34-0.66)	(0.33-0.77)	(0.46-0.73)		
Q16	0.63*	0.49*	0.82*	0.65*	0.60*	0.82*	0.73*	0.74*	0.75*	0.35*	0.81*	0.79*	0.82*	0.82*	0.65*	1
	(0.47-0.74)	(0.31-0.64)	(0.73-0.88)	(0.49-0.76)	(0.44-0.72)	(0.74-0.88)	(0.61-0.82)	(0.62-0.82)	(0.64-0.83)	(0.13-0.53)	(0.72-0.87)	(0.69-0.86)	(0.74-0.88)	(0.51-0.76)		
Q17	0.64*	0.44*	0.82*	0.54*	0.52*	0.77*	0.64*	0.59*	0.80*	0.31*	0.78*	0.76*	0.80*	0.65*	0.84*	0.84*
	(0.50-0.75)	(0.25-0.60)	(0.74-0.88)	(0.37-0.68)	(0.34-0.66)	(0.67-0.85)	(0.49-0.76)	(0.42-0.71)	(0.71-0.87)	(0.64-0.83)	(0.09-0.50)	(0.68-0.85)	(0.72-0.87)	(0.49-0.76)	(0.77-0.89)	

**p* < 0.001.

Table 4. Factor loading and uniqueness for each item of the Telephone Care Satisfaction Questionnaire for IBD patients (TCSQ patient), $n = 75$.

Item		Dimension 1 (TC usability)	Dimension 2 (TC convenience)	Uniqueness
Q10	I think the care provided over the telephone is as good as the care provided in-person	0.8291	0.2506	0.2498
Q15	I prefer using telephone care rather than in-person appointments	0.8010	0.1327	0.3408
Q13	Telephone care is an appropriate way to receive healthcare services	0.7962	0.3693	0.2297
Q03	Telephone care meets my healthcare needs	0.7953	0.3898	0.2155
Q06	I like using telephone care	0.7910	0.4753	0.1484
Q14	I would use telephone care services again	0.7701	0.4471	0.2070
Q09	I felt I was able to express myself effectively using telephone care	0.7461	0.4580	0.2335
Q16	Telephone care is an efficient way to receive care from my provider	0.7429	0.5232	0.1744
Q12	I feel comfortable communicating with the clinician using telephone care	0.7264	0.5015	0.2209
Q01	Telephone care improves my access to healthcare services	0.6987	0.3194	0.4098
Q11	If there were technical issues when using telephone care, they were easily resolved	0.3559	0.2658	0.8026
Q04	It was simple to use telephone care	0.3216	0.8680	0.1431
Q05	It was easy to understand the process of using telephone care	0.2365	0.8575	0.2087
Q08	I could hear the clinician clearly using telephone care	0.3800	0.8328	0.1620
Q07	The clinician could hear me clearly using telephone care	0.4719	0.7683	0.1870
Q02	Telephone care saves me time travelling to a hospital or specialist clinic	0.3545	0.5779	0.5404

Loadings below 0.3000 are in grey font.

participants had to make an assessment within the last year. Some participants probably found it difficult to recall events and perceptions which could have led to a higher or lower correlation or validity than that being reported. Given that ethnicity and socioeconomic status were not captured in this study, further research using the TCSQ patient could explore the questionnaire's psychometric properties considering these and other demographic variables. In addition, the adapted questionnaire was tested among individuals who previously had in-person visits and were living with IBD for several years. The performance of the TCSQ patient could be further explored in different sub-populations, for example, among patients new to a gastroenterology clinic and those newly diagnosed with IBD.

Conclusion

The TCSQ patient is a highly valid and reliable measure of TC satisfaction among individuals living with IBD. This questionnaire is the first validated tool to measure patients' satisfaction with TC. This questionnaire demonstrated excellent psychometric properties with evidence of its validity and reliability. Our results allow us to recommend the use of the TCSQ patient in further studies assessing satisfaction with TC. The use of the TCSQ patient could facilitate the identification of opportunities for improvement of TC use among individuals with IBD. In addition, further studies could

consider exploring the psychometric properties of the TCSQ patient in other chronic medical conditions.

Authors' contributions

J.N.F., N.R., S.F., and J.N.P.S. designed the study and contributed to the drafting of the manuscript. J.N.F. and J.N.P.S. completed the analysis of the data. All authors contributed to the study conception, data interpretation, and revisions to the manuscript for important intellectual content, and approved the final version for publication.

Conflict of interest

S.F. has received honoraria for speaking or consultancy from AbbVie, Amgen, Janssen, Pendopharm, Pfizer, Sandoz, and Takeda. SB has received honoraria for speaking or consultancy from Janssen, Abbvie, Takeda, and Pfizer, as well as support for attending meetings from Pfizer. S.B. is also a board member of the Saskatchewan Medical Association. The other authors declare no conflict of interest.

Acknowledgments

This study received funding from the Saskatchewan Health Research Foundation (SHRF), Solutions Grant. In addition,

the graduate student of the project received funding from the College of Medicine Graduate Award (CoMGRAD), University of Saskatchewan. We also thank the members of the committee of experts who worked on the adaptation of the questionnaire, as well as the individuals who participated in the online survey.

Data availability

The data of this study could be shared on reasonable request to the corresponding author. This data cannot be shared publicly to protect the privacy of the study participants.

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