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Original Research

## Development and validation of PSPSQ 2.0 measuring patient satisfaction with pharmacist services

Prashant Sakharkar, Pharm.D., M.P.H.<sup>a,\*</sup>,  
Mark Bounthavong, Pharm.D., M.P.H.<sup>b</sup>,  
Jan D. Hirsch, B.Pharm., Ph.D.<sup>b,c</sup>,  
Candis M. Morello, Pharm.D., CDE<sup>c</sup>,  
Timothy C. Chen, Pharm.D., BCACP, CGP<sup>d</sup>,  
Anandi V. Law, B.Pharm., Ph.D., FAPhA<sup>e</sup>

<sup>a</sup>Department of Clinical and Administrative Sciences, Roosevelt University, College of Pharmacy, 1400 N Roosevelt Blvd, Schaumburg, IL 60173, USA

<sup>b</sup>Veterans Affairs San Diego Healthcare System, San Diego, CA, USA

<sup>c</sup>UC San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences, La Jolla, CA, USA

<sup>d</sup>Tobacco Cessation Clinical Resource Center (TCCRC), Veterans Affairs San Diego Healthcare System, San Diego, CA, USA

<sup>e</sup>Department of Pharmacy Practice and Administration, Western University of Health Sciences, College of Pharmacy, Pomona, CA, USA

### Abstract

**Background:** The extant literature reveals a lack of psychometrically validated tools measuring patient satisfaction with pharmacist clinical services. The Patient Satisfaction with Pharmacist Services Questionnaire (PSPSQ 2.0) was developed to address this need using a mixed methods approach.

**Objective:** To assess the psychometric properties of the PSPSQ 2.0, an instrument developed to measure patient satisfaction with clinical services provided by pharmacists.

**Methods:** Validation studies were conducted in two Veterans Affairs (VA)-based and two community-based (diabetes and psychiatric care) disease management/medication therapy management clinics. The PSPSQ 2.0 consisted of 22-items related to three domains identified as quality of care, patient-pharmacist relationship and overall satisfaction using a 4-point, Likert-type scale. It was administered to participants following their session with a pharmacist at the clinics. Collected data were analyzed for descriptive statistics, internal consistency, and validity using exploratory factor analysis.

**Results:** A total of 149 patients completed the survey. Patients from VA clinics were on average 61 years old, mostly white (63%), and predominantly male (95%). Patients from non-VA clinics were on average 47 years old, mostly White (47%) and male (53%). Non-VA patients mostly had Medicaid (42%) and commercial health insurance (31%), whereas VA patients retained benefits with the US Department of Veterans Affairs. Reliability of the scale using internal consistency metrics revealed a Cronbach's alpha of 0.98, 0.98 and 0.95 for VA, diabetes, and psychiatric care clinics, respectively, whereas the Cronbach's alpha for the pooled sample was 0.96. Factor analyses resulted in a three-factor solution accounting for 91% and 69% variance for diabetes and psychiatric care clinics, respectively; however, VA clinics and

\* Corresponding author. Tel.: +1 847 240 4077; fax: +1 847 330 4525.

E-mail address: [psakharkar@roosevelt.edu](mailto:psakharkar@roosevelt.edu) (P. Sakharkar).

pooled sample yielded only 2-factor solution with 80% and 66% variance, respectively, with more items loading on patient-pharmacist relationship domain.

**Conclusions:** The results suggest that the PSPSQ 2.0 can serve as a reliable and valid tool for measuring patient satisfaction with pharmacists providing clinical services in VA- and non-VA settings upon further validation.

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**Keywords:** Patient satisfaction; Satisfaction questionnaire; Survey validation; Pharmacy services; Disease state management

## Introduction

Patient satisfaction with health care services has gained increased attention in the last two decades as a valuable indicator of perceived quality of care. Patient satisfaction is referred to as a humanistic or patient reported outcome (PRO) that, in addition to clinical and economic outcomes, serves as an important determinant of the success and sustainability of health care services.<sup>1</sup> According to Linder-Pelz, satisfaction is mediated by personal beliefs and values about care as well as prior expectations about care, whereas Ware and colleagues postulated that patient satisfaction is a multidimensional function of patients' subjective responses to experienced care mediated by their personal preferences and expectations.<sup>2,3</sup> Patients with high health care satisfaction have been reported to value their relationship with health care providers, accept their advice, and adhere to treatment resulting in improved health outcomes.<sup>2–6</sup>

In recent years, patient satisfaction has also evolved as an outcome indicator in pharmacist-directed patient care services such as disease management (DM), Medication therapy management (MTM), oncology and pain management, and parenteral nutrition support services.<sup>7</sup> Patient satisfaction with pharmacist-provided care directly reflects the patients' positive (or negative) perception of pharmacists and the services provided by them; and was identified as a significant factor in determining the value of MTM in a survey conducted among pharmacist-run DM clinics.<sup>8</sup>

In 1983, Ware and colleagues developed the Patient Satisfaction Questionnaire (PSQ) to assess patient satisfaction with medical care, an instrument that has undergone psychometric evaluation.<sup>9–11</sup> As a result, the PSQ served as a framework for the development of future patient satisfaction instruments. The PSQ had 55 Likert-type items related to 9 domains (i.e. technical

and interpersonal skills of providers, waiting time for appointments, office waits, emergency care, costs of care, insurance coverage, availability of hospitals, and other resources and satisfaction with care, in general).<sup>9–11</sup> Several items of the PSQ were adapted by MacKeigan and Larson in the development and validation of a multidimensional measure of patient satisfaction with pharmacy services.<sup>12</sup> Dimensions included by MacKeigan and Larson were explanation, consideration, technical competence, financial aspects, accessibility, drug efficacy, over the counter (OTC) product availability, and quality of the drug product. Additional domains from this study requiring further validation included drug quality and OTC availability. This study was conducted two decades ago using convenience sampling with a large number (889) of low-income patients attending outpatient clinics (family practice clinics) to measure patient satisfaction, in general. Since then, with the further development of pharmacists' clinical roles, dimensions of pharmacists' responsibilities have evolved. The Pharmaceutical Care Satisfaction Questionnaire (PCSQ) developed by Gourley et al measured consumer satisfaction with pharmacy services.<sup>8</sup> This instrument was developed to measure patient satisfaction with pharmacist services; however, its validation was conducted in disease-specific clinics in one practice setting (hyperlipidemia patients at Veterans Affairs medical centers), and no further validation of it was reported in other practice settings.

A literature review revealed that over the last 30 years, numerous instruments have been developed and used to measure patient satisfaction with pharmacist and pharmacy services in various health care settings including hospital, community, ambulatory care and specialized pharmacy services.<sup>4,13–30</sup> However, these instruments suffered from various limitations: they were either a set of 3–4 questions developed to measure patient satisfaction with a specific clinic, with no

attempt at any or robust psychometric testing, not re-used, or employed a variety of response scales. Additionally and in most cases, they did not focus on patient satisfaction as a primary outcome.<sup>4,13,30</sup> These factors have limited their uptake by researchers and clinicians. The recent Consumer Assessment of Healthcare Providers and Systems (CAHPS-III) survey included pharmacy services but had only 1–2 items focusing on pharmacist patient relationship or care.<sup>31</sup> To the authors' knowledge, there is no psychometrically established patient satisfaction instrument focused on direct patient care by pharmacists in the current health care environment. Additionally, a literature review performed in 2005 concluded that "with the exception of diabetes disease management, there are no prevalent, systematic, or statistically validated approaches for measuring patient satisfaction within the disease management industry."<sup>32</sup>

#### *Instrument development (PSPSQ 2.0)*

The Patient Satisfaction with Pharmacist Clinical Services Questionnaire (PSPSQ) underwent two phases of development. This paper discusses two phases and the rationale for the generation and selection of items and domains.

As evident in the literature, patient satisfaction with health care has been assessed on various dimensions including provider communication, patient involvement in care decisions, provider behavior, perceptions of quality of care, physical surroundings, professional competence, personal qualities, cost/convenience, and nursing and medical care.<sup>33–36</sup> Patient satisfaction with pharmacist/pharmacy services include domains such as technical competence, accessibility, competence in dispensing, professional communication, physical and emotional comfort, location plus convenience, trust, interpersonal skills, explanation, knowledge and service delivery.<sup>4,9,30,37,38</sup>

Researchers have identified two primary dimensions of patient satisfaction within a pharmacist intervention: friendly explanation (including friendliness of care, the setting of care, and medication counseling) and managing therapy (dealing with pharmaceutical care-managing drug therapy and solving therapy problems).<sup>39</sup> Patient satisfaction is linked to several aspects of health-care experience, patient's relationship with the provider and several service quality dimensions.<sup>33,35</sup> These factors carry different weights in terms of their importance in assessing patient satisfaction.

Patient satisfaction was operationalized as a patient evaluation of pharmacist and services for quality of care, their relationship and overall satisfaction in direct patient care settings such as Disease Management/MTM clinics. A mixed methods approach was employed to develop the "Patient Satisfaction with Pharmacist Clinical Services Questionnaire (PSPSQ)" instrument based on Ware's framework and building upon the work of MacKeigan and Larson, and others. Responses from patients to a qualitative interview at local DM/MTM clinics were also incorporated. Using this approach, two domains, patient-pharmacist relationship and quality of care, similar to ones that were studied earlier and a third domain to measure patients' overall satisfaction (in global sense) with pharmacist services were incorporated.<sup>4,9,30</sup> Following this step, 23 items were generated to form the first version of the PSPSQ. It comprised a 4-point, Likert-type scale (strongly agree, agree, disagree, and strongly disagree) as opposed to a 5-point response. The instrument did not include items related to domains that dealt with other aspects of quality of care (i.e., accessibility of pharmacy or financial aspects of service).

The first version of PSPSQ was tested in a sample of 70 pharmacy students for comprehensibility, clarity, and internal consistency, which led to the refinement of several items. This version was then pilot-tested with a sample of 10 lay individuals and patients. Several items were reworded and one item was eliminated based on these results and after soliciting feedback from experts (faculty that are engaged in teaching and research in social, administrative and behavioral sciences and have expertise in survey development and validation) (Fig. 1). Further refinement yielded the final version of the instrument (PSPSQ 2.0), which consists of three domains and 22 items (Appendix I). Three additional items were added

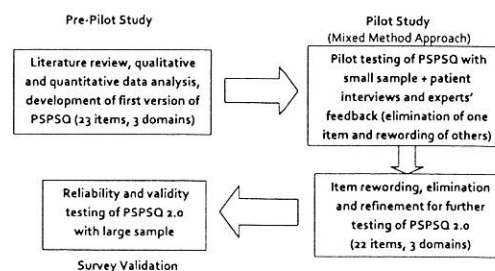


Fig. 1. Survey Development Process.



to collect baseline demographics: (1) age, (2) gender and (3) race/ethnicity.

The primary objective of the current study was to assess the psychometric properties of the PSPSQ 2.0 in measuring patient satisfaction with pharmacist-provided clinical services in various settings.

## Methods

### *Study design*

An observational study design was used to psychometrically test the PSPSQ 2.0 and assess patient satisfaction with pharmacist-managed DM/MTM clinics. The purpose of this study was to explore the three identified domains and to ascertain the underlying relationships between measured variables using exploratory factor analysis.

The study received approval from participating centers' Institutional Review Boards, which included Western University of Health Sciences and the Veterans Affairs San Diego Healthcare System.

### *Participating clinics*

Data collection was conducted at three pharmacy settings: (1) Veterans Affairs San Diego Healthcare System (VASDHS) primary care clinics in San Diego, CA; (2) a community-based diabetes care clinic located in Covina, CA; and (3) an outpatient psychiatric care MTM Clinic at Aurora Charter Oak Behavioral Healthcare Hospital in Covina, CA.

The VASDHS sample came from two DM clinics: the Pharmacist Primary Care Clinic and the Diabetes Intense Medical Management Clinic. The clinical pharmacy specialists at VASDHS have full prescriptive authority granted by the local Medical Executive Committee and an overseeing physician for managing hypertension, dyslipidemia, diabetes management and other related conditions. Given that both VA clinics functioned similarly, they were combined in the analysis and categorized as VA (Veterans Affairs) clinics.

The community-based diabetes care clinic in Covina is a specialized DM clinic with pharmacists exclusively involved in caring for patients with diabetes and related conditions. The primary goal of this clinic is to provide counseling and diabetes education, manage medication therapy, and dispense diabetes medications and durable medical equipment.

The psychiatric care clinic is an ambulatory care facility within an acute care psychiatric hospital responsible for treatment of psychiatric and chemical dependency problems providing a full continuum of care. The pharmacist is responsible for medication reconciliation, consultations involving a brief medication therapy management and weekly patient education in-group sessions.

### *Data collection*

Following informed consent, the PSPSQ 2.0 was administered to patients following their regular pharmacist clinic visits. Survey administrators were not providers at the respective clinics. Data collection was started in July 2009 and continued until May 2012.

### *Statistical analyses*

According to Streiner and Norman, the required sample size to perform factor analysis is conditioned on the completion of surveys by five to ten respondents for every item under investigation.<sup>40</sup> By using ratio of 1:5, a sample of 110 was estimated to be the minimally sufficient sample size for the study independent of number of clinics. An additional 20% were included to account for non-participation or dropouts bringing the total to 132 participants.

Data were analyzed for descriptive statistics. A chi-square test was used to discern differences in baseline characteristics and patient satisfaction across clinical settings. Descriptive statistics included frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Item analysis was performed and the item-total correlation was calculated. Items with total correlation value of 0.3 or higher were retained. The scores per domain were averaged to obtain a summary measure of patient satisfaction. Psychometric analyses included testing for reliability and construct validity. Tool reliability analysis was conducted using internal consistency via Cronbach's alpha for each domain and for the entire scale. Construct validity was examined using exploratory factor analysis with principal component method and Varimax rotation with Kaiser normalization. Factor loadings with eigenvalues of 1.0 or above were used as a means of retaining factors. Items showing loading on multiple domains were allocated to the domain that had higher loading. A simple mean imputation method was used when individual items from a domain were missing. Statistical significance was

defined as a  $P < 0.05$  (two-tailed). All analyses were performed using SPSS ver. 19 (Chicago, IL).<sup>41</sup>

## Results

A total of 149 participants from the three pharmacy settings completed the PSPSQ 2.0 (Diabetes Care Clinic,  $N = 25$ ; VA clinics,  $N = 43$ ; and Psychiatric Care Clinic,  $N = 81$ ). Patients from the two VA clinics were comparable in terms of baseline demographics. Table 1 summarizes the profile of the survey respondents. There were significant differences in age and gender between the VA and non-VA clinics; otherwise, measurable baseline characteristics were similar across the groups. Due to the differences in these baseline characteristics, tool reliability and factor analysis were conducted separately for VA and non-VA clinics along with analysis of the pooled sample.

### Respondent characteristics

A group-to-group comparison was performed on respondents' characteristics. The average age for all patients combined in the study was 51.4 (SD, 16.9) years. Age was categorized as  $\leq 50$  and  $> 50$ , since mean sample age was 51 yrs and

majority of patients were 60 yrs of age and above. Patients at the diabetes and VA clinics were relatively older compared to the Psychiatric Care Clinic (Table 1). Large proportions of the patients were White (63%, 64% and 41%) at the VA, Diabetes Care, and Psychiatric Care clinics, respectively. In addition, one-third of the participants at the Psychiatric Care Clinic were Hispanics/Latinos. The VA clinics had 95% male patients compared to Diabetes Care (48%) and Psychiatric Care Clinic (53%). Information regarding third party insurance for VA patients could not be obtained for our sample and may result in some heterogeneity. Unlike the VA respondents, a large proportion (42%) of patients at the non-VA clinics had Medicaid followed by commercial health insurance coverage (31%).

### Psychometric properties of the instrument

The survey response rate, individual item means, floor and ceiling effects are summarized in Table 2. The survey response rate was 90% with individual item mean ranging from 3.5 to 3.7 on 4-point Likert scale. A large proportion of respondents (90%) reported high satisfaction with all items of PSPSQ 2.0, but it was greater (99%) with items related to patient-pharmacist relationship domain.

Table 1  
Profile of survey responders ( $N = 149$ )

	VAC $n = 43, (\%)^a$	DC $n = 25, (\%)^a$	PC $n = 81, (\%)^a$	Total $n = 149, (\%)^a$	$P$ -value <sup>b</sup>
Age (yrs.)					
$\leq 50$	7 (16)	1 (4)	56 (69)	64 (43)	$< 0.05$
$> 50$	36 (84)	24 (96)	20 (25)	80 (54)	
Mean (SD)	60.8 (9.8)	69.9 (9.1)	40.34 (13.4)	51.4 (16.9)	
Gender					
Male	41 (95)	12 (48)	43 (53)	96 (64)	$< 0.05$
Female	2 (5)	10 (40)	33 (41)	45 (30)	
Race/ethnicity					
White/Caucasian	27 (63)	16 (64)	33 (41)	76 (51)	NS
African American	4 (9)	1 (4)	4 (5)	9 (6)	
Hispanic/Latino	3 (7)	6 (16)	25 (31)	34 (23)	
Asian	2 (5)	–	7 (9)	9 (6)	
Other	–	–	5 (6)	5 (3)	
Insurance					
Commercial	–	9 (36)	24 (30)	33 (22)	NS
Medicare	–	7 (28)	4 (5)	11 (7)	
Medicaid	–	–	44 (54)	44 (30)	
VA benefits	43 (100)	–	–	43 (29)	

VAC – Veterans Affairs Clinics; DC – Diabetes Clinic; PC – Psychiatric Clinic.

<sup>a</sup> Percentages may not equal 100 because of missing responses.

<sup>b</sup>  $P$ -value on the Chi-square analysis; NS – Not significant.

Table 2  
Survey response rate

Survey items	No.	% Missing	Mean	SD	Floor effects <sup>a</sup>	Ceiling effects <sup>b</sup>
1. RPh addressed my health concerns	149	0.00	3.60	0.59	1.3	63.8
2. RPh was professional in interaction	149	0.00	3.66	0.54	0.7	69.1
3. RPh explained information that I can understand	149	0.00	3.66	0.49	0.7	67.1
4. RPh checked if I understood	148	0.68	3.53	0.59	0.0	57.7
6. RPh spent as much time needed	149	0.00	3.56	0.59	0.0	61.1
7. RPh made sure I understood following the drug regimen	148	0.68	3.58	0.52	0.0	59.1
8. RPh provided useful recommendations on taking my meds	149	0.00	3.43	0.68	0.0	51.7
9. RPh made recommendations for my overall health	149	0.00	3.40	0.75	0.7	53.7
10. RPh worked with me to manage my med related issues	148	0.68	3.46	0.69	1.3	55.7
11. RPh followed up on my progress in timely manner	145	2.68	3.37	0.73	0.7	47.0
12. RPh was caring and kind in his interactions	148	0.68	3.66	0.51	1.3	66.4
13. RPh encouraged me to achieve my treatment goals	149	0.00	3.54	0.67	0.0	61.7
14. RPh made me comfortable in my interactions	148	0.68	3.71	0.47	0.0	71.1
15. RPh was respectful during our interactions	149	0.00	3.74	0.44	0.0	73.8
16. RPh was committed in improving my health	147	1.34	3.66	0.53	0.0	67.8
17. I could trust my RPh on the information provided	147	1.34	3.67	0.47	0.0	65.8
18. I was satisfied with my RPh for overall care provided	148	0.68	3.60	0.54	0.0	62.4
20. I would recommend my RPh to others	149	0.00	3.58	0.58	0.0	61.1
21. I would continue seeing my RPh if needed	149	0.00	3.64	0.49	0.0	65.1
22. I am satisfied with the overall care provided	148	0.68	3.54	0.60	1.3	57.7

SD – Standard deviation.

<sup>a</sup> Percentage of patients with the lowest scoring.

<sup>b</sup> Percentage of patients with highest scoring.

#### Reliability and validity

For reliability testing and factor analysis, two of the survey items were excluded, as their inter-item correlations for the only negatively worded item were very low (<0.3) (“There are some things about my visit with the pharmacist that can be improved,” and “My physician and

pharmacist worked together as a team to manage my health”). The results of reliability and factor analysis are presented in Tables 3–5.

#### VA clinics

The Cronbach’s alpha was 0.98 for the entire scale, 0.96 for domain labeled “quality of care”;

Table 3  
Results of reliability and item analysis

Factors	VA clinics	Diabetes clinic	Psychiatric clinic	Pooled sample
1. Quality of care				
Item mean (range)	3.5 (3.3–3.7)	3.7 (3.6–3.7)	3.5 (3.3–3.7)	3.6 (3.4–3.7)
Inter-item correlation mean	0.73	0.85	0.49	0.61
Cronbach’s alpha	0.96	0.98	0.91	0.94
2. Patient pharmacist relationship				
Item mean (range)	3.6 (3.5–3.7)	3.7 (3.6–3.7)	3.7 (3.5–3.7)	3.7 (3.5–3.7)
Inter-item correlation mean	0.79	0.85	0.54	0.65
Cronbach’s alpha	0.96	0.97	0.89	0.92
3. Overall satisfaction				
Item mean (range)	3.5 (3.4–3.6)	3.6 (3.6–3.6)	3.6 (3.6–3.7)	3.6 (3.5–3.6)
Inter-item correlation mean	0.72	0.70	0.63	0.65
Cronbach’s alpha	0.88	0.82	0.84	0.84
Total scale				
Item mean (range)	3.6 (3.3–3.7)	3.7 (3.6–3.7)	3.5 (3.3–3.7)	3.6 (3.4–3.7)
Inter-item correlation mean	0.70	0.77	0.64	0.58
Cronbach’s alpha	0.98	0.98	0.95	0.96



Table 4  
Survey items and their loading on three domains (Rotated component matrix) for different clinics

Survey item <sup>a</sup>	VA clinics <sup>b</sup>		Diabetes clinic			Psychiatric clinic		
	F1	F2	F1	F2	F3	F1	F2	F3
1. RPh addressed my health concerns	0.359	<b>0.827</b>	<b>0.716</b>	0.654	0.146	<b>0.583</b>	0.390	0.390
2. RPh was professional in interaction	<b>0.892</b>	0.317	0.564	<b>0.764</b>	0.043	<b>0.760</b>	0.080	0.080
3. RPh explained information that I can understand	0.596	<b>0.624</b>	0.564	<b>0.764</b>	0.043	0.326	0.309	<b>0.596</b>
4. RPh checked if I understood	0.510	<b>0.783</b>	<b>0.716</b>	0.654	0.146	0.485	<b>0.580</b>	0.220
6. RPh spent as much time needed	0.470	<b>0.786</b>	<b>0.716</b>	0.654	0.146	<b>0.555</b>	0.440	0.417
7. RPh made sure I understood following the drug regimen	<b>0.655</b>	0.579	<b>0.876</b>	0.297	0.112	<b>0.798</b>	0.253	0.213
8. RPh provided useful recommendations on taking my meds	0.338	<b>0.808</b>	<b>0.711</b>	0.538	0.266	<b>0.743</b>	0.385	0.215
9. RPh made recommendations for my overall health	0.217	<b>0.931</b>	<b>0.758</b>	0.450	0.220	0.141	<b>0.770</b>	0.392
10. RPh worked with me to manage my med related issues	0.280	<b>0.881</b>	<b>0.845</b>	0.297	0.303	0.575	<b>0.628</b>	0.237
11. RPh followed up on my progress in timely manner	0.526	<b>0.631</b>	<b>0.841</b>	0.414	0.173	0.457	<b>0.696</b>	0.126
12. RPh was caring and kind in his interactions	<b>0.846</b>	0.350	<b>0.716</b>	0.654	0.146	0.232	0.389	<b>0.607</b>
13. RPh encouraged me to achieve my treatment goals	<b>0.701</b>	0.476	<b>0.742</b>	0.457	0.216	0.223	0.547	<b>0.583</b>
14. RPh made me comfortable in my interactions	<b>0.843</b>	0.394	0.326	<b>0.906</b>	0.182	0.257	0.317	<b>0.835</b>
15. RPh was respectful during our interactions	<b>0.911</b>	0.200	0.326	<b>0.906</b>	0.182	0.416	0.046	<b>0.697</b>
16. RPh was committed in improving my health	<b>0.846</b>	0.371	0.508	<b>0.647</b>	0.407	0.203	0.516	<b>0.575</b>
17. I Could trust my RPh on the information provided	<b>0.867</b>	0.417	0.490	<b>0.777</b>	0.281	<b>0.561</b>	0.378	0.406
18. I was satisfied with my RPh for overall care provided	<b>0.620</b>	0.576	0.490	<b>0.777</b>	0.281	<b>0.693</b>	0.457	0.369
20. I would recommend my RPh to others	<b>0.743</b>	0.541	0.102	0.041	<b>0.948</b>	0.507	<b>0.553</b>	0.209
21. I would continue seeing my RPh if needed	<b>0.733</b>	0.480	<b>0.595</b>	0.559	0.459	0.287	<b>0.710</b>	0.266
22. I am satisfied with the overall care provided	0.453	<b>0.593</b>	0.392	0.552	<b>0.713</b>	0.273	<b>0.676</b>	0.379

F1: Quality of care, F2: Patient Pharmacist relationship, F3: Overall satisfaction. Extraction method: Principal component analysis, Rotation method: Varimax with Kaiser Normalization; Rotation converged in 3, 5 and 16 iterations for VA, diabetes and psychiatric care clinic, respectively. High factor loadings are presented in bold.

<sup>a</sup> Detail description of survey items is provided in Appendix I, item no. 5 and 19 were not included in final factor analysis.

<sup>b</sup> Data yielded only two domains.

and 0.96 for the domain labeled "patient-pharmacist relationship"; and 0.88 for the domain labeled "overall satisfaction" from respondents at the VA clinics. The overall mean item score was 3.6 on a 4-point scale. No significant association was found between patient satisfaction and age, gender, and ethnicity. The corrected item to total correlation for the entire scale was 0.70. Factor analysis using Varimax rotation yielded two factors that accounted for 80% of the variance. Items 1, 3, 4, 6, 8, 9, 10, 11, 18, 20 and 21 loaded on factors other than expected (Tables 3 and 4).

#### Diabetes care clinic

For the diabetes care clinic, the reliability assessment resulted in Cronbach's alpha of 0.98 for the entire scale, 0.98 for domain labeled quality of care, 0.97 for domain labeled patient-pharmacist relationship, and 0.82 for domain labeled overall satisfaction. The overall mean item score was 3.7 on a 4-point scale. No significant association was found between patient satisfaction and age, gender, ethnicity and

insurance status. The corrected item to total correlation for the entire scale was 0.77. Factor analysis using Varimax rotation yielded three factors that accounted for 91% variance. A total of 5 items (2, 3, 12, 13 and 21) showed higher factor loading on factors other than expected.

#### Psychiatric care clinic

Cronbach's alpha of the entire survey tool was 0.95; Cronbach's alpha was 0.91 for domain labeled quality of care, 0.89 for domain labeled pharmacist patient relationship and 0.84 for domain labeled overall satisfaction. The overall mean item score was 3.5 on a 4-point scale. Factor analysis resulted in a three-factor solution accounting for 69% of variance. The corrected item to total correlation for the entire scale was 0.642. Majority of factors loaded on domains with five items (3, 9, 10, 11 and 18) showing loading on two other factors than expected.

None of the items if deleted would have increased the Cronbach's alpha among these clinics; hence, all the items were retained in the

Table 5  
Survey items and their loading on two domains with pooled sample<sup>b</sup> (Rotated component matrix)

Survey item <sup>a</sup>	Pooled sample	
	F1	F2
1. RPh addressed my health concerns	0.514	<b>0.646</b>
2. RPh was professional in interaction	<b>0.688</b>	0.363
3. RPh explained information that I can understand	<b>0.666</b>	0.442
4. RPh checked if I understood	0.538	<b>0.643</b>
6. RPh spent as much time needed	0.596	<b>0.617</b>
7. RPh made sure I understood following the drug regimen	<b>0.593</b>	0.511
8. RPh provided useful recommendations on taking my meds	0.230	<b>0.812</b>
9. RPh made recommendations for my overall health	0.209	<b>0.831</b>
10. RPh worked with me to manage my med related issues	0.412	<b>0.763</b>
11. RPh followed up on my progress in timely manner	0.375	<b>0.633</b>
12. RPh was caring and kind in his interactions	<b>0.741</b>	0.317
13. RPh encouraged me to achieve my treatment goals	0.375	<b>0.633</b>
14. RPh made me comfortable in my interactions	<b>0.839</b>	0.295
15. RPh was respectful during our interactions	<b>0.815</b>	0.170
16. RPh was committed in improving my health	<b>0.667</b>	0.454
17. I could trust my RPh on the information provided	<b>0.766</b>	0.393
18. I was satisfied with my RPh for overall care provided	<b>0.690</b>	0.552
20. I would recommend my RPh to others	<b>0.597</b>	0.341
21. I would continue seeing my RPh if needed	<b>0.680</b>	0.432
22. I am satisfied with the overall care provided	0.523	<b>0.554</b>

F1: Quality of care, F2: Patient Pharmacist relationship, F3: Overall satisfaction. Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser Normalization; Rotation converged in 3 iterations. High factor loadings are presented in bold.

<sup>a</sup> Detail description of survey items is provided in Appendix I, item no. 5 and 19 were not included in final factor analysis.

<sup>b</sup> Items loaded on only two domains rather than three as expected.

scale. No significant association was found between patient demographic characteristics and their satisfaction with the pharmacist services among respondents from all clinics.

#### Pooled sample analysis

The Cronbach's alpha was 0.96 for the entire scale, 0.94 for domain labeled "quality of care," 0.92 for the domain labeled "patient-pharmacist relationship", and 0.84 for the domain labeled "overall satisfaction" for all of the respondents. The overall mean item score was 3.6 on the 4-point scale. The corrected item-to-total correlation for the entire scale was 0.58. Factor analysis using Varimax rotation yielded two factors that accounted for 66% of the variance. Item 2 ("The pharmacist was professional in all of our interactions") and item 3 ("The pharmacist explained information to me in a manner that I could understand") of the quality of care domain were poorly correlated with items within the same domain, whereas highly correlated with items of domain labeled patient-pharmacist relationship. Three items related to domain labeled overall satisfactions showed good correlation with each other, but they were also highly correlated with items from other domains. In total, five items did not load on domains as expected with pooled sample (Tables 3 and 5). No significant association was observed between patient demographic characteristics and their satisfaction with the pharmacist services.

#### Discussion

This study assessed the psychometric properties of PSPSQ 2.0, developed to measure patient satisfaction with pharmacist services rendered in DM and MTM clinics. Two survey items were excluded from the final analysis. These items may have confused survey respondents in differentiating negatively worded and positively worded items. All scales, such as domain-specific scale and scale for the entire survey, demonstrated good reliability.

Item analyses of PSPSQ 2.0 indicated considerable item-domain convergence for data from all clinics. The item means ranged from 3.5 to 3.7 on a 4-point Likert scale with low variability. The patients who took part in the study were generally highly satisfied with the quality of care and relationship with their pharmacist as reflected by ceiling effects (higher proportion of respondents grading maximum score) and low floor effects. In this study, 12 out of 20 items had no low scoring (floor effects), whereas 47%–74% patients had high scoring for different items resulting in positively skewed response. This is consistent with the



findings of Gourley and colleagues, where the overall PCSQ mean scores were high and positively skewed, indicating higher patient satisfaction and other evidence in patient satisfaction research.<sup>8,42</sup> Although there was some variability in the degree of satisfaction observed for different domains, which can be attributed to the fact that patients at these clinics may have different perceptions and expectations of services offered by their pharmacists. This variability further indicates that the items were discriminating at measuring differences between individuals on the facets being measured.

The results of factor analysis supported the validity of the PSPSQ 2.0 questionnaire. The domains brought about by the factor analysis with few exceptions were similar to those posited. Moreover, the PSPSQ 2.0 showed loading of items related to domains that are similar with the previously validated questionnaires for assessing patient satisfaction.<sup>9–11</sup> The PSPSQ 2.0 domain of quality of care and patient-pharmacist relationship were similar to domains of earlier instruments (technical quality, interpersonal manner, communication, time spent with provider, explanation, consideration and technical competence) identified by Ware et al, MacKeigan et al and Horvat and Kos.<sup>9–12,43</sup> Similarly, a four-factor solution determined in a validation study by Gourley and colleagues included domains of patient-pharmacist relationship and provision of pharmaceutical care, similar to PSPSQ 2.0. In this study patients showed higher satisfaction with the care they received from their pharmacists similar to the manner observed with the PSPSQ 2.0.<sup>8</sup>

Patients frequently seek information from pharmacist on medication use, dosages, adverse effects and drug interactions.<sup>41</sup> In this study, patients' perceptions about how pharmacist made sure that "I understood how important it is to follow the drug regimen"; "worked with me to manage my medication related issues (e.g. cost, side effects of drugs)"; and "provided useful recommendations on how to take my medications" were measured, and patients were found to be highly satisfied with the quality of care provided by their pharmacists. This provides further evidence that patients' positive perception of this attribute is an important factor for building and sustaining patient relationships.

The item-total correlations for most of the items for all three clinics and with pooled sample were high indicating that the items demonstrated strong positive correlation with the total scale

score. The Cronbach's alphas for all three clinics were in the range of 0.95–0.98, and 0.96 for pooled sample. This provides assurance for the internal consistency of the survey and its suitability to measure patient satisfaction with pharmacist-managed clinical services. The study results were consistent with the findings of Larson et al, where patient satisfaction with pharmaceutical care was measured on two dimensions: Managing Therapy (nine items) and Friendly Explanation (eleven items) among eight community pharmacies in Iowa.<sup>42</sup> Results of this study showed that the patients had low scoring on items related to Managing Therapy scale compared to Friendly Explanation scale. In the current study, patients reported high levels of agreement on items comprising the patient-pharmacist relationship domain.

Three overall satisfactions items did not load as expected but loaded on other domains for data from independent clinics and with pooled sample, this aspect can be attributed to the global nature of this construct. This observation is also consistent with the findings by MacKeigan and Larson et al, where items related to general satisfaction failed to define a separate dimension in their validation study.<sup>12</sup> In the pooled sample, a total of five items of PSPSQ 2.0 loaded on domains other than their own.

The PSPSQ 2.0 is relatively simple to use in practice; scoring of the questionnaire is easy and satisfaction scores can be compared with other pharmacies or within a single pharmacy over time. Overall, it took on average 10–15 min to complete 22 items of the PSPSQ 2.0 which included obtaining patient's informed consent and administration of survey. Since this completion time suggests burden to respondents, further psychometric analysis involving item reduction will be undertaken in future survey use and validation. In the current analysis, 20 items (after excluding two) were analyzed. Further testing will involve exclusion of three overall satisfactions items that failed to define a separate domain and two other items which had poor correlation with items within the same domain and high correlation with items of other domain, reducing PSPSQ 2.0 from 20 items to 15 items.

Confirmatory factor analysis (CFA) will be used to identify items that most adequately measure the true construct of each of the 2 remaining domains. Here, CFA will be used in an exploratory context to further refine solutions provided by exploratory factor analyses. This approach allows

investigators to identify items that have weak relationships with their corresponding domains and to subsequently exclude these items from further analyses leading to further shortening of instrument, if needed. Another approach may be undertaken includes comparing PPSQ 2.0 with other instruments of known properties for convergence and divergence validity.

This study used the data from three pharmacy practice settings for its first validity analysis. Study findings provided preliminary evidence that the PPSQ 2.0 is a reliable and valid patient satisfaction measurement instrument for pharmacist clinical services. This instrument is currently in use at the VASDHS. Continuing data collection from this and several planned sites will focus on construct validity and possible item reduction to reduce respondent burden as discussed above. Further research is needed to look at confirmatory factor analysis and testing in other practice settings to expand generalizability.

#### Limitations

This study has several limitations that should be taken into account when extrapolating results to different populations and DM/MTM settings. The sampling method did not preclude self-selection, which may have introduced selection bias. Sample size was determined based on the overall sample regardless of clinic characteristics; however differences in clinical setting, role of the pharmacists, unique healthcare practices (especially collaborative care in VA) and patient population across three settings forced us to consider data analysis of independent clinics along with a pooled sample. In this case, our sample number may not be sufficient to meet standard sample size requirement, if individual clinics are to be considered. The factor analysis resulted in items loading on two domains rather than three as expected. Responses were positively skewed towards greater patient satisfaction, which may be due to pre-existing long-term relationships of patients with pharmacists as a result of the collaborative care provided at the VA healthcare system. This potential confounder could not be adjusted for in our current analysis.

The three overall satisfaction items loaded on different domains than expected. This aspect can be attributed to the global nature of this construct. High satisfaction with pharmacy services may attenuate any expected responses and affect instrument validity.

#### Conclusion

The PPSQ 2.0 is an instrument developed to assess patient satisfaction with various pharmacist clinical services. Our results suggest that the PPSQ 2.0 can serve as a valid and reliable instrument for measuring patient satisfaction with pharmacist clinical services. Further research is needed to refine the instrument, confirm its domains and to test its utility in other pharmacy practice settings to make it more robust.

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#### Appendix A

##### Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.sapharm.2014.10.006>.

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