Development and validation of a scale to measure patients' trust in pharmacists in Singapore

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Objective: To develop and validate a scale to measure patients' trust in pharmacists for use as an outcomes predictor in pharmacoeconomic and pharmaceutical care studies.

Methods: Literature review, study team discussion and focus group discussions were conducted to generate items of a candidate version to be pilot-tested for content validity. An amended candidate version was then tested among eligible Singaporeans across different ethnic and age groups. Score distributions were assessed for discriminatory power and item analyses for finalizing items. Exploratory factor analysis was used to identify dimensionality and homogeneous items. Cronbach's alpha was measured for internal consistency and Pearson's correlation coefficients for convergent validity.

Results: Eighteen items were generated with good variability (SD > 1.0) and symmetry (means ranged from −1 to 1) for score distribution. After minor changes to improve content clarity, the amended questionnaire was self-administered among 1196 respondents [mean (SD) age: 38.6 (14.9) years, 51.6% female, 87% >6 years of education]. Six items were dropped due to inadequate item-total correlation coefficients, leaving 12-item scale for factor analysis. Three factors ("benevolence", "technical competence" and "global trust") were identified, accounting for 55% of the total variance. Cronbach's alpha was 0.83, indicating high internal consistency. Convergent validity was demonstrated by statistically significant positive correlations between trust and patients' satisfaction with pharmacists' service (r = 0.54), returning for care (r = 0.30) and preference of medical decision-making pattern (r = 0.16).

Conclusion: The 12-item trust in pharmacists scale demonstrated high reliability and convergent validity. Further studies among other populations are suggested to confirm the robustness and even improve the current scale.

Keywords: trust, pharmacist, scale, factor analysis, patient relationship

Introduction

With the increasing emphasis on pharmaceutical care in the practice of pharmacy, the roles of pharmacists have been undergoing vigorous expansion. Studies have shown that pharmaceutical care contributed to less drug-related morbidities and mortalities, improved clinical outcomes and health-related quality of life, and lower medical costs.[1–3] A key success factor in the pharmaceutical care is the quality of patient-pharmacist relationship. In such relationship, patients grant authority to pharmacists to manage their health and well-being. In turn, pharmacists accept responsibility to take care of the well-being of the patients.[1,4] Because of the vulnerability of patients and uncertainties of outcomes, patient-pharmacist relationship is largely influenced by the level of patients' trust in pharmacists.[5] From the patients' perspective, trust in pharmacists could be defined as "patients' willingness to be vulnerable to the actions of pharmacists based on the expectation that pharmacists will do what is best for patients, irrespective of patients' ability to monitor pharmacists."[6]

Based on a literature search in PubMed (1966–Oct 2006), there was no published scale to measure patients' trust in pharmacists. In order to assess influence of trust on

other outcomes (ie, adherence to drug therapy, satisfaction with the pharmacy service, quality of pharmaceutical care, etc.) as demonstrated in studies on other medical practitioners, a reliable and valid instrument to test patients' trust in pharmacists should be developed first.[7–9]

Therefore, the primary objective of this study was to develop and validate a scale that could measure patients' trust in pharmacists.

As for the scale development, although practical patterns are different between pharmacists and other health care practitioners, items and dimensions in trust scales of other health care practitioners could still provide useful references. It was found that items in the other trust scales could be summed into two overarching dimensions as technical competence and benevolence.[10,11] Technical competence might include evaluating problems thoroughly, providing appropriate and effective treatment, predisposing factors and structural and staffing factors. Benevolence dimension might comprise understanding patients' individual experiences, expressing caring, communicating clearly and completely, building partnership and sharing power, demonstrating honesty and respect, and keeping information confidential.[8,10–13]

In the process of validation, three hypotheses were generated to test the convergent validity of the scale based on findings from studies on the relationships between patients and physicians/other health care practitioners:[8,10,11,14]

1) Patients' trust in pharmacists would be positively correlated with "satisfaction with pharmacists' service";
2) Patients' trust in pharmacists would be positively correlated with "returning for care";
3) Patients' trust in pharmacists would be positively correlated with "preference of having pharmacists to decide on the medication to buy".

Methods
Study design and subjects
The whole study was divided into two phases: scale development and scale validation. No financial compensation was given to any participants in this study and ethics approval for the study was obtained from the National University of Singapore.

Scale development
Literature review on trust scales in other health care professions and further study team discussion were carried out to identify or generate candidate domains and items that might be used to develop the trust scale in pharmacists. Focus group approach was then used to determine whether the concept,

the candidate domains and items based on the literature review and study team discussion were relevant, and to explore any new candidate domains or items. Apart from the open discussion, quantitative methods were also used to explore the relevance of those candidate items identified or generated from the literature review and the study team discussion. Respondents were asked to rate the relevance of those domains and items on a 5-point Likert Scale (1 = least relevant, 5 = most relevant).

Eligible participants for the focus group discussion were recruited from the batch of final-year pharmacy undergraduates at the National University of Singapore, who had consulted and obtained medications from pharmacists during the past six months before the discussion. The rationale to recruit final-year pharmacy undergraduate students as focus group participants was that their valuable experience as intern pharmacists could add in the perspective from pharmacists as well as third-party observers.

In accordance with rules of thumb, a sample of three to four groups with seven people each was planned initially. The exact number of groups was determined by the reaching of "saturation point".[15] The saturation point was decided to be reached if there was no more information/data generated from the last two focus group discussions. Focus group discussions were audio-recorded and transcribed for content analysis using ATLAS.ti 5.0 Demo (ATLAS.ti Scientific Software Development GmBh, Berlin, 2003–2005).

Based on the results of the focus group discussions, the candidate version of "Trust in Pharmacists Scale" was developed. The scale was structured with both favorably and unfavorably worded items to avoid respondents' blind agreement with statements regardless of the content.[16] Answers were formatted with a 7-point Likert scale (with −3 = totally disagree and 3 = totally agree) to improve score distribution.[17] Scores of individual items could be summed up for a final score to represent the level of patients' trust in pharmacists.

The candidate scale was evaluated by 10 other pharmacy graduate students for face validity (the relevance to measure "patients' trust in pharmacists") and clarity of those candidate items. An expert panel of three experienced pharmacists was asked to assess content validity, that is, how well the candidate items represented the specific intended domains based on experts' judgment.[18] Pilot testing of the revised candidate version was undertaken by a convenience sample of another 77 final-year pharmacy undergraduates, who had not participated in the focus group discussion. Time of completion, comments on the revised candidate scale were also collected

to ensure nonexcessive burden on the respondents and to provide further suggestions on item modifications.

Scale validation

After necessary amendments, the finalized candidate scale was aimed to be distributed by research assistants to a convenience sample of 1,200 English-speaking Singaporeans at local neighbourhoods and community centers. It was designed that study subjects should be across the three major local ethnic groups (Chinese, Malay and Indian) from three age groups (18–35 yrs; 36–55 yrs; 56 yrs and above) with an equal ratio among ethnic groups and 2:2:1 ratio among age groups to explore factor structure, reliability and validity of the questionnaire. The uneven ratio of age groups was due to the fact that the English-speaking elderly population is relatively small in Singapore.[19] Besides, some of the elderly English-speaking population might also have cognitive dysfunction due to medical problems or the aging process.

Eligible respondents should be able to complete the English questionnaire without any help and have consulted or obtained medications from a pharmacist during the past six months.

Measures

Besides the finalized candidate scale to measure patients' trust in pharmacists, several other questions were included in the questionnaire: demographic information (age, gender, ethnicity, housing, education level); current chronic disease status, basic information relevant to the scale (time period of last visit to a pharmacist; type of pharmacist visited last time); a validated six-item scale to assess patients' satisfaction with the pharmacists' service;[17] and two newly-generated items based on the demonstrated positive association as in earlier literatures to assess the behavior intents (willingness to return for care on the 7-point Likert scale, preferred decision-making pattern on medication on a 5-point Likert scale [1 = totally by myself, 5 = totally by pharmacist]).[20,21]

Statistical analysis
Scale development
In the scale development, item means and standard deviations were used to quantitatively measure the relevance of those candidate items generated from literature review and study team discussion by the focus group participants. Item means and standard deviations were also used to determine whether adequate variability and symmetry in score distribution were achieved in the revised candidate scale.

Scale validation
In the scale validation, sample characteristics were descriptively analyzed. Response means and standard deviation were calculated to determine variability and symmetry in score distributions, which could indicate discriminatory power. To select items for the final scale, item analyses were done to ensure the corrected item–total correlation coefficients should be greater than 0.30 for final items.[22] Exploratory factor analysis was used to determine dimensions of the trust. Principal components analysis of the partial correlation matrix was used to identify groups of homogeneous items suitable for measuring each dimension of the trust. The number of factors selected for Varimax rotation was determined by a combination of criteria: (1) the roots criterion of selecting factors with eigenvalues to be greater than 1; (2) the Scree test to examine a plot of eigenvalues and stop factoring at the point where the pot begins to level off; and (3) the interpretability and meaningfulness of trial factor rotations. Each factor should have two or more loadings above 0.40 to make a rotated factor interpretable. In addition, the items loading on one factor should fit together logically.[23–26]

Tentative scale was then composed of those items with factor loading above 0.40 on one factor and lesser loadings on other factors to represent each dimension. If an item loaded above 0.40 on more than one factor, assignment of the item was to be based on logical fit and verification by item analysis.[22,23,25] As for reliability, internal consistency was assessed by Cronbach's alpha. Convergent validity was studied using Pearson's correlation coefficients to indicate the association between "patients' trust in pharmacists" with "patients' satisfaction with pharmacists' service", "willingness to return for care" and "preferred decision-making pattern on medication".[26]

Results
Scale development
Altogether four focus groups (total number of participants = 28) were shown to be adequate for item generation. Table 1 presents the eighteen candidate items that were identified in the literature review, the study team and the focus group discussions. It was found that most of the candidate items generated from the focus group discussion were the same as those identified from the literature review and the study team discussion. Results showed that age, gender, ethnicity of pharmacist might be less relevant to patients' predisposing trust in pharmacists than the rest of the items. There were two brand new items generated from the focus group discussions: type of the pharmacist and set-up of the pharmacy counter. Some of the participants thought aloud that they preferred

Table 1 Items generated from focus group approach and response analysis

	Items	Source*	Relevance** Mean (SD)
1.	Demonstrating up-to-date knowledge	3	4.32 (0.72)
2.	Evaluating medical problems thoroughly	3	4.36 (0.68)
3.	Keeping information totally private (confidentiality)	3	4.75 (0.52)
4.	Demonstrating honesty when a mistake is made	3	4.32 (0.77)
5.	Expressing concern	3	4.43 (0.69)
6.	Communicating clearly and completely	3	4.61 (0.50)
7.	Showing sufficient respect	3	4.57 (0.69)
8.	Providing effective medication at a reasonable price	4	4.82 (0.48)
9.	Allowing shared decision-making pattern when there are alternatives	2	3.89 (0.69)
Predisposing factors			
10.	Age of the pharmacist	3	2.50 (1.28)
11.	Gender of the pharmacist	3	2.25 (1.18)
12.	Ethnicity of the pharmacist	1, 4	2.11 (1.10)
13.	Type of the pharmacist (Hospital, polyclinic, community, etc.)	1	N/A
14.	Past experience with pharmacists	4	4.00 (0.90)
15.	Recommendation by others (friends, neighbors, relatives, etc.)	3	3.68 (0.72)
16.	Set-up of the pharmacy counter	1	N/A
17.	Professional appearance	3	4.14 (0.71)
18.	Global trust in pharmacist	2	N/A

Notes: *1 = generated from focus group only; 2 = generated from literature review only; 3 = both 1 and 2; 4 = generated by the study team only; **Relevance is scored on a 5-point Likert scale (1 = most irrelevant; 2 = somewhat irrelevant; 3 = neutral; 4 = somewhat relevant; 5 = most relevant) from 28 participants. Data is presented as mean (SD); N/A, not applicable.

hospital pharmacists due to their rich experience with various illnesses. Additionally, "a neat and tidy pharmacy counter" was regarded as a reflection of professionalism and efficiency of pharmacists. Based on literature review, another item on global trust was also included (Item 18 in Table 1).[11]

The questionnaire was assessed as face valid by the pharmacy postgraduate students and as content valid by the expert panel of pharmacists. In the pilot test, the average completion time was 7.4 minutes. Score distribution of the 18 candidate items was shown to achieve good variability (SD > 1.0) and symmetry (means ranged from −1 to 1). In the open-ended question on readability of the questionnaire, quite a few respondents suggested to avoid using negative worded items so as to minimize confusion. Except for some minor wording changes, no other problems were raised. After minor revisions, the scale to be validated included 18 revised candidate items (Table 2).

Scale validation
Altogether 2,965 people were approached for the study, yet 1,759 of them declined to participate. In the end, the questionnaires were distributed to 1,206 eligible respondents (response rate = 41%). Data analysis was based on 1,196 respondents with complete answers on all 18 candidate items of the trust scale. Demographic and background information was summarized in Table 3.

Item analyses (Table 2) showed that five candidate items (Items 4, 11, 13, 14, and 15) were below the criteria of 0.3 in item-total correlation, so they were dropped in the first round. When the 13 candidate items were performed using the same analysis again, item 10 was found to be below the criteria (coefficient = 0.12 <0.3), leaving 12 items for subsequent analyses.[22]

Based on the criteria of eigenvalue and Scree plot, three factors were identified that accounted for 55% of the total variance with the first factor explaining up to 36%. Two items (Items 3 and 5) had dual loadings (loadings greater than 0.40 on two factors). Scale assignments for them were made on the basis of logical fit with other items loading on the two factors under consideration. Table 4 lists the factor loading and assignment of the 12 final items.

Table 2 Item analyses of 18 candidate items

Candidate items	Score*	Corrected item-total correlation coefficients
1. I trust a pharmacist who has updated knowledge.	1.58 (0.98)	0.39
2. I trust the pharmacist if he/she evaluates my medical problem thoroughly.	1.59 (0.99)	0.45
3. I trust the pharmacist who could keep the information we discuss totally private.	1.63 (1.05)	0.43
4. I trust the pharmacist if he/she tells me about a mistake he/she has made on my medication.	0.95 (1.35)	0.28
5. I trust the pharmacist if he/she expresses concern and talks to me with reassuring and comforting words.	1.47 (0.99)	0.41
6. I trust the pharmacist if he/she could communicate with me clearly and completely.	1.79 (0.87)	0.46
7. I trust a pharmacist who shows sufficient respect for me.	1.75 (0.74)	0.43
8. I trust the pharmacist if he/she provides me with effective medication at a reasonable price to me.	1.60 (1.03)	0.46
9. I trust the pharmacist if he/she allows me to make decision on which medication to take when there are alternatives.	0.99 (1.19)	0.33
10. I trust an older pharmacist more than a younger one.	0.44 (1.42)	0.32
11. I trust a hospital pharmacist more than other types of pharmacist (community, polyclinic pharmacist, etc.).	0.31 (1.41)	0.28
12. I trust a pharmacist with professional appearance.	1.25 (1.07)	0.46
13. I will trust other pharmacists if I have had pleasant past experience with another pharmacist.	0.25 (1.48)	0.14
14. I trust a pharmacist of the same race as myself more than the other races.	−0.51 (1.59)	0.27
15. I trust a pharmacist of the same gender as myself more than the opposite gender.	−0.56 (1.53)	0.19
16. I trust a pharmacist who has been recommended by others (ie, friends, neighbors or relatives, etc.).	1.13 (1.06)	0.39
17. I trust a pharmacist whose set-up of the counter is neat and tidy.	1.19 (0.95)	0.37
18. I trust a pharmacist so much that I always try to follow his/her advice.	0.84 (1.14)	0.38

Note: *Score is presented as Mean (SD).

Factors were labeled as follows according to the order of extraction: (1) benevolence (including six candidate items: confidentiality, expressing caring, communicating clearly and completely, showing sufficient respect, providing effective medication at a reasonable price and allowing shared decision-making pattern when there are alternatives); (2) technical competence (including two candidate items: demonstrating up-to-date knowledge and evaluating medical problem thoroughly); and (3) global trust including all other aspects that do not exclusively fit in any dimension (including four candidate items: blind trust in pharmacists and predisposing factors such as recommendation by others, set-up of pharmacy counter and professional appearance).[8,10–13]

Due to the observation that the correlation coefficients among three factors via Promax rotation were all less than 0.5, discriminatory power was demonstrated and a three-dimension scale structure was suggested.[24] As shown in Table 4, item-scale correlation coefficients were between 0.35 and 0.60. The Cronbach's alpha was 0.83, indicating high internal consistency.[27] Convergent validity was demonstrated by the finding that, as hypothesized, patients' trust in pharmacists was positively correlated with patients' satisfaction with pharmacists' service (r = 0.54, P < 0.001), returning for care (r = 0.30, P < 0.001) and preference of having pharmacists to decide on the medication to buy (r = 0.16, P < 0.001).

Discussion

To the best of our knowledge, the current study was the first one to develop and validate a scale to measure patients' trust in pharmacists. The availability of such scale will enable the incorporation of "patients' trust in pharmacists" as a dependent or an independent variable in pharmacoeconomics and pharmaceutical care studies in various health care settings. The 12-item scale developed in this study demonstrated high reliability and good convergent validity. Systematic approach has been adopted to ensure robustness of the results. Scale development included item generation (by literature review, study team discussion and focus group approach) and item

Table 3 Demographic and background information of respondents

	N (%) unless specified otherwise
Age*	38.6 (14.9)
Female	617 (51.6)
Ethnicity	
Chinese	460 (38.5)
Malay	373 (31.2)
Indian	363 (30.4)
Housing	
Public housing	927 (77.5)
Private housing	254 (21.2)
Presence of chronic medical problems	526 (44.0)
Education level	
≤6 yrs of education	137 (11.5)
7 to 10 yrs of education	646 (54.0)
≥11 yrs of education	394 (32.9)
Last visit to a pharmacist	
Within 1–3 months	671 (56.1)
Within 4–6 months	525 (43.9)
Type of pharmacist visited last time	
Hospital	294 (24.6)
Polyclinic	388 (32.4)
Community	507 (42.4)

Note: *Age is presented as Mean (SD).

refinement (by panel review and pilot test). Scale validation was performed by response analysis, reliability and validity tests, and exploratory factor analysis.

Interestingly, the scale to measure patients' trust in pharmacists was shown to have similar dimensionalities to the scale to measure patients' trust in physicians. The two common dimensionalities were technical competence and benevolence. This would imply that patients tend to trust health care providers based on similar criteria. If so, health care providers should especially put their efforts in improving technical competence and showing benevolence to achieve desired treatment outcomes.[26] Apart from the similarity, a difference was also detected in the assignment of global trust. Global trust was identified as an independent factor based on the exploratory factor analysis in the current scale. Yet, in the scale to measure patients' trust in physicians, it was incorporated into the benevolence factor.[11]

Additionally, the positive correlations as reported in the findings of convergent validity merit some further discussion. It is important and interesting for pharmacists to know that trust did play an important part in patients' satisfaction with their services ($r = 0.54$, $p < 0.001$). As patients' satisfaction has been increasingly emphasized to measure the quality of pharmaceutical care, it is thus essential for pharmacists to understand how to gain and improve patients' trust, which could actually be assisted with the use of the current scale.[17] Similarly, although the correlation between trust and chances of returning for care was only mild ($r = 0.30$, $p < 0.001$), yet it did suggest that trust would influence the long-term relationship between pharmacists and patients, which has become increasingly important in chronic disease management. Comparatively, the correlation between trust in pharmacists and preference of having pharmacists to make the medication decision tended to be much milder. This might in fact suggest that patients, especially younger generations, might prefer a shared decision-making pattern by pharmacists and themselves. This changing paradigm actually fit one of the objectives of disease management, that is, patients themselves should play a critical role and be more medically knowledgeable.[27]

Table 4 Factor analysis and reliability of the 12-item trust scale

Factors	Item No	Factor loading	Corrected item-total correlation	Cronbach's alpha if item deleted
Factor 1 (benevolence)	3	0.42	0.56	0.81
	5	0.46	0.52	0.81
	6	0.68	0.60	0.80
	7	0.79	0.55	0.81
	8	0.73	0.53	0.81
	9	0.53	0.36	0.82
Factor 2 (technical competence)	1	0.84	0.52	0.81
	2	0.82	0.60	0.80
Factor 3 (global trust)	12	0.62	0.43	0.82
	16	0.67	0.35	0.82
	17	0.74	0.43	0.82
	18	0.59	0.38	0.82

Several limitations together with suggestions for future studies should also be noted:

First, because patients' trust is a changeable psychological trait and not a steady state, retest was not carried out in our study.[9,28] Therefore, test–retest reliability remains unknown for the scale. We suggest that test-retest reliability test be assessed in future studies to prove the robustness of the scale. In order to minimize the potential change in this psychological trait, we suggest the interval of test-retest should be relatively short (eg, one to two weeks) and the participant should not have interacted with any other pharmacist during the interval. Otherwise, the participant should be excluded from the test–retest reliability analysis.

Second, despite potential advantages of thinking of trust in perspectives of both patients and pharmacists, final-year pharmacy undergraduates may not well represent pharmacy-visiting patients in the real world. Hence, it is possible that the items generated from those undergraduates might be different from patients with diversified backgrounds. Hence, this may potentially affect the validity of the current scale. We suggest that in future studies patients with diversified backgrounds be recruited in the focus group discussions to further validate the current scale.

Third, due to the convenience sampling and self-administration mode, respondents of the current study might be healthier and better educated compared with the average level of pharmacy-visiting patients. Such potential bias may lead to different emphasis on the items of trust in pharmacists, which may lead to somewhat different chosen items. Hence, it is suggested that future study be sampled on a more general population to further validate the scale.

In conclusion, the 12-item scale to measure patients' trust in pharmacists demonstrated high reliability and convergent validity. It was constructed on three factors, namely, benevolence, technical competence and global trust. Further studies with a larger and diverse sample are suggested to confirm the robustness or even improve the scales. Nevertheless, the current scale would provide at least a viable prototype for further development of a universally accepted scale to measure patients' trust in pharmacists.

Disclosure

The authors report no conflicts of interest in this work.

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