CHAPTER 5

RESULTS OF STUDY 1

This chapter presents the results on:

1) Information from in-depth interviews
2) Survey responses and non-response bias
3) Demographic characteristics of respondents
4) Reliability and validity of the instruments
5) Descriptive statistics of psychological variables
6) SEM of the hypothesized model

1. Information from in-depth interviews

1.1 Factors affecting attitude

According to the theory of planned behavior, beliefs about the benefit and drawbacks of antibiotic dispensing influence attitude toward the behavior. From the in-depth interviews, the benefit of antibiotics for URI was the decreased duration of disease (cure) and prevention of complications. One pharmacist explained, “Many pharmacists are not sure whether the patients with URI have bacterial infections. It is hard to do physical examinations. Accordingly, antibiotics are preferred to treat patients with URI because they may reduce the duration of symptoms or the patients may recover from the illness sooner”. A subject said, “Patients may have complications after pharmacy visits, it is better to dispense antibiotics for them to prevent the complications. Moreover, it saves their money and time by not having to come back again”. Participants with negative attitude were concerned about adverse drug reactions and drug resistance with antibiotic use. The other pharmacist mentioned, “Antibiotics could cause adverse reactions, particularly those in the penicillin group, which is widely used”. One senior pharmacist said, “In the drugstores, the patients don’t want a large amount of medications, so most pharmacists usually dispense antibiotics for three days and that could cause drug resistance".

According to the interviews, attitude toward antibiotics use for URI depended on pharmacists' beliefs on the effects of antibiotics in reducing duration of disease, preventing complications, causing adverse drug reactions and drug resistance.

1.2 Factors affecting subjective norm

Three of four participants mentioned three important referents, i.e., physicians, other pharmacists and drug sellers. One of them reported, "Physicians and drug sellers would approve my antibiotic use. Most of them often dispense antibiotics in URI management as well". One community pharmacist said, "Some community pharmacists usually dispense antibiotics, even though the patients have viral URI. Thus, they would agree with me if I dispense antibiotics". The lecturers in the Faculty of Pharmaceutical Sciences were also mentioned as another group of referents by one participant. She argued, "The lecturers would disapprove my antibiotic use for the case in this study because it should be viral, not bacterial infections". In conclusion, the major referents for antibiotic dispensing mentioned by the participants were physicians, other pharmacists, drug sellers and lecturers.

1.3 Factors affecting perceived behavioral control

The income of drugstores was a factor affecting antibiotic dispensing. One participant said, "Antibiotic dispensing can increase the income of the drugstore, but not very much". The participants believed that the standard practice guidelines of the Pharmacy Council discouraged the pharmacists from dispensing antibiotics in the hypothetical case mentioned in the interviews, "The standard practice guidelines limit the antibiotic use because excessive use causes many problems, especially drug resistance". Additional factors mentioned were patient factors such as patient demand for antibiotics and patients' SES. No participant commented on the effect of patients' gender on the practice. One pharmacist said, "The patients asked for antibiotics. They probably thought these drugs could shorten the duration of symptoms". Regarding the SES of patients, "For me, it is easier to dispense antibiotics for the rich than for the poor". In conclusion, the factors or circumstances influencing perceived behavioral control were income, standard guidelines, patient demand and SES of patients.

The detailed exploration in the interviews and the theory of planned behavior were combined and used to develop the hypothesized model as shown in Figure 5.

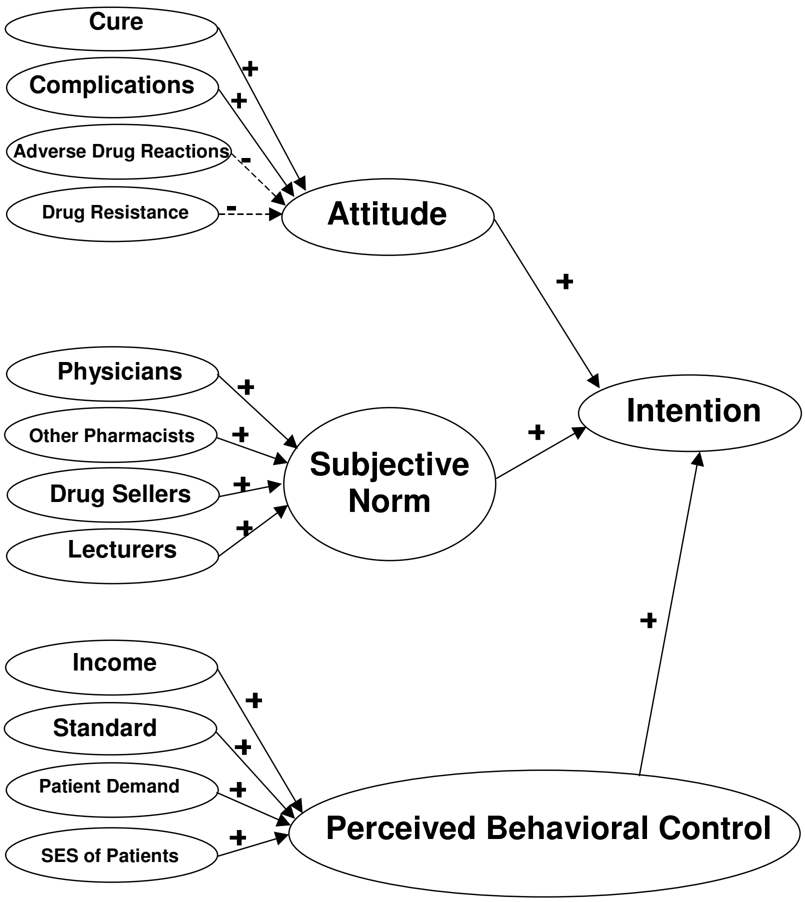

Figure 5 The hypothesized model

2. Survey responses and non-response bias

Table 5 summarizes survey responses in this study. Of the 862 drugstores, 29 were out of business at the time of survey. As a result, the sample size was reduced to 833.

Table 5 Survey response

Landscape

Assuming that all non-respondents were eligible for this study, the usable respondent rate from eligible subjects was 78.8% (656 from 833). The provincial response rates ranged from 73.2% (Phuket) to 94.4% (Satun). Non-respondents accounted for 20.6% of the subjects. This may introduce selection bias into this study. This study examined non-response bias by persuading non-respondents to complete the questionnaires using an incentive (40 Baht equal to US$ 1). A comparison of their responses to those of subjects who replied earlier gave information on non-response bias.

From Table 6, early respondents and late respondents (those responding after incentives were offered) were not different in gender, regions of practice, education and antibiotic dispensing for URI. However, late respondents were more likely to work in hospital pharmacies and less likely to be the owners of drugstores.

The first part of Table 7 displays the multivariate test of significance by multivariate analysis of variance (MANOVA). Null hypothesis was that early respondents and late respondents were not different in all 23 variables listed in the second part of Table 7. To control the overall alpha level at 0.05, the test of all 23 variables was done in one step. The P values from Pillais, Wilks, Hotellings, and Roys tests were greater 0.05. Thus, the null hypothesis was not rejected. Accordingly, early respondents and late respondents were not significantly different in terms of these 23 variables.

Table 6 Comparison of early respondents and late respondents: categorical variables

Variables	Early respondents	Late respondents	Significant test
Numbers	549 (83.7%)	107 (16.3%)	-
Gender			
Male	227 (41.3%)	38 (35.5%)	$\chi^2(1) = 1.27$
Female	322 (58.7%)	69 (64.5%)	P = 0.261
Region of practice[a]			
Upper south	271 (49.4%)	59 (55.1%)	$\chi^2(1) = 1.20$
Lower south	278 (50.6%)	48 (44.9%)	P = 0.274

Table 6 (continued)

Variables	**Early respondents**	**Late respondents**	**Significant test**
Education			
Bachelor degree	458 (83.7%)	85 (79.4%)	$\chi^2(1) = 1.17$
Master degree or higher	89 (16.3%)	22 (20.6%)	P = 0.280
Work setting			
Hospital pharmacy	255 (46.8%)	66 (61.7%)	$\chi^2(2) = 13.57$
Drugstore	214 (39.3%)	22 (20.6%)	P = 0.001
Others	76 (13.9%)	19 (17.8%)	
Owner of drugstore			
Yes	379 (69.0%)	55 (51.4%)	$\chi^2(1) = 12.44$
No	170 (31.0%)	52 (48.6%)	P <0.001
Antibiotic dispensing			
Yes	99 (18.0%)	15 (14.0%)	$\chi^2(1) = 1.01$
No	450 (82.0%)	92 (86.0%)	P = 0.316

[a] Regions of pharmacists' practice in the south of Thailand were separated by Thai Public Relations Department (2006).

Table 7 Comparison of early respondents and late respondents: continuous variables

Multivariate test of significance (using listwise deletion of missing data)

Test name	**Value**	**Exact F**	**Hypothesis df**	**Error df**	**Sig. of F**
Pillais	0.053	1.472	23	609	0.072
Wilks	0.947	1.472	23	609	0.072
Hotellings	0.056	1.472	23	609	0.072
Roys	0.056	1.472	23	609	0.072

Table 7 (continued)

Variable	Scale of item	Early respondents (mean±SD)	Late respondents (mean±SD)
Age (years)	-	42.16±71.49 (n=549)	34.95±7.51 (n=107)
Experience in drugstores (years)	-	8.11±7.01 (n=531)	6.94±6.66 (n=105)
History taking:			
Age of patient	1-7	6.47±1.09 (n=548)	6.54±0.95 (n=107)
Fever	1-7	6.67±0.75 (n=549)	6.71±0.57 (n=107)
Congestion	1-7	6.39±0.99 (n=549)	6.47±0.87 (n=107)
Rhinorrhea	1-7	6.52±0.85 (n=549)	6.50±0.78 (n=107)
Cough	1-7	6.63±0.71 (n=549)	6.61±0.68 (n=107)
Psychological variable:			
Intention	1-7	2.39±1.79 (n=549)	2.17±1.60 (n=107)
Attitude	1-7	2.65±1.75 (n=549)	2.40±1.48 (n=107)
Subjective norm	1-7	4.01±1.64 (n=549)	3.99±1.55 (n=107)
Perceived behavioral control	1-7	3.66±1.71 (n=549)	4.13±1.64 (n=106)

Table 7 (continued)

Variable	Scale of item	Early respondents	Late respondents
Psychological variable: (continued)			
Beliefs in cure of disease	1-7	3.36±1.75 (n=549)	3.52±1.69 (n=107)
Beliefs in prevention of complications	1-7	3.53±1.63 (n=549)	3.51±1.51 (n=107)
Beliefs in adverse drug reactions	1-7	4.57±1.12 (n=549)	4.56±0.95 (n=107)
Beliefs in drug resistance	1-7	5.26±1.30 (n=549)	5.45±1.08 (n=107)
Beliefs in physicians	1-7	3.77±1.57 (n=549)	3.73±1.59 (n=107)
Beliefs in pharmacists	1-7	3.44±1.38 (n=549)	3.29±1.27 (n=107)
Beliefs in drug sellers	1-7	5.08±1.26 (n=549)	4.89±1.37 (n=107)
Beliefs in lecturers	1-7	2.58±1.37 (n=549)	2.55±1.34 (n=107)
Beliefs in income	1-7	4.07±1.58 (n=548)	4.12±1.50 (n=107)
Beliefs in standard guidelines	1-7	2.25±1.46 (n=548)	2.05±1.26 (n=107)
Beliefs in patient demand	1-7	4.25±1.56 (n=548)	4.29±1.63 (n=107)
Beliefs in SES of patients	1-7	4.15±0.93 (n=548)	4.04±0.95 (n=107)

3. Demographic characteristics of respondents

The demographic characteristics of respondents are shown in Table 8. The majority of respondents were female (59.6%) and had achieved Bachelor degrees only (83.2%). On average, respondents were 37 years old and had just under eight years experience in drugstores. Thirty six percent of respondents were full-time community pharmacists, while 64.0% of respondents were part-time community pharmacists (49.3% worked in hospitals and the rest worked in Faculty of Pharmaceutical Sciences, Provincial Public Health Office and Community College). Approximately 66% of respondents were the owner of drugstores and nearly all respondents (97.7%) were registered as practising pharmacists in that particular drugstore at the Provincial Public Health Office.

Table 8 Demographic characteristics of respondents

Variable	**Mean$\pm$SD[a]**	**Number[b] (percent)**
Total number		656
Gender (N=656)		
Male		265 (40.4%)
Female		391 (59.6%)
Age (N=653)	36.58$\pm$8.31	
20-29 years		117 (17.9%)
30-39 years		356 (54.5%)
40-49 years		121 (18.5%)
50-59 years		49 (7.5%)
60-69 years		7 (1.1%)
70-79 years		3 (0.5%)
Highest degree in education (N=654)		
Bachelor degree		544 (83.2%)
Master degree		98 (15.0%)
Ph.D.		12 (1.8%)

Table 8 (continued)

Variable	Mean$\pm$SD[a]	Number[b] (percent)
Experience in drugstores (N=636)	7.92$\pm$6.96	
Less than 10 years		427 (67.1%)
10-19 years		156 (24.5%)
20-29 years		41 (6.5%)
30-39 years		10 (1.6%)
40-49 years		2 (0.3%)
Full time work setting (N=652)		
Government hospital		305 (46.8%)
Drugstore		236 (36.2%)
Provincial public health office		49 (7.5%)
Faculty of Pharmaceutical Sciences		27 (4.1%)
Private hospital		16 (2.5%)
Others		19 (2.9%)
Owner of drugstore (N=656)		
Yes		434 (66.2%)
No		222 (33.8%)
Registered at Provincial Health Office (N=656)		
Yes		641 (97.7%)
No		15 (2.3%)

[a] Standard deviation

[b] Response varies due to missing data

4. Reliability and validity of the instruments

4.1 Reliability of the instruments

Cronbach Alphas for the 16 scales in this study are listed in Table 9. The reliability of each construct ranged from 0.7639 to 0.9467, except for drug resistance and adverse drug reactions (0.5934 and 0.6155, respectively). However, the drug resistance and adverse drug reaction scales were still retained in the subsequent analysis because of their theoretical importance to behavioral attitude.

SEM of the hypothesized model found multicollinearity problem resulting from high correlation between independent variables (cure and complications, adverse drug reactions and drug resistance, and physicians and other pharmacists). As a result, the highly correlated scales were combined and their problematic items were deleted. Cronbach Alphas of three new scales (benefit, problems and physicians and other pharmacists) were 0.9140, 0.7305 and 0.8867, respectively.

Table 9 Reliability of the scales[a]

Item	**Number of items**	**Cronbach Alpha**[a]	**N**[b]
Intention	3	0.9438	656
Attitude	3	0.8154	656
Subjective norm	3	0.8895	656
Perceived behavioral control	3	0.8652	655
Behavioral beliefs in			
Cure	3	0.8956	656
Complications	3	0.8279	656
ADR[c]	3	0.6155	656
Drug resistance	3	0.5934	655

Table 9 (continued)

Item	**Number of items**	**Cronbach Alpha[a]**	**N [b]**
Normative beliefs			
Physicians	3	0.8393	655
Other pharmacists	3	0.7805	655
Drug sellers[d]	3	0.7639	655
Lecturers	3	0.7960	655
Control beliefs			
Income	3	0.9071	655
Standard	3	0.9467	655
Patient demand	3	0.9071	655
SES of patients	3	0.9053	655

Combinations of scales

Item	**Number of items**	**Cronbach Alpha[a]**	**N [b]**
Behavioral beliefs in			
Cure + complications (benefit)	6	0.9140	656
ADR[c] + drug resistance (problems)	4[e]	0.7305	655
Physicians + other pharmacists	6	0.8867	655

[a] Response options for each item ranged from 1 to 7 (midpoint 4)

[b] Number of respondents based on listwise deletion of missing data.

[c] Adverse drug reactions

[d] Non-pharmacist drugstore personnel

[e] Two indicators were excluded due to their low factor loadings (approximately 0.30).

4.2 Construct validity of the instruments

Construct validity refers to the degree to which the test or questionnaire score is a measure of the psychological characteristics. The following analyses focus on construct validity. The construct validity of each scale was examined by assessing whether the relationships of its score and other variables are consistent with the theoretical expectations. Table 10 contains bivariate correlations among intention, attitude, subjective norm and perceived behavioral control and 9 other scales in this study. Correlation coefficients of every pair of variables had the direction consistent with theoretical expectations. Attitude, subjective norm and perceived behavioral control were positively correlated with intention. Behavioral beliefs in benefit of antibiotic use were positively correlated, while those in problems of antibiotics were negatively correlated with attitude. Normative beliefs in physicians and other pharmacists, drug sellers and lecturers had positive correlations with subjective norm. Control beliefs in income, standard treatment, patient demand and SES of patients were positively correlated with perceived behavioral control.

Table 10 Bivariate correlations between intention component and other nine scales

	Intention	**Attitude**	**Subjective norm**	**Perceived behavioral control**
Intention	1.000	.811	.543	.147
	(656)	(656)	(656)	(655)
Attitude	.811	1.000	.541	.103
	(656)	(656)	(656)	(655)
Subjective norm	.543	.541	1.000	.255
	(656)	(656)	(656)	(655)
Perceived behavioral control	.147	.103	.255	1.000
	(655)	(655)	(655)	(655)
Beliefs in benefit of	.654	.679	.528	.186
antibiotics	(656)	(656)	(656)	(655)
Beliefs in problems of	-.407	-.445	-.223	-.015
antibiotics	(656)	(656)	(656)	(655)

Table 10 (continued)

	Intention	**Attitude**	**Subjective norm**	**Perceived behavioral control**
Beliefs in physicians and	.596	.642	.687	.198
other pharmacists	(656)	(656)	(656)	(655)
Beliefs in drug sellers	.164	.166	.394	.162
	(656)	(656)	(656)	(655)
Beliefs in lecturers	.568	.598	.421	.098
	(656)	(656)	(656)	(655)
Beliefs in income	.128	.115	.221	.212
	(655)	(655)	(655)	(654)
Beliefs in standard	.601	.584	.373	.094
guidelines	(655)	(655)	(655)	(654)
Beliefs in patient demand	.317	.269	.365	.279
	(655)	(655)	(655)	(654)
Beliefs in SES of patients	.064	.040	.082	.021
	(655)	(655)	(655)	(654)

Note: 1. The number in the parenthesis indicates sample size.

2. Correlation coefficient of every pair is significantly different at the 0.05 level, except those of four pairs of perceived behavioral control and beliefs in problems, intention and patients' SES, attitude and patients' SES, and perceived behavioral control and patients' SES.

5. Descriptive statistics of psychological variables

Table 11 lists the history taking items as reported by the pharmacists. The most frequently asked questions were the presence of fever (6.68 ± 0.73), cough (6.63 ± 0.70), rhinorrhea (6.52 ± 0.84), age of patient (6.48 ± 1.07) and congestion (6.40 ± 0.97).

Table 11 Descriptive statistics of history taking

Item of history taking	N	Minimum score	Maximum score	Mean	SD[a]
Fever	655	1	7	**6.68**	0.73
Cough	656	4	7	**6.63**	0.70
Rhinorrhea	656	2	7	**6.52**	0.84
Patient age	656	1	7	**6.48**	1.07
Congestion	656	1	7	**6.40**	0.97
History of drug allergy	656	0	7	3.14	3.42
Duration of sore throat	656	0	7	2.21	3.18
Previous medication used	656	0	7	1.21	2.61
Chronic diseases	656	0	7	0.92	2.34
Sputum	656	0	7	0.87	2.28
Severity of sore throat	656	0	7	0.75	2.12
Color of sputum	656	0	7	0.61	1.94
Color of nasal discharge	656	0	7	0.46	1.72
Other medication used	656	0	7	0.42	1.65
Frequency of illness	656	0	7	0.19	1.12
Sore throat	656	0	7	0.18	1.09
Other symptoms	656	0	7	0.13	0.95
Body weight	656	0	7	0.12	0.88
Career	656	0	7	0.09	0.79
Pregnancy and lactation	656	0	7	0.09	0.80
Family history of allergy	656	0	7	0.03	0.47
Sneezing	656	0	6	0.01	0.23
Itchy eyes	656	0	6	0.01	0.23
Total	655				

[a] Standard deviation

Note: The items of history taking were rated on a 7-point scale ranging from 1 (absolutely ask) to 7 (rather absolutely ask). The zero value indicates that question was not asked by pharmacists.

The medications that subjects intended to dispense are shown in Table 12. Antihistamines, including first and second generation groups, were the most common class of drugs reported. Triprolidine combined with pseudoephedrine was most commonly mentioned drug. The second most common class of drug was lozenges. Nearly all of the lozenges that pharmacists would dispense contained antiseptics, except Fisherman's Friend®.

Table 12 Drugs dispensed in URI treatment

Drug	Frequency	Percent
Antihistamines:		
Triprolidine+pseudoephedrine	**502**	**64.9**
Chlorpheniramine	89	11.5
Loratadine	76	9.8
Cetirizine	69	8.9
Brompheniramine +pseudoephedrine	10	1.3
Brompheniramine +phenylephrine	10	1.3
Diphenhydramine	4	0.5
Loratadine+pseudoephedrine	4	0.5
Chlorpheniramine +pseudoephedrine	3	0.4
Fexofenadine	3	0.4
Carbinoxamine+pseudoephedrine	2	0.3
Brompheniramine+vitamin C	1	0.1
Brompheniramine	1	0.1
Total	774	100.0
Topical nasal preparation:		
Oxymethazoline	3	75.0
Xylomethazoline	1	25.0
Total	4	100.0

Table 12 (continued)

Drug	Frequency	Percent
Antibiotics:		
Amoxycillin	**99**	**86.8**
Roxithromycin	7	6.1
Penicillin V	3	2.6
Erythromycin	2	1.8
Cloxacillin	1	0.9
Ciprofloxacin	1	0.9
Ampicillin	1	0.9
Total	114	100.0
Analgesics:		
Paracetamol	48	84.2
Ibuprofen	8	14.0
Aspirin	1	1.8
Total	57	100.0
Lozenge:		
Mybacin®	98	40.7
Antiseptic lozenge	74	30.7
Strepsils®	48	19.9
Cepacol®	11	4.6
Sigatricin®	6	2.5
Dequadin®	3	1.2
Fisherman's Friend®	1	0.4
Total	241	100.0

Table 12 (continued)

Drug	Frequency	Percent
Miscellaneous:		
Vitamin C	32	36.0
Serratiopeptidase	12	13.5
Pseudoephedrine	10	11.2
Bromhexine	9	10.1
Others	26	29.2
Total	89	100.0

Note: The cumulative frequency of dispensed medications exceeded the number of subjects because the same pharmacist may dispense more than 2 drugs in each class.

The mean and standard deviation (SD) of psychological variables are presented in Table 13. Each construct was measured on a 7 point scale. Scores lower than 4 reflect disagreement/unlikely, whereas scores higher than 4 imply agreement/likely. On average, the pharmacists exhibited strong intention not to dispense antibiotics (2.35 ± 1.85) and had unfavorable attitude toward antibiotic use for URI (2.61 ± 2.00). In relation to beliefs, most pharmacists believed that antibiotic dispensing could cause drug resistance (5.29 ± 1.71). In addition, they strongly disagreed that lecturers (2.57 ± 1.62) and the standard practice guidelines of the Pharmacy Council (2.21 ± 1.50) supported the use of antibiotics. The rest of the constructs were at a moderate level.

Table 13 Mean and standard deviation of psychological variables (N = 656)

Item	**Number of items**	**Item range**	**Mean**	**SD** [a]
Intention	3	1-7	2.35	1.85
Attitude	3	1-7	2.61	2.00
Subjective Norm	3	1-7	4.01	1.80
Perceived Behavioral Control	3	1-7	3.74	1.93
Behavioral Beliefs in				
Cure	3	1-7	3.38	1.91
Complications	3	1-7	3.52	1.87
ADR [b]	3	1-7	4.57	1.45
Drug resistance	3	1-7	5.29	1.71
Normative Beliefs				
Physicians	3	1-7	3.77	1.81
Other pharmacists	3	1-7	3.42	1.63
Drug sellers	3	1-7	5.05	1.56
Lecturers	3	1-7	2.57	1.62
Control Beliefs				
Income	3	1-7	4.08	1.70
Standard guidelines	3	1-7	2.21	1.50
Patient demand	3	1-7	4.26	1.71
SES of patients	3	1-7	4.13	1.02

Combinations of scales

Item	**Number of items**	**Item range**	**Mean**	**SD** [a]
Behavioral beliefs in				
Cure + complications (benefit)	6	1-7	3.44	1.89
ADR[b] + drug resistance (problems)	4[c]	1-7	4.90	1.62
Physicians + other pharmacists	6	1-7	3.59	1.72

[a] Standard deviation, [b] Adverse drug reactions

[c] Two indicators were excluded due to their low factor loadings (approximately 0.30).

6. SEM of the hypothesized model

6.1 Testing the hypothesized model

We first analyzed the conceptual model with 16 constructs as depicted in Figure 5. Unfortunately, the analysis failed because of multicollinearity problems. Correlations of three pairs of constructs were high: correlation between cure and complications = 0.89, correlation between adverse drug reactions and drug resistance = 0.63, and correlation between physicians and other pharmacists = 0.90. To solve these problems, the items of highly correlated constructs were combined together into three new constructs: benefit for antibiotic use, problems for antibiotic use and beliefs and practice of physicians and other pharmacists, respectively. Two indicators were also excluded from the model due to their low factor loadings (less than 0.30). Hence, the tested model consisted of 13 constructs with 46 indicators (Figure 6). Three new constructs exhibited acceptable Cronbach Alphas, as reported in the second part of Table 9. Mean and SD values of these constructs are displayed in the lower part of Table 13.

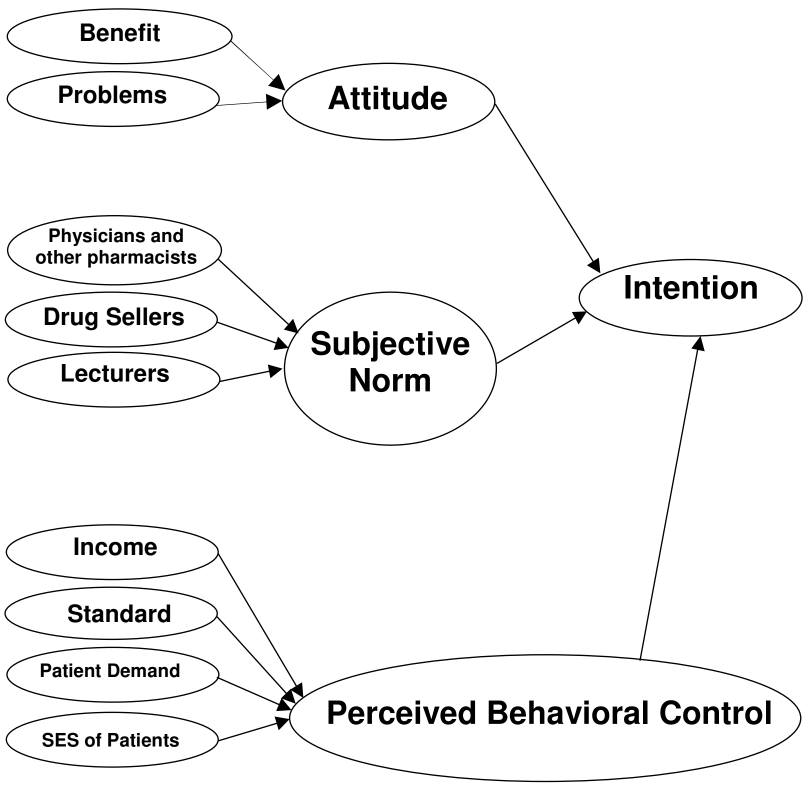

Figure 6 The conceptual model with 13 constructs

To examine the factor structure of the conceptual model, the following models were investigated and their relative fits were compared.

1) ***Null model***. This model assumes that there is no construct or the indicators were completely independent. It is a helpful baseline to compare against other models.
2) ***Thirteen uncorrelated factor model (model 1).*** This model indicates no correlation among the thirteen factors. According to this model, the hypothesized relations as depicted in Figure 6 are not necessary to explain the correlations among the constructs.
3) ***Thirteen correlated factor model (model 2).*** Each construct is hypothesized to correlate with the others. This model hypothesizes that the scales measure thirteen distinct constructs but correlated concepts. It represents the measurement model. A good fit of the model to the data indicates the adequacy of measurement model, implying the items could satisfactorily measure the underlying constructs.
4) ***Hypothesized model (model 3).*** This is model 2 that also specifies all hypothesized paths among the constructs as shown in Figure 6.

Table 14 displays the fit indices for the models that were tested. Model 1 (thirteen uncorrelated factor model) showed a poor fit (RMSEA = 0.110, SRMR = 0.270, TLI = 0.92 and CFI = 0.93). Model 2 (thirteen correlated factor model) provided a better fit to the data than model 1. The chi-square difference test was significant ($\Delta\chi^2$ (78) = 6610, P < 0.001), implying the 13 constructs were not independent. The fit indices for model 2 were satisfactory (RMSEA = 0.051, SRMR = 0.042, TLI = 0.98 and CFI = 0.98). Based on these results, the measurement model showed a good fit to the data indicating the scale items could closely measure their constructs. Model 3 (the hypothesized model) showed an acceptable fit (RMSEA = 0.054, SRMR = 0.056, TLI = 0.97, and CFI = 0.98). Nonetheless, the fit of measurement model (model 2) was superior to that of the hypothesized model ($\Delta\chi^2$ (30) = 254, P < 0.001). LISREL provided the modification indices for modifying the model to gain a better fit to the data (Table 15). However, the modification indices were not used for the modification of model 3 because the fit was already acceptable. MacCallum, et al. (1992) states that when an initial model fits well, it is unnecessary to modify it to achieve a better fit because any modification may simply be fitting only small idiosyncratic characteristics of the sample.

Table 14 Fit statistics for tested models

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Table 15 The five highest values of modification indices for the hypothesized model (model 3)

Modification indices		
Path from → to	**Decrease in Chi-Square**	**New estimate**
ADR [a] 1 → ADR2	106.32	0.34 [b]
Pharmacists3 → lecturers3	97.28	0.28 [b]
Physicians1 → physicians2	90.53	0.14 [b]
Pharmacists1 → physicians2	80.58	-0.14 [b]
Beliefs in standard guidelines → attitude	78.01	0.32 [c]

[a] Adverse drug reactions, ADR1 = first indicator (or item) of ADR,
ADR2 = second indicator of ADR

[b] Completely Standardized Expected Change

[c] Standardized Expected Change

Note: All variables were indicators, except beliefs in standard guidelines.

In model 3, each indicator is specified to measure a single construct. Accordingly, the standardized factor loadings are the correlations between indicators and constructs. The high factor loadings of all indicators imply convergent validity or a high possibility that all indicators measure the same construct. A square factor loading is the proportion of indicator variance explained by its underlying construct. The analysis of model 3 showed that most of the factor loadings were more than 0.50 indicating high convergent validity. Only one indicator of adverse drug reactions had moderate convergent validity (factor loading = 0.45) (Table 16).

Table 16 Standardized factor loadings for the hypothesized model (t-value)

Standardized factor loading				
Indicator	**Attitude**	**Subjective norm**	**Perceived behavioral control**	**Intention**
int1	-	-	-	0.93
				(-)
int2	-	-	-	0.90
				(38.82)
int3	-	-	-	0.92
				(41.70)
att1	0.94	-	-	-
	(-)			
att2	0.65	-	-	-
	(19.66)			
att3	0.77	-	-	-
	(26.61)			
sn1	-	0.86		-
		(-)		
sn2	-	0.89		-
		(28.49)		
sn3	-	0.82		-
		(25.56)		
pbc1	-	-	0.82	-
			(-)	
pbc2	-	-	0.83	-
			(22.09)	
pbc3	-	-	0.82	-
			(22.02)	

Table 16 (continued)

	Standardized factor loading	
Indicator	**Benefit**	**Problems**
cure1	0.87	-
	(-)	
cure2	0.82	-
	(27.26)	
cure3	0.85	-
	(28.83)	
comp1	0.80	-
	(25.69)	
comp2	0.73	-
	(22.26)	
comp3	0.70	-
	(21.12)	
adr1	-	0.56
		(-)
adr2	-	0.45
		(9.13)
resis1	-	0.81
		(12.57)
resis3	-	0.71
		(12.19)

Table 16 (continued)

	Standardized factor loading		
Indicator	**Physicians and other pharmacists**	**Drug sellers**	**Lecturers**
phy1	0.83	-	-
	(-)		
phy2	0.85	-	-
	(26.81)		
phy3	0.62	-	-
	(17.26)		
phar1	0.78	-	-
	(23.33)		
phar2	0.85	-	-
	(26.65)		
phar3	0.57	-	-
	(15.30)		
sell1	-	0.68	
		(-)	
sell2	-	0.83	-
		(15.84)	
sell3	-	0.70	-
		(14.81)	
lec1	-	-	0.86
			(-)
lec2	-	-	0.90
			(26.71)
lec3	-	-	0.54
			(14.28)

Table 16 (continued)

	Standardized factor loading			
Indicator	**Income**	**Standard**	**Patient demand**	**SES of patients**
inco1	0.83	-	-	-
	(-)			
inco2	0.96	-	-	-
	(29.13)			
inco3	0.84	-	-	-
	(25.97)			
std1	-	0.87	-	-
		(-)		
std2	-	0.96	-	-
		(38.04)		
std3	-	0.93	-	-
		(35.78)		
dem1	-	-	0.83	-
			(-)	
dem2	-	-	0.94	-
			(29.37)	
dem3	-	-	0.87	-
			(27.11)	

Table 16 (continued)

		Standardized factor loading		
Indicator	**Income**	**Standard**	**Patient demand**	**SES of patients**
ses1	-	-	-	0.85
				(-)
ses2	-	-	-	0.96
				(30.84)
ses3	-	-	-	0.82
				(26.15)

Note: int=intention, att=attitude, sn=subjective norm, pbc=perceived behavioral control, cure= behavioral beliefs that antibiotics lead to the cure of the disease, comp=behavioral beliefs that antibiotics prevent complications of the disease, adr=behavioral beliefs that antibiotics cause adverse drug reactions, resis=behavioral beliefs that antibiotics cause drug resistance, phy=normative beliefs in physicians, phar=normative beliefs in other pharmacists, sell= normative beliefs in drug sellers, lec=normative beliefs in lecturers in Faculty of Pharmaceutical Sciences, inco=control beliefs in income for drugstore, std=control beliefs in standard practice guidelines, dem=control beliefs in patient demand and ses=control beliefs in SES of patient.

Low to moderate factor correlations imply discriminant validity. The majority of factor correlations ranged from 0.01 (low) to 0.58 (moderate) reflecting discriminant validity (Table 17). Correlations between seven pairs of constructs were > 0.60, such as correlations between benefit beliefs and lecturers (0.64), beliefs on physicians and other pharmacists and lecturers (0.69), benefit beliefs and beliefs on physicians and other pharmacists (0.73), benefit beliefs and intention (0.74), benefit beliefs and attitude (0.78), subjective norm and combinations of physicians and other pharmacists (0.78), and attitude and intention (0.93). However, high correlations between these constructs probably reflect high theoretical correlations, not the overlapping between constructs.

Table 17 Correlation matrix of constructs in model 3 (hypothesized model)

Landscape

6.2 Direct and indirect effects of variables on the behavioral intention

Parameters estimated in model 3 reflect the effects of independent variables on dependent variables (Figure 7). For attitude toward the behavior, pharmacists' beliefs in benefit of antibiotics were the most important predictor (path coefficient = 0.71), followed by their beliefs in problems of antibiotic use (path coefficient = -0.17). For subjective norm, beliefs and practice of physicians and other pharmacists were the major predictor (path coefficient = 0.74), followed by those of drug sellers (path coefficient = 0.16). Beliefs and practice of lecturers had no impact on the subjective norm (path coefficient = -0.04). For perceived behavioral control, beliefs in patient demand was the main predictor (path coefficient = 0.26), followed by the beliefs that antibiotic dispensing increased the income of drugstores (path coefficient = 0.19). Control beliefs in standard practice guidelines and in patients' SES had no effect on perceived behavioral control (path coefficient = 0.02 and -0.03, respectively).

For intention to dispense antibiotics, attitude was the most important predictor (path coefficient = 0.89), followed by subjective norm (path coefficient = 0.07). Perceived behavioral control had no effect on intention (path coefficient = 0.03). Four constructs having significant indirect effects on intention were beliefs in benefit of antibiotics (path coefficient = 0.63), beliefs in problems of antibiotics (path coefficient = -0.15), beliefs and practice of physicians and other pharmacists (path coefficient = 0.06), and beliefs and practice of drug sellers (path coefficient = 0.01).

LISREL provides squared multiple correlations (R^2) for structural model. The R^2 value represents the extent of variance of an endogenous construct that is explained by exogenous constructs (as predictive power). Model 3 (R^2_{attitude} = 0.64, $R^2_{\text{subjective norm}}$ = 0.63, $R^2_{\text{perceived behavioral control}}$ = 0.13 and $R^2_{\text{intention}}$ = 0.86). R^2_{attitude} indicates that 64% of attitude's variance is explained by the behavioral beliefs in benefit and problems of antibiotic dispensing. $R^2_{\text{subjective norm}}$ interprets that 63% of subjective norm's variance is explained by the normative beliefs in physicians, other pharmacists, drug sellers and lecturers. $R^2_{\text{perceived behavioral control}}$ means that only 13% of perceived behavioral control's variance is explained by the control beliefs in income of drugstore, standard practice guidelines, patient demand and SES of patients. Additionally, $R^2_{\text{intention}}$ reflects that 86% of intention's variance is explained by attitude, subjective norm and perceived behavioral control.

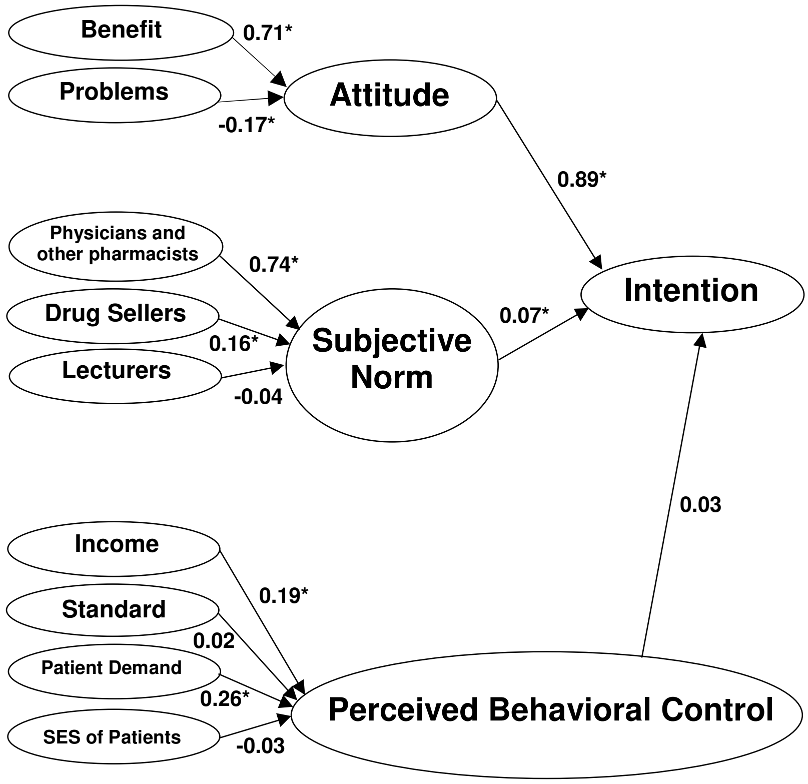

Figure 7 The effects of all constructs in the conceptual model

* indicates significance ($P < 0.05$)

The number indicates standardized regression coefficient.

Table 5 Survey response

Response	Total	Province[a]													
		AL	BE	KH	KT	LG	LH	NA	NE	NG	PN	TG	TL	TN	WS
Numbers of initial subjects	862	38	50	194	117	38	71	24	119	18	44	60	20	31	38
Subject exclusion[b]	29	3	4	7	5	1	1	0	2	0	0	2	2	2	0
Final numbers of subjects	833	35	46	187	112	37	70	24	117	18	44	58	18	29	38
Usable response from	656	27	40	150	82	30	53	19	89	14	33	48	17	25	29
eligible subjects	(78.8%)	(77.1%)	(87.0%)	(80.2%)	(73.2%)	(81.1%)	(75.7%)	(79.2%)	(76.1%)	(77.8%)	(75.0%)	(82.8%)	(94.4%)	(86.2%)	(76.3%)
Unusable response from	5	1	0	0	2	0	0	0	1	0	0	0	0	0	1
eligible subjects[c]	(0.6%)	(2.9%)	(0.0%)	(0.0%)	(1.8%)	(0.0%)	(0.0%)	(0.0%)	(0.9%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(2.6%)
Non-response	172	7	6	37	28	7	17	5	27	4	11	10	1	4	8
	(20.6%)	(20.0%)	(13.0%)	(19.8%)	(25.0%)	(18.9%)	(24.3%)	(20.8%)	(23.1%)	(22.2%)	(25.0%)	(17.2%)	(5.6%)	(13.8%)	(21.1%)

[a] AL=Yala, BE=Krabi, KH=Songkhla, KT=Phuket, LG=Phattalung, LH=Nakhon Sri Thammarat, NA=Phang Nga, NE=Surat Thani, NG=Ranong, PN=Chumporn, TG=Trang, TL=Satun, TN=Pattani, WS=Narathiwat

[b] These subjects could not be contacted because the drugstores where the questionnaires were sent to were out of business.

[c] Blank questionnaires returned

Table 14 Fit statistics for tested models

Model	χ^{2a}	df	$\Delta\chi^2$	Δdf	RMSEA (90%CI[b])	SRMR	TLI	CFI
Null model	70510	1035	-	-	-	-	-	-
Model 1: 13 uncorrelated factors	9071	989	-	-	0.110 (0.110-0.110)	0.270	0.920	0.930
Model 2: 13 correlated factors	2461	911	6610[c]	78	0.051 (0.049-0.053)	0.042	0.980	0.980
Model 3: hypothesized model	2715	941	254[d]	30	0.054 (0.051-0.056)	0.056	0.970	0.980

[a] Maximum likelihood chi-square and P <0.001

[b] 90% confidence interval

[c] Tested difference between model 2 and 1, P < 0.001

[d] Tested difference between model 3 and 2, P < 0.001

Table 17 Correlation matrix of constructs in model 3 (hypothesized model)

	ATT	SN	PBC	INT	BENEB	PROBB	PHYPB	SELLB	LECB	INCOB	STDB	DEMB	SESB
ATT	1.00												
SN	0.44	1.00											
PBC	0.09	0.12	1.00										
INT	**0.93**	0.47	0.13	1.00									
BENEB	**0.78**	0.56	0.12	**0.74**	1.00								
PROBB	-0.47	-0.26	-0.02	-0.44	-0.42	1.00							
PHYPB	0.58	**0.78**	0.13	0.58	**0.73**	-0.38	1.00						
SELLB	0.20	0.48	0.15	0.22	0.28	-0.01	0.44	1.00					
LECB	0.53	0.49	0.08	0.51	**0.64**	-0.40	**0.69**	0.14	1.00				
INCOB	0.12	0.15	0.25	0.13	0.18	0.02	0.17	0.20	0.10	1.00			
STDB	0.48	0.36	0.10	0.45	0.58	-0.35	0.50	0.10	0.56	0.11	1.00		
DEMB	0.23	0.32	0.31	0.23	0.30	-0.07	0.35	0.43	0.16	0.23	0.22	1.00	
SESB	0.04	0.07	0.04	0.04	0.06	-0.01	0.08	0.07	-0.03	0.13	0.05	0.18	1.00

Note: ATT=attitude, SN=subjective norm, PBC=perceived behavioral control, INT=intention, BENEB=behavioral beliefs in benefit of antibiotic dispensing, PROBB= behavioral beliefs in problems of antibiotic dispensing, PHYPB=normative beliefs in physicians and other pharmacists, SELLB= normative beliefs in drug sellers, LECB= normative beliefs in lecturers, INCOB=control beliefs in income for drugstore, STDB=control beliefs in standard guidelines, DEMB=control beliefs in patient demand, SESB=control beliefs in SES of patients