Original Research Article

Preferences for participating in a new community pharmacy alcohol brief intervention in Thailand: Discrete choice experiment with assessment of external validity

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Abstract

Purpose: To explore the clients' preferences for brief alcohol intervention features delivered by community pharmacists, and to evaluate the external validity of discrete choice experiment (DCE) by comparing predicted choices with actual choices.

Methods: A generic DCE questionnaire was filled out by 300 drinking clients selected by nine community pharmacists based on convenience sampling. Respondents made repeated choices between two hypothetical ABI alternatives according to five attributes, and a third alternative of no participation. One choice task was added to test choice rationality. Choice data were analyzed using a mixed logit model. The predicted choice external validity assessment of DCE was compared to actual participation at the population and individual levels.

Results: A total of 162 customers from one pharmacy who passed the choice rationality test were included in the preference model. Most attributes in the model were significant at the 5 % level, influencing participation in the ABI service. The aggregate decision to participate in the ABI service was minimally overestimated by the DCE model. At the individual level, a lower accuracy was observed.

Conclusion: The results provide useful information for policymakers to implement the alcohol-related problem prevention strategy in community pharmacies in Thailand. Future research may require an establishment of the DCE model's external validity to incorporate terms of interaction and assess why the participants did not do as they had decided.

Keywords: Discrete choice experiment, External validity, Alcohol brief intervention, Community pharmacist

INTRODUCTION

In Thailand, nurses as a general practice use an Alcohol Use Disorder Identification Test (AUDIT) to screen alcohol risk levels and provide brief intervention as motivational enhancement therapy in primary care units [1]. In addition, the Alcohol, Smoking, and Substance Involvement Screening Tool (ASSIST–Lite) was developed by Ali *et al* [2], and is quick and effective compared

to a standard tool (DSM-IV substance dependence). Community pharmacists are health care workers, and they particularly have opportunities to provide screening and brief intervention for alcohol-related problems to clients as Alcohol Brief Intervention (ABI) [3]. Thai community pharmacists have expanded their public health roles to include screening the risks of cardiovascular disease, diabetes mellitus, respiratory disease and metabolic disease, providing sexual health services, and smoking cessation support [4].

Furthermore, there have been studies investigating the effectiveness of alcohol screening and brief interventions delivered by community pharmacists abroad. The clients were satisfied and were willing to participate in ABI conducted by the community pharmacist [3,5]. Moreover, the community pharmacist accepted a new role in health promotion by conducting ABI [5,6], and they proved suitable to work with other healthcare providers [3]. However, there are some constraints in providing ABI in community pharmacies, such as the physical location of the counseling activity [3,5], non-pharmacy staff support in health services [5], and lack of government support [6]. It is therefore important to assess clients' preferences for this new health service (ABI) in Thai community pharmacies, so as to provide policymakers with the data required to determine policy for the new ABI delivered by community pharmacists.

Discrete choice experiments (DCEs) are used to elicit preferences in a hypothetical situation by means of a survey questionnaire. The results of the estimating choice model indicate the relative importance of each factor composed of goods or services. Post-estimation of the model provides the expected willingness to pay and the predicted uptake rate [7].

A systematic review of external validity testing of DCEs found a number of health-related DCE studies comparing the predicted DCEs results with the revealed preferences [8]. The studies were published abroad from 2009, suggesting that the external validity of the DCEs should be further evaluated. Moreover, the preferences revealed in other studies compared with the predicted results of the DCEs were limited to the real clients' participation [9].

This study has two objectives; the first aim was to use a DCE to explore clients' preferences for the ABI features delivered by community pharmacists. The second aim was to evaluate and study the external validity of DCE, based on a comparison between the predicted uptake rate

of hypothetical choices designed by a DCE, and observing the uptake rate of real clients' participation in a proposed ABI in the Thai community pharmacies.

METHODS

The study consisted of two objectives: 1) the DCE model was developed and conducted for estimating the stated preferences, and 2) respondents' choices in real-life situations were studied.

Objective 1: Estimating clients' preferences by conducting the DCE

Sample size and administration

A sample of at least 300 individuals with a minimum of 200 respondents per group for subgroup analysis, as guided by ISPOR [7]. The convenience sampling of clients visiting nine pharmacies with the inclusion criteria for these samples is as follows; adults 18 years or over of age, drank alcohol in the past three months, Thai nationality and language, and can participate for around 25 min in the study. Along with each questionnaire an information sheet and consent form were handed to each participant.

Respondents were given the option of opting in or out of the proposed ABI services in each choice task.
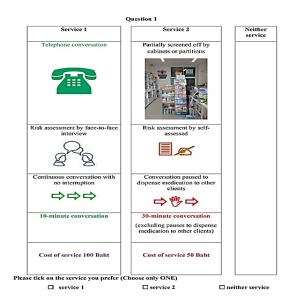

Figure 1: An example of a DCE set

Development of discrete choice experiment

The generic DCE set model was developed according to Ryan *et al* [10], who outlined clear,

step-by-step guidelines with examples of the method's application, in addition to statistical analyses of DCE data using Stata estimation commands. The mixed-method approach was used to construct a DCE model consisting of two steps:

1) Identifying attributes and their levels via a semi-structured interview with 20 clients and selecting attributes by focus group discussion with seven community pharmacists. The five attributes and their levels consisted of an area of counselling, screening method, continuous conversation, counselling session and cost of service. However, the coronavirus outbreaks in Thailand started while performing a pilot study in March 2020. The researchers then modified the area of counselling by changing from the counselling room system to telephone counselling, and the name of this attribute was also changed to 'a mode of counselling'. The details of this step are outlined in a previous study [11].

2) The generic DCE model was generated by using the Ngene software with two alternatives. Neither choice (opt-out option) was included in assessing the uptake rate of the novel service [7]. A D-efficient design with expected priors for the multinomial logit model was selected to be used to construct the pilot survey. The expected priors were derived from the theoretical sign of the priors with small values. In addition, the questionnaire collected demographics, and the difficulties associated with completing the DCE questionnaire and alcohol-drinking behaviour.

Face validity testing was conducted using a convenience sample of five clients until data-saturation was reached. The think-aloud protocol was used to assess the DCE self-report questionnaire's feasibility and this revealed that the five clients made trade-off decisions between the five attributes. The data collection from the five clients was concluded in February 2020 before the corona virus outbreak in Thailand. Two respondents were then added to test face validity for a new DCE model in March 2020 (Table 1). The description of the DCE questionnaires was corrected following the result from the think-aloud technique.

A pilot study was conducted by a convenient sampling of 32 clients from four community pharmacies. The DCE format was developed by adding color for easy trade-off and choosing the alternative. The signs on the parameter estimates covered most aspects, except the mode of counseling.

The coefficients of the pilot study model were determined using the Bayesian efficient design of the DCE. The researcher consulted Ngene syntax for the main survey via the expert Ngene forum. The main survey's DCE questionnaire consisted of the 12 choice sets with two blocks, and two alternatives with an opt-out option. It was switched by ordering the choice set for two sets in order to increase response quality [7]. An example of a DCE is shown in Figure 1.

Choice rationality testing

One hold task was added in the first choice set to check the choice rationality. Two alternatives to the hold out task consisted of the attribute levels: telephone counseling, non-continuous conversation, alcohol screening by pharmacist interviewed, 10 min for ABI service, and different service cost values. To test the respondents' rational choice, the different alternatives between the two services the cost was set at 0 THB and 100 THB respectively. The respondents who chose an alternative with no cost or opt-out option passed this test and were analyzed in the data.

Table 1: Attributes and attribute levels of DCE model

Attribute	Level
Mode of counselling	Partially screened off by cabinets or partitions
	No screen, separate counter
	Telephone counselling
Screening method	Self-assessed
	Interview with pharmacist
Continuous conversation with pharmacists	Continuous conversation with no interruption
	Conversation interrupted when pharmacist dispensed medication to walk-in clients
Duration of counseling	10 min, 20 min, 30 min
Cost of service (Thai Baht)	0, 50, 100

Analysis of DCE design

The DCE data was analyzed with the Mixed-logit model (MXL) in STATA 16.1, using the code's recommendation by Hole [12]. The attribute levels were dummy coded. The test for the necessity of random parameters, based on maximum stimulated log-likelihood [12], resulted in the following parameters being set as random and assuming a normal distribution. The following equations were tested:

$$U_{nj} = V_{nj} + \varepsilon_{nj} = b_{0,i} + b_{1,i}Semi + b_{2,i} Counter + b_{3,i}Tele + b_{4,i} Screen + b_{5,i}Con + b_{6,i}Time + b_{7,i}Cost + \varepsilon_{nj} \quad \text{..................... (1)}$$

$$V_{opt-out} = 0 \quad \text{.................. (2)}$$

Where U is the indirect utility of individual *n* selecting the alternative *j*. This can be estimated by the observed component (V) and unobserved component (ε).

V is the deterministic utility of choice, which may be calculated as the sum of β_1 - β_7, which are attribute estimations that show the relative relevance of each attribute.

ε is a random error term that accounts for differences in individual preferences. The Mixed-logit model assumes that different decision-makers may have different preferences. This allows the coefficients to vary across decision-makers. The mean and standard deviation values (SD), as well as the individual-level coefficients were retrieved from the Mixed-logit model. Computing the uptake rate for participation of ABI based on DCE at population level and at individual level can be calculated as $1/(1+exp-v)$.

Model specifications

Various model specifications were investigated. Two attributes, time and service cost, had numerical levels that tested the linearity of preferences for different levels of these attributes by comparing the model with a continuous variable, to the model with dummy coded levels. To check for a potential opt-out effect as a dummy variable, an alternative specific constant (ASC) with the value 1 for not choosing the service and 0 for two other service alternatives, was adopted.

To pick the random parameters in MXL, the model with all the parameters was estimated to be random, and the importance of their change was investigated. The effectiveness of the model fit, which was assessed by higher (less negative) values in the log-likelihood, was associated with a greater ability of the model to explain the pattern of choices in the data.

Objective 2: External validity testing of the DCE model

Observation of actual behavior

Individuals were recruited for this study by pharmacists who asked them to complete a DCE option set. After completing the DCE set, clients were asked to accept the ABI service by a community pharmacist, comprising of telephone counselling, alcohol screening interviews with the conversation possibly being interrupted, and a counselling session of 10 min, all free of service charge. The community pharmacists were providing the ABI and also recorded the number of participating clients.

Comparing the predictions with real participation

In a binary diagnostic test 2 x 2 table, individual-level stated preferences for ABI were compared to observed behaviors.

STATA version 16.1 calculated the predictive values based on the sensitivity, specificity, positive predictive value, and negative predictive value.

Ethics approval

This study was reviewed and approved by the Khon Kaen University Ethics Committee for Human Research (HE622098) in an official letter dated 20th March 2019. The study also followed international guidelines for human studies.

RESULTS

To avoid the community pharmacist's confounder, 162 (62 %) clients from one of nine volunteer community pharmacists were analyzed. As shown in Table 2, the estimated model respondents had a mean age of 41 y (SD = 14.7). Of the respondents, 63 % were female, 72 % had not obtained a university degree, 60 % were in the Universal Coverage Scheme for health care (UCS), of which 77 % had no underlying disease, 90 % rarely drank and 86 % never smoked. In addition, the ABI service-related data of respondents showed that 99 % had never received an alcohol screening service in the past year. Half of them were interested in participating in the ABI service and 77 % regularly visited a community pharmacy.

Table 2: General characteristics of respondents

Characteristic	Mean (SD)	N = 162 (%)
Age (years)	41 (14.7) Max. 79, Min. 18	
Gender (female)		102 (63 %)
Occupation		
Farming		12 (8 %)
Technician		3 (2 %)
Professional		9 (6 %)
Employee		30 (19 %)
Secretary		13 (8 %)
Merchant/ Service worker		61 (39 %)
Student/Retired		27 (17 %)
Unemployed		3 (2 %)
Educational level		
Below Bachelor's degree		116 (72 %)
Bachelor's degree		41 (25 %)
Graduate degree		5 (3 %)
Income per month (THB)		
Less than 5,000		8 (5 %)
5,000-29,999		139 (86 %)
More than 30,000		14 (9 %)
Health insurance		
Universal coverage Scheme (UCS)		98 (60 %)
Civil Servant Medical Benefit Scheme (CSMBS)		12 (17 %)
Social security Scheme (SSS)		46 (28 %)
Private health insurance		6 (4 %)
		125 (77 %)
No underlying disease		
Frequency of drinking		
Rarely drank		146 (90 %)
Regular drank		16 (10 %)
Cigarette smoking behavior		
Smoke		13 (8 %)
Non - smoke but ever smoked		10 (6 %)
Never smoke		139 (86 %)
		161 (99 %)
Never receiving the alcohol screening in 1-year pass		
Interest to participating the ABI		83 (51 %)
Frequency of visit at pharmacy		
First time		37 (23 %)
Regularly visit		124 (77 %)

Results of the model specification

In total, 972 choice sets (2,916 scenarios) were used for the analysis. Table 3 shows the results of the Mixed-logit model of the DCE. The goodness of fit significantly improved when the CLM and MXL results were compared. Using the likelihood ratio test, the null hypothesis that the two models were structurally identical was rejected.

Estimating the random parameters model showed that the SD of most parameters, with the exception of the semi-private area with partition and the continuous conversation, was statistically significant ($p < 0.01$). This indicates that the respondents have heterogeneous preferences with regards to qualities. As a result, two traits were set to be fixed and the rest were set to be random. The estimated MXL showed a continuous variable representing attributes, as counseling session and cost of service had a better fit than the model with dummy-coded levels. These attributes were continuous variables in the model. Accounting for scale heterogeneity in the DCE model, the generalized multinomial logit model was used for estimation. The overall fit was not much better than the standard MXL model so that the MXL model was used to estimate the final model.

Results of the model on DCE data

Of the 2,916 (162 x 18) hypothetical choice-sets, the parameter estimates of utilities for ABI are as shown in Table 3.

Table 3: Mixed-logit model estimates

Attribute and level	Coefficient	s.e.	SD	s.e.	Relative importance (%)
Mode of counselling					7.1
The semi-private area with partition[a]	Constrained to be 0				
Non-private area	-0.497**	0.163			
Telephone	-0.599**	0.250	1.90***	0.327	
Mode of alcohol screening test					2.7
Self-report[a]	Constrained to be 0				
Interviewed	0.229*	0.118	0.586**	0.231	
Mode of continuous conversation					14.40
Non-continuous[a]	Constrained to be 0				
Continuous	1.091***	0.184			
Duration of					
Counselling	-0.043***	0.009	0.077***	0.012	10.9
Service cost	-0.050***	0.006	0.038***	0.005	64.9
ASC	-7.552***	0.857	3.294***	0.712	-
Number of obs	2,916				
Lok likelihood	-716.66348				
Model χ^2	276.51 (5 dif); *p*<0.0001				

Asc = Alternative specific constant to opt out, *** $p < 0.01$ ** $p < 0.05$ * $p < 0.1$; [a] Reference variable

Most attributes showed significant attribute level estimates, implying that most attributes significantly affected the choice for participation in the ABI ($p < 0.05$). The ASC parameter for the opt-out option had a significantly negative sign, indicating that all else was equal, and the ABI preferred by the respondents were statistically significant ($p < 0.01$). The theoretical validity of the parameter estimates was consistent with most attribute parameters.

The positive parameters, i.e., continuous conversation ($p < 0.01$), were statistically significant, indicating that the respondents preferred these attributes more than self-report screening and conversation with interruption. In addition, the negative signs of the parameter, i.e., counseling session and cost of service were statistically significant ($p < 0.01$), indicating that the lower the value, the better for them. However, the parameter sign of mode of counselling attributes was unexpected in a spreading corona virus situation. The respondents preferred the semi-private area with partition or the open area in the pharmacy, than telephone counselling.

The relative importance of the attributes relating to how people might trade less of one attribute for more of another is presented as relative importance value (Table 3). The cost of service was the most important (64.9 %), followed by continuous conversation (14.4 %), counselling session (10.9 %), mode of counselling (7.1 %) and screening method (2.7 %).

Results of comparing the DCE and real behavior

The real participation of the ABI in one community pharmacy was 26 %. At an aggregate level, an uptake rate of 31 % (95 % CI: 0.18 - 0.44) was estimated for the ABI scenario that most closely resembled the situation in real life. Table 4 shows a cross-tabulation of the computed DCE predicted choice and the actual behavior of all 162 respondents compared at an individual level.

A low accuracy level of 54.9 % was found, indicating that half of the respondents were correctly DCE predicted, compared to actual behavior. Furthermore, the PPV of 0.22 indicates that one out of every five respondents who were predicted to participate in ABI did so. The NPV of 0.71 indicates that 71 percent of non-participation was properly predicted. Moreover, the sensitivity was low at 0.28 and specificity was moderate at 0.65.

Table 4: Comparing predicted and real participation at the individual level (n = 162)

	Real participation		
Item		*Participated*	*Not participated*
		54 (27.9%)	108 (64.7%)
DCE predicted Participated	43	12 (22.2%)	42
Not participated	119	31	77 (71.3%)

Table 5: Probability of choice for the proposed situation

Attribute	Situation		
	A	*B*	*C*
Mode of counselling	Telephone	Non-private area	Semi-private with partition
Mode of alcohol screening test	Interviewed	Interviewed	Interviewed
Mode of continuous conversation	Non-continuous	Continuous	continuous
Session length	10	10	10
Service cost	0	0	0
Probability of choose (s.e.)	31.0***% (0.06)	59.7***% (0.06)	70.9***% (0.05)

***$P < 0.01$

Results of post-estimation

When the ABI delivered by the community pharmacist had been estimated into its component attributes using the DCE approach, the attribute levels were designed into specific scenarios of interest, directly comparing the relative importance of these scenarios against non-participation. For situation C, 77 % of respondents could participate in ABI when there was a semi-private area with a partition, interview screening, continuous conversation, 10 min per counseling session and no service cost ($p < 0.01$, Table 5).

DISCUSSION

This research used DCE to eliciting the clients' preferences for an alcohol brief intervention delivered by community pharmacists in Thailand. The DCE revealed that all else being equal, the clients preferred to participate in the proposed alcohol brief intervention delivered by a community pharmacist in Thailand. In choosing a hypothetical choice, the client valued consistent access to less service cost, preferred continuous conversation, less counselling sessions, and preferred counselling at the community pharmacy in a semi-private area, more than on the counter of pharmacy or telephone counselling; and also preferred interviewed screening more than self-reported screening. The strong external validity testing predicted DCE results to be more precise at the aggregate level, and not at the individual level.

Most community pharmacists in Thailand are the first-line health care providers for people with minor ailments or health promotion services [13]. In fact, the clients preferred continuous conversation with pharmacists with no interruption by other customers. The community pharmacist must then handle the limitation of providing health promotion with no service cost and operating with no other pharmacist or assistant [14]. Also, the clients worried about the private area, and they preferred a semi-private area with partition more than a non-private area, or telephone counselling. The ABI can be

provided in a traditional area of counselling in a pharmacy. Currently, community pharmacy services have been incorporated into the Thai National Health Insurance System (NHS), including dispensing services and various health promotion services, except alcohol brief intervention. The DCE's results are useful for informing policymakers to incorporate the alcohol brief intervention into community pharmacies for the Thai public, including the alcohol brief intervention training course.

The external validity of the DCE results at the individual level was correctly predicted for only 55 % of participants' real participation. Following Chua *et al* [15], the DCE correctly predicted 42.1 % of participants, compared with their actual behavior. They recommended calibrating the DCE with certain questions, and incorporating the Theory of Planned Behavior into DCE so as to improve DCE-prediction. Moreover, Chua *et al* [15] found that attitudinal and other contextual factors, e.g., timing and location, were related to differences in decision-making processes in DCE choice and actual choice. Future research should apply qualitative methods in a pilot study to determine the other factors influencing the real-life decision-making processes.

The external validity of this DCE at the individual level did not support the previous meta-analysis from seven DCE designs. Quaife *et al* [8] found a high pooled sensitivity (0.88) and low pooled specificity (0.34). The various aspects of this research methodology are different from other external validity testing of DCEs. The acceptance of real participation in this study showed 26 % concurrence with Chua *et al* (23 %); conversely, most studies were conducted in the health prevention program, screening disease, and treatment programs that have high acceptance of real participation (more than 67 %). According to Lambooij *et al* [16] most of their respondents chose vaccination (77 %), the only yield evidence of acceptable predictive validity.

In summary, the external validity of DCE prediction had a low accuracy at the individual level. However, the attribute values from the

DCE model were useful for implementing the ABI service in the community pharmacists for people who want to participate in this service. Further research should take note of participants' attitudes, other contextual factors, quality of response, and other decision-making factors related to the external validity of the DCEs.

This study had various limitations. First, the attributes were developed entirely before the corona virus spread, and the counselling room was changed to telephone counselling. Thus, a preference for the counseling room was not determined. This issue must be reconsidered when the corona virus spread is under control. Second, de Bekker-Grob *et al* [9] proposed including the context-related covariate (e.g., respondent characteristic, health status, and attitude) in the DCE model to provide more accurate predictions. This study's sample size was insufficient to include multiple interaction terms. Future research on the external validity of a DCE should consider incorporating interaction terms between attribute levels and context factors.

Finally, this study was designed to collect 300-convenience samples beforehand from nine community pharmacies. Half of the respondents (n = 162) from one pharmacy were used; future studies should consider the health provider's influence. In concordance with Chua *et al* [15], it was observed that the customers preferred a health check delivered by experienced pharmacists.

CONCLUSION

The results of this study provides the clients' preferences for a new health promotion service and alcohol brief intervention delivered by community pharmacists. Many characteristics influence the clients' tendency to participate in this health service. These results provide useful information for policymakers to implement the alcohol-related problem prevention strategy in community pharmacies in Thailand. Moreover, this study provides the external validity testing of clients' state preferences, and appears consistent with their actual decision-making behavior at the aggregate level, supporting the external validity of DCEs. However, the accuracy value was low, raising awareness of the need to improve the response quality. In order to integrate interaction terms between attribute levels and context elements in the DCE model and analyze why the participant did not perform as they had decided, further research will be needed to establish the DCE model's external validity.

DECLARATIONS

Conflict of interest

No conflict of interest is associated with this work

Contributions of authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them. Nusaraporn Kessomboon (NK) encouraged Sukunta Muadthong (SM) to investigate the clients' preferences and supervised the findings of this work. SM and NK designed the study. SM designed the DCE model. SM analyzed the data. SM and NK discussed the results and contributed to the final manuscript.

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