การพัฒนาเครื่องมือ Discrete Choice Experiment สำหรับการศึกษาการตัดสินใจเลือกงานให้ความรู้และคำปรึกษาสำหรับผู้ดื่มเครื่องดื่มแอลกอฮอล์ โดยเภสัชกรร้านยา
Instrument Development of a Discrete Choice Experiment for Eliciting Clients' Preference in Alcohol Brief Intervention by Community Pharmacists

นิพนธ์ต้นฉบับ **Original Article**

สุกัณฑา หมวดทอง[1] และ นุศราพร เกษสมบูรณ์[2*]

[1] วิทยาลัยการสาธารณสุขสิรินธร-จังหวัดขอนแก่น, คณะสาธารณสุขศาสตร์และสหเวชศาสตร์ สถาบันพระบรมราชชนก อ.เมือง จ.นนทบุรี 11000

[2] สาขาวิชาเภสัชศาสตรสังคมและการบริหาร คณะเภสัชศาสตร์ มหาวิทยาลัยขอนแก่น จ.ขอนแก่น 40000

*** Corresponding author:** nustat2@gmail.com

วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2565;17(1):84-94.

Sukunta Muadthong[1] and Nusaraporn Kessomboon[2*]

[1] Sirindhorn College of Public Health-Khon Kaen, Faculty of Public Health and Allied Health Sciences, Royal Institute Office of the Permanent Secretary, Ministry of Public Health, Nonthaburi, Thailand 11000

[2] Division of Social and Administrative Pharmacy, Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen, Thailand, 40002

*** Corresponding author:** nusatat2@gmail.com

Thai Pharmaceutical and Health Science Journal 2022;17(1):84-94.

บทคัดย่อ

วัตถุประสงค์: เพื่อพัฒนาแบบสอบถาม DCE สำหรับศึกษาความประสงค์ต่อการใช้บริการงานให้ความรู้และคำปรึกษาสำหรับผู้ดื่มสุรา (Alcohol brief intervention; ABI) โดยเภสัชกรร้านยา พร้อมแสดงรายละเอียดของวิธีการพัฒนาเครื่องมือ DCE ก่อนนำไปใช้ในการวิจัยหลักต่อไป **วิธีการศึกษา:** ใช้วิธีการศึกษาแบบผสมผสานในการสร้างแบบสอบถาม DCE ซึ่งประกอบด้วย 6 ขั้นตอน 1) คัดเลือกคุณลักษณะและระดับของคุณลักษณะ 2) การกำหนดรูปแบบของ DCE 3) ออกแบบ DCE โดยใช้โปรแกรมสำเร็จรูป 4) ทดสอบความเข้าใจในการตอบแบบสอบถาม DCE 5) ทดลองนำร่อง และ 6) ออกแบบ DCE สำหรับการวิจัยหลัก **ผลการศึกษา:** ผลการศึกษาตาม 6 ขั้นตอนดังนี้ 1) พบคุณลักษณะของงานบริการ ABI ที่มีผลต่อการเลือกใช้บริการ 5 ด้าน ได้แก่ ราคาค่าบริการ ระยะเวลาในการรับบริการ วิธีการคัดกรองความเสี่ยงต่อการดื่มแอลกอฮอล์ สถานที่การสนทนา และความต่อเนื่องของการสนทนา 2) กำหนดรูปแบบของทางเลือกแบบไม่ระบุชื่อ และเพิ่มการไม่เลือกการใช้บริการทั้งสองทางเลือก 3) ผู้วิจัยใช้วิธี efficient design โดยโปรแกรมสำเร็จรูป 4) ปรับการอธิบายคำถาม DCE โดยการทดสอบความเข้าใจในการตอบ DCE ด้วยวิธี Think aloud technique สุ่มตัวอย่างตามสะดวกกับลูกค้าที่ดื่มสุราภายใน 3 เดือนที่ผ่านมาจำนวน 7 คน 5) ผลการศึกษานำร่องจำนวน 32 คน พบว่าทิศทางของสัมประสิทธิ์ของโมเดลส่วนใหญ่เป็นไปตามทฤษฎี และ 6) นำค่าสัมประสิทธิ์และทิศทางที่ได้ของการศึกษานำร่องมาออกแบบ DCE สำหรับการวิจัยหลักโดยวิธี Bayesian efficient design ต่อไป **สรุป:** การวิจัยนี้แสดงถึงขั้นตอนการออกแบบเครื่องมือ DCE สำหรับการสอบถามความประสงค์ต่องานให้ความรู้และคำปรึกษาสำหรับผู้ดื่มแอลกอฮอล์โดยเภสัชกรร้านยา ซึ่งประกอบด้วย 6 ขั้นตอน และได้แบบสอบถาม DCE ที่เหมาะสมในการนำไปออกแบบในการวิจัยหลักต่อไป การศึกษาอื่นที่มีขอบเขตใกล้เคียงสามารถนำแนวทางนี้ไปประยุกต์ใช้ได้

คำสำคัญ: discrete choice experiment, การพัฒนาเครื่องมือ, เภสัชกรร้านยา, การบำบัดแบบสั้นสำหรับผู้ดื่มแอลกอฮอล์

Editorial note
Manuscript received in original form: November 19, 2020;
Revised: January 15, 2021;
Accepted in final form: December 29, 2021;
Published online: February 26, 2022.

Abstract

Objective: To develop a discrete choice experiment for eliciting clients' preference in Alcohol brief intervention (ABI) by community pharmacists and illustrate a detailed procedure for constructing a DCE questionnaire before conducting the main survey. **Methods:** Mixed method approach was used to construct a DCE questionnaire, which consists of 6 steps: 1) selecting attributes and their levels, 2) determining the construction of DCE and analysis requirement, 3) designing DCE, 4) face validity testing of DCE, 5) pilot study and 6) re-designing DCE for the main survey. **Results**: The results of the six-step study were as follows. 1) Five characteristics of ABI by community pharmacists influencing the choice of service, namely *cost of service*, *counseling session*, *screening alcohol risk drinking method*, *mode of conversation*, and *a continuation of the conversation* were found. 2) Generic DCE with two alternatives and the opt-out option were determined. 3) The efficient design was used to construct the DCE by using a package software. 4) The explanation of DCE was adjusted via think-aloud technique with seven respondents sampled from clients who had drunk alcohol in the past three months. 5) The pilot study of 32 people showed that directions of most coefficients were consistent with the theory. 6) Coefficients with their directions were used for DEC design which will be used in the main study using Bayesian efficient design. **Conclusion:** This research presented a detailed 6-step process for designing a DCE questionnaire in ABI by community pharmacists. This service was composed of five characteristics suitable for applying to the main survey. Other similar studies could apply this DCE approach.

Key words: discrete choice experiment, instrument development, community pharmacy, alcohol screening and brief intervention

Journal website: http://ejournals.swu.ac.th/index.php/pharm/index

Introduction

Worldwide in 2016, the harmful use of alcohol is the cause of three million deaths per year and causes more than 200 different alcohol-related diseases and injuries.[1] Additionally, alcohol consumption is a common cause of premature death. In Thailand, 7.4% of all deaths were related to alcohol consumption and in alcohol-related deaths, 57.4% were caused by liver cirrhosis, 24.7 % road accidents and 5.5% of cancer.[1] In 2017, among the population aged 15 years and over in Thailand, 15.9 million (28.4%) were alcohol drinkers in the past year.[2]

The World Health Organization has created the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)[3] and the guideline of the ASSIST-linked brief intervention for hazardous and harmful substances[4] which help people who have the risk of drinking alcohol. The alcohol brief intervention (ABI) can be used to screen alcohol drinkers in various places such as hospitals, health centers, or even workplaces or prisons. Thai Ministry of Public Health has set these guidelines that people who drink alcohol should be screened for the risk of drinking alcohol once a year.[5] In addition, ABI by community pharmacists has never been offered in Thailand.

In screening alcohol drinking, drug stores or community pharmacies could offer such consultation service. However, the service would need to be provided with preferable attributes. For example, space for the service might be an important attribute for the decision. For levels of the attribute of service space, customers or clients might prefer private room to open space or shared, partitioned space. For cost of the service as an attribute, clients might prefer low or affordable cost to no or high cost. The success of alcohol drinking screening consultation service at the community pharmacies could depend on proper attributes and their levels. Therefore, attributes and their levels that are preferred by the clients need to be determined. Among various methods to determine the customer's preference, Discrete Choice Experiment (DCE) is promising since it is a method for non-existing services or products.

Discrete Choice Experiment (DCE) is a conjoint analysis method derived from Lancaster's consumer theory and random utility theory.[6] DCE was initially used in commodity marketing design and later applied to environmental and logistics policies. The DCE was first reported to be used in public health study in 1982, and more studies were reported since 1997.[7,8] The DCE is a stated preference method estimating preferences from hypothetical questions with no actual data collection such as revealed preference method, which is acceptable to use with non-existing services or products.[9] Data acquired from the DCE study can yield relative importance of each attribute of a policy or service scheme, informing decision-makers to forecast the most desirable products or services for the market, including the willingness to pay for a product or service as well as probability of customers attending the services.[10]

The International Society for Pharmacoeconomics and Outcomes Research (ISPOR) has set up DCE designing guidelines and package software.[11,12] The WHO has also proposed the construction of the DCE guideline for the public health workforce, with detailed steps for research using DCE.[10] The DCE approach needs to use experimental design to set up questions in the questionnaire to elicit the respondents' best-preferred choices. Thus, the study using DCE needs to implement detailed designing steps to ensure its data quality.

This study's objective was to report the DCE development to elicit data on alcohol brief intervention by community pharmacists caring for patients with no access to hospitals, suitable for providing information and counseling to alcohol consumers and general healthcare to others.

Methods

This study received Khon Khan University's ethical approval on 20 March 2019 (reference: HE 622098). The research tool was designed according to the guidelines set out by ISPOR[11,12], and Ryan[10], comprising six steps as follows.

Step 1: Selecting attributes and their levels

This step aimed to identify the attributes and their levels of ABI by community pharmacists. Two sample groups were recruited in the study. The first group, twenty clients aged 18 and over, consumed alcoholic beverages in the past three months, convenience samples, or until the data is saturated. The second group, seven community pharmacists, were one day trained by the physician and nurses who are experts in ABI. Using a a mixed-method research consisting of 5 sub-steps: (1) literature review and observation for the designing of

interview questions, (2) raw data collection from seven pharmacy customers using a semi-structured interview, (3) attributes selection by focus group discussion available pharmacists, (4) additional interviews with pharmacy customers for attributes confirmation and confirm wording used in the questionnaire, and (5) re-confirming attributes and their levels follows the literature recommendation before DCE model implementation.

Step 2: Determining the construction of DCE and analysis requirement.

This step aimed to determine DCE model properties composed of five attributes retrieved from step 2, which consists of 4 domains: (1) types of alternatives, generic or unlabeled DCE and labeled DCE; (2) additional opt-out option, or forced-choice; (3) determining the tools for designing the DCE- manual, catalog and software package (4) non-DCE questions to elicit related general information, difficulty levels, and questions for internal consistency testing.

Step 3: Experimental design by using software packages

This step aimed to design a DCE question set based on the resulting attributes of steps 1 and 2 to design a DCE question set using the copyrighted Ngene program. The syntax command will be designed in various ways, such as orthogonal design, efficient design, or advanced features in generating DCE design. Users can learn from the manual and consult with experts from an on-line forum.

Step 4: Face validity testing

This step aimed to test the comprehension of the sample for the DCE questionnaire. Participants were selected by a convenience sampling technique. Participants were clients of seven drugstores, were 18 years old or older, and had drunk alcoholic beverages in the past three months. The target was five participants to be recruited or the information was saturated. The potential participants were informed about the study objective and process by the researcher (SM). Permission to audio-record the interview was sought from the participants. Once agreed, the participants signed an informed consent before participating in the study. The questions were asked and the participants were guided to answer with a think-aloud technique. The participants were encouraged to describe why they selected the choice and how they understood the questions and the descriptions. Afterward, the recorded interviews were transcribed. The DCE questionnaire was corrected during the interview.

Step 5: Pilot study

This step aimed to determine the coefficients of each attribute and the theoretical validity testing by conducting the pilot test of the self-report DCE questionnaire. A convenience sample of 30 participants with characteristics similar to the potential participants for the main survey was recruited from seven community pharmacies. The data were analyzed with conditional logistic regression to determine the coefficient value of each attribute of the model. The direction of a given attribute's coefficient was interpreted whether it was consistent with the theory. For example, for the attribute of "service fee," the coefficient should be negative to suggest that less costly service would attract more use.

Step 6: DCE design for the main survey

This step aimed to re-design the DCE for the main survey. The pilot study had estimated model's coefficients and standard error values were applied in the syntax command of Ngene, using Bayesian efficient designs to provide the DCE questionnaire for main survey.

Results

Step 1: Selecting attributes and their levels

1.1 Literature review and observations

The literature review for this study aimed to collect information related to pharmacists' alcohol brief intervention for alcohol consumers[13-29] and applying DCE in community pharmacy services.[30-35] Key searching

terms were identified and searched from at least four databases. The data were then used as guidelines in designing a semi-structured interview. Content validity was assessed by three experts using the Index of Item-Objective Congruence[36] and face-to-face interviews with volunteers at the time and place of their convenience. The findings yielded nine characteristics or attributes of pharmacists' services including 1) suitability of the facility, 2) pharmacist's characters, 3) screening method during the interview and self-assessment in the questionnaire, 4) area of consultation (such as counseling room, with partition, and open area), 5) screening duration, 6) counseling time, 7) continuation of conversation during counseling, 8) cost of service, and 9) mode of service, such as service by appointment or service once per week.

1.2 Raw data collection by semi-structured fac-to face-interview with 12 clients visiting seven community pharmacists. Eight of ten key informants have opinions congruence with one of the DCE choice set. The final attributes were identified not more than sub-step 1.1.

1.3 Selection of key attributes affecting decision-making to use the service from pharmacists' viewpoint was conducted by focus group discussion via Line™ application. One pharmacist proposed waiting time for service, but the group disagreed and suggested that the waiting time should not be too long. This attribute was thus rejected. The consensus of the group discussion was provided the prioritization of the attributes from the most to the least desirable, namely the *mode of service*, *assessment method, a continuation of the conversation, counseling cession,* and *cost of service.*

1.4 Data confirmation was done by interviewing four volunteers. No additional attributes were added to those set at the initial steps.

1.5 Data confirmation of attribute definitions and wording in the questionnaire was directly conducted with the volunteers. It was found that the term "screening of those with drinking experience" was rather difficult to understand. Four volunteers understood the term "alcohol drinking risk assessment." Moreover, the term "alcohol brief intervention" was changed to "education and counseling for alcohol drinkers." Thus, this term was used instead of alcohol brief intervention in the DCE questionnaire.

1.6 The properties of the attributes were examined according to the recommendations in the literature.[36] The interviewed data in Step 1 revealed that mode of service (appointment or service once per week) has a large effect on the clients' decision to choose the service. It may affect other attributes in the model, and volunteer pharmacists can offer both service modes. Thus, the attribute of the mode of service was thus discarded. From verifying the consistency between face-to-face interviews and DCE questions, the clients preferred to pay less more than 300 Baht. In addition, the community pharmacist received 70 Baht/dispensing for the dispensing fee from the National Health Security Office.[34] Thus, the *cost of service* was adjusted from 0, 100, 200, and 300 Baht per consultation to be 0, 50, and 100 Baht per consultation.

However, this step of wording confirmation was completed before the strike of the pandemic COVID-19 which prompted the researcher and volunteering pharmacies to adjust service settings from person-to-person in a counseling room to telephone counseling. The finalized attributes and their levels are shown in Table 1.

Table 1 Attributes and attribute levels.

Attributes	Levels	Variables	Code	Prior value
1. Cost of service	Baht 0, 50, 100	continuous	cost	-0.00001
2. Conseling session	10 min, 20 min, 30 min	continuous	time	-0.00001
3. Screening method	Self-assessed Interview with pharmacist	dummy	format	0.00001
4. Mode of counseling	Partially screened off by cabinets or partitions No screen, separate counter Telephone counseling	dummy	mode	0.00001
5. Continuation of conversation with pharmacists	Continuous conversation with no interruption Conversation interrupted when pharmacist dispensed medication to walk-in clients	dummy	con	0.00001

Step 2: Determining the construction of DCE and analysis requirement

The alternative of DCE choice set used were generic or unlabeled DCE, with an opt-out option added cause to evaluate the service's uptake rate. The Ngene software

package designed the DCE via efficient design, which offered the utility balance between respondents' alternatives to trade-off the attributes.[38] Additional non-DCE questions included those concerning general information, drinking habit and the level of difficulty to answer of the DCE questionnaire.

Step 3: Experimental design by using software packages

The Ngene software package was used to design the DCE for this pilot study with efficiency design. The method was more efficient than an orthogonal design using the prior values. However, since there were no previous DCE studies to determine the preferences for alcohol screening and brief intervention by pharmacists, the researcher had chosen the multinomial logit (MNL) model and used the prior value obtained from the attributes' theoretical coefficient values. The coefficients with the negative sign, such as the *cost of service*, meant the lesser *cost of service* the better. For the screening method, it was found that most volunteers preferred being assessed alcohol risk by face-to-face interview with the pharmacist more than self-assessment. Thus, this attribute was assigned a positive sign for a face-to-face interview. According to the spread of COVID-19, the researcher assumed that most people would prefer telephone counseling to coming personally to the pharmacy, and uninterrupted to interrupted conversation.

Additionally, the number of questions was determined using the formula S = K / (J – 1) when S = number of choice set, J = number of alternatives which was 3 in this study, and K = number of variables used to calculate coefficients. The number of continuous variable was 2, whereas that of categorical variable was 4 as reference variables were not counted. Thus, the K value was 6. At any rate, attribute levels had to be balanced. The levels used in this study were 3, 3, 2, 3, 2; thus, the least common denominator was 6. Therefore, the researcher used 6 as the number of questions in the pilot study.

In addition, the syntax command an asterisk mark over alt1 and alt 2 aims to the software would not choose the questions with row repetition in an unlabeled choice situation, check to prevent strict attribute level dominance, and pick out choice task repetition from given attribute bundle ordering; whereas alt3 meant no-service choice (opt-out option). The syntax command is shown in Figure 1.

```
Design
;alts=alt1*,alt2*,alt3
;rows=6
;eff=(mnl,d)
;con
;model:
U(alt1)=b0[0.000001]+b1.dummy[0.000001|0.000002]*area[1,2,0]+b2.dummy[0.000001]*risk_as
   [1,0]+b3dummy[0.000001]*con_ser[1,0]+b4[0.000001]*time[10,20,30]+ +b5[-
   0.000001]*cost[0,50,100]/
U(alt2)= b0[0.000001]+ b1*area +b2*risk_as+b3*con_ser+b4*time+ +b5*cost
$
```

Figure 1 The syntax command of efficient design with priors for MNL model 1.

The DCE was proposed with many sets from the syntax in Figure 1. The DCE was chosen with the lowest value D-error (0.1740428) and offered a choice set with real-life situations. Community pharmacists can provide the ABI , including 10-minute telephone interviews, where there may be some interruptions and free service charge. The DCE was transferred in a questionnaire, as in the example question in Figure 2.

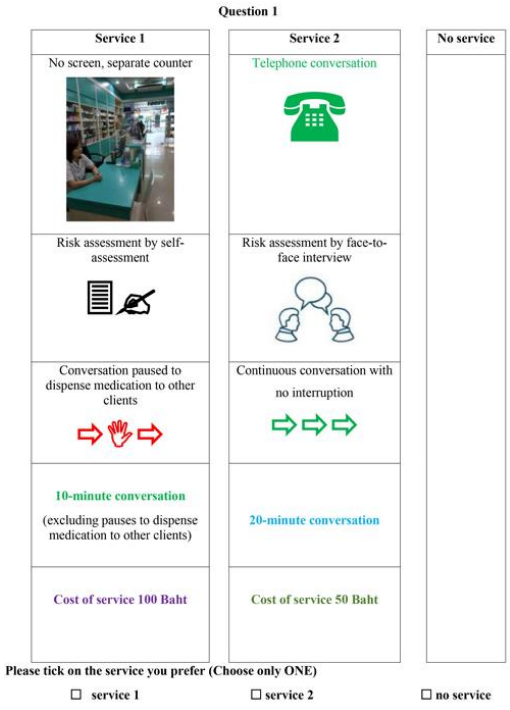

Figure 2 The example of the DCE choice set.

Step 4: Face validity testing

A convenience sample consisted of five volunteers for comprehension testing on the questionnaire. These volunteers were interviewed before the spread of COVID-19. When the attribute was changed from the counseling room to telephone counseling, two more volunteers were recruited for additional data. The seven respondents were four males and three females, aged 29 – 69 years, with education levels ranging from elementary to high school. Most respondents (n = 6) thought the questionnaire was moderately difficult. One respondent found it rather difficult. The average time to complete the questionnaire was 20 minutes, with 4 minutes on the instructions, 10 minutes on DCE questions, and 7 minutes on other general questions. Corrections were found in all three parts of the questionnaire, as shown in Table 2.

Step 5: Pilot study

Corrected questionnaire from Step 4 was administered to 32 convenience selected volunteers with similar inclusion criteria as those recruited previously. Half of the respondents were male 53% (n =17) (Table 3). Their average age was 42.7 years. Most of them had education level lower than Bachelor degree (n = 25, or 78%), and had no underlying disease (n = 28, or 88%). Half of them regularly drank alcohol beverages once a week. Most respondents thought the questionnaire was moderately difficult (n = 23, or 72%).

The data were analyzed using the conditional logistic regression approach, as shown in Table 4. The data in Table 4 shows that given equivalent utility in all attributes, volunteers preferred alcohol brief intervention services for alcohol drinkers by pharmacists with statistical significance (*P*-value < 0.05). Most coefficients were consistent with the pre-existing theories and data obtained from the qualitative study. The *counseling session*'s coefficient and *the cost of service* negatively, showing that the less value is, the better, and the coefficient of *continuous conversation* has a positive direction, which means the respondents like a *continuous conversation*.

However, the preferred screening method differed from what was found in the step 1 of this study that most respondents preferred being interviewed by pharmacists to a self-assessed method. The coefficients of all variables were not statistically significant. It might have occurred because the sample size was too small.

Of these 32 respondents, most of them thought that the questionnaire was moderately difficult (71.9%). Half of them were interested in the service (56.3%). Most of them were regular customers visiting the pharmacy at least four times a year (84.4%) while the rest were first-time customers (15.6%).

Table 2 Face validity testing results

No.	Gender	Age	Education	Difficulty level	Time (min)				DCE wording corrections	Other parts' corrections
					Instructions	DCE	Non DCE	Total		
1	male	69	Elementary	moderate	10	12	12	34	Continuous service means regular visit to the pharmacy, then change to continuous of conversation	Too small example picture Add an arrow at the mark
2	female	29	Junior-high	moderate	4	9	6	19	Continuous service means opening of pharmacy, then change to continuous of conversation Time of service means time of open the pharmacy, then change to time of counseling	
3	male	42	Junior-high	moderate	3	14	8	26		
4	female	52	elementary	moderate	3	8	6	16		
5	female	32	High school	moderate	3	4	5	12		Change business owners to employer
6	male	38	Junior high school	difficult	2	15	7	24		Change 'at the pharmacy' to 'by the pharmacist and the format you prefer'
7	male	41	High school	moderate	2	5	5	12		Corect description to service mode by adding the sentence "For each mode, you can pick making an appointment, or immediate service, at your convenience"

Table 3 Characteristics of volunteers in pilot study (N = 32).

Topic	number	%
Average age, years: 42.7 (sd = 0.57)		
Gender		
Female	15	46.88
Male	17	53.13
Current area of residence		
In Khon Kaen municipality	24	75.0
Education Level		
Below Bachelor's degree	25	78.1
Bachelor's degree	6	18.8
Master's degree	1	3.1
Occupation		
Service sector, e.g., fruit vending, barber	13	40.6
Unemployed, e.g., housewife, home-maker, pensioner, elderly, out-of-job	8	25.0
Other occupations	11	34.4
Monthly income (Bath)		
< 5,000	1	3.1
5,000 - 29,999	29	90.6
30,000 - 39,999	2	6.3
Health benefits		
Universal coverage scheme	22	68.75
Social security scheme	10	31.25
No congenital disease	28	87.5
Drinking frequency in the last 12 months		
Frequent (every week)	18	56.3
Occasional	14	43.8

Table 4 Results of a conditional logistic regression model.

Attributes	Level of attributes	Coefficient value	SE	*P*-value
ASC [a]		5.51892	2.4	0.022
Area of counseling (b1)	With partitions [b]			
	Open area	-0.1969752	0.625659	0.753
	Telephone	-1.777203	1.348568	0.188
Risk assessment (b2)	Self-assessed [b]			
	Interview with pharmacist	-0.0287256	0.103096	0.781
Mode of conversation (b3)	Interrupted[b]			
	Uninterrupted	1.368347	1.700064	0.421
Counseling session (b4)	Minutes	-0.0268496	0.031664	0.396
Cost of service/time (b5)	Baht	-0.0297015	0.024611	0.227
Number of observations		572		
Log pseudolikelihood		-138.04307		

[a] ASC = alternative specific constant relative to opt the alcohol brief intervention.

[b] reference variable.

For the pilot survey model estimation, the researcher remains used five attributes and adjusted the picture's size and colors to facilitate the answering. DCE difficulty level following the difficulty level of answering the DCE.

Step 6: DCE design for the main survey

The priors results obtained from the pilot study were used in the Bayesian efficient designs for a more effective prediction of the model. The attributes coefficient and their standard errors were used to set the syntax command's priors, as shown in Figure 3. However, the D-b mean error value was too high; the expert of the Ngene recommended the change to use the D-b median error, as shown in Figure 4. However, when the D-b median error value was too high, the number of questions was changed from 6 to 12 and divided into two blocks, as shown in Figure 5.

```
Design
;alts=alt1*,alt2*,alt3
;rows=6
;eff = (mnl,d,mean)
;con
;bdraws = gauss(3)
;model:
U(alt1)=b0 [(n,5.51892, 2.400485)]+b1.dummy[(n,-.1969752, 0.6256593) |(n, -1.777203,
   1.348568)]*mode[1,2,0]+b2.dummy[(n, -0.0287256,
   0.20309630)]*format[1,0]+b3.dummy[(n,1.368347,
   1.700064)]*con_ser[1,0]+b4[(n,-.0268496, .0316639)]*time[10,20,30]+ b5
   [(n,-.0297015, .0246112)]*cost[0,50,100]/
U(alt2)= b0 [(n,5.51892, 2.400485)]+b1*mode+b2*format+b3*con_ser+b4*time+b5*cost$
```

Figure 3 The syntax command of Bayesian efficient design with mean error for MNL model 2.

```
Design
;alts=alt1*,alt2*,alt3
;rows=6
;eff = (mnl,d,mean)
;con
;bdraws = gauss(3)
;model:
U(alt1)=b0 [(n,5.51892, 2.400485)]+b1.dummy[(n,-.1969752, 0.6256593) |(n, -1.777203,
   1.348568)]*mode[1,2,0]+b2.dummy[(n, -0.0287256,
   0.20309630)]*format[1,0]+b3.dummy[(n,1.368347,
   1.700064)]*con_ser[1,0]+b4[(n,-.0268496, .0316639)]*time[10,20,30]+ b5
   [(n,-.0297015, .0246112)]*cost[0,50,100]/
U(alt2)= b0 [(n,5.51892, 2.400485)]+b1*mode+b2*format+b3*con_ser+b4*time+b5*cost
$
```

Figure 4 The syntax command of Bayesian efficient design with mean error for MNL model 3.

```
design
;alts=alt1*,alt2*,alt3
;rows=12
;block=2
;eff =(mnl,d,median)
;con
;bdraws = sobol(5000)
;model:
U(alt1)=b0 [(n,5.51892, 2.400485)]+b1.dummy[(n,-.1969752, 0.6256593) |(n, -1.777203,
1.348568)]*mode[1,2,0]+b2.dummy[(n, -0.0287256,
0.20309630)]*format[1,0]+b3.dummy[(n,1.368347,
1.700064)]*con_ser[1,0]+b4[(n,-.0268496, .0316639)]*time[10,20,30]+ b5
[(n,-.0297015, .0246112)]*cost[0,50,100]/
U(alt2)= b0 [(n,5.51892, 2.400485)]+b1*mode+b2*format+b3*con_ser+b4*time+b5*cost
$
```

Figure 5 The syntax command of Bayesian efficient design with mean error for MNL model 4.

Table 5 shows the comparison between the second and third designs, with the sample size requirement of estimates (Sp) used in the study. This shows that the

latest DCE model with the smallest sample size of 72x2 =144 was sufficient to estimate model attributes. The *screening method* attribute estimation was calculated to be 2,016x2 = 4,032, which required a very large sample size. Therefore, this researcher opted for a sample group of 300 as guided by ISPOR.[11]

Table 5 Model comparisons.

	Model 3	Model 4
Number of choice-set	Row 6	Rows 12, block 2
D-b Median error	0.640401	0.197265
Sp estimate[a]	197.3	72

[a] Sample size estimate except for b2.

When the DCE design was complete, the researcher added questions that test the internal consistency testing from the researcher designed. It is a situation where pharmacists will actually provide services, but the only difference is *the cost of service* for the external validity test (Figure 6).

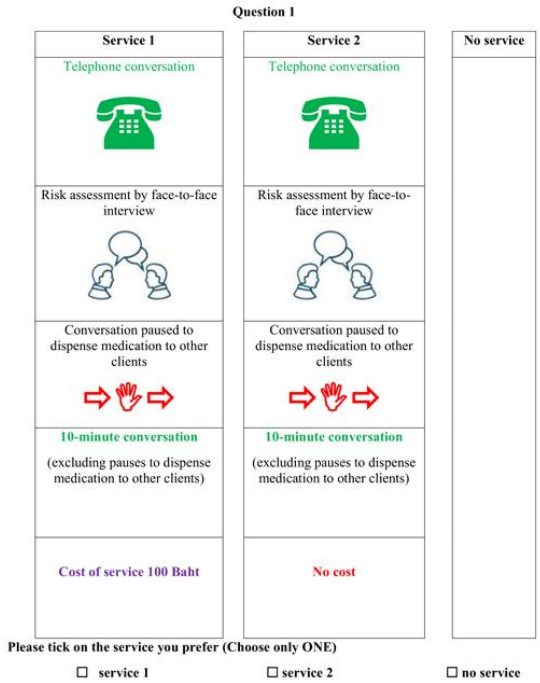

Figure 6 A choice-set for internal consistency test of the DCE main survey.

Based on the findings, if the respondent chooses an option that costs 100 Baht. In that case, the respondent does not understand or not intending to answer the questionnaire. A finalize each of two blocks DCE was composed of seven choice-set, consisting of two service alternatives and one option for no service, each of which consisted of five features: *cost of service, counseling session, screening alcohol risk drinking method, conversation mode, and a continuation of the conversation*, and suitable for will be used to elicit clients' preference in alcohol brief intervention by community pharmacists in the following main research survey.

Discussions and Conclusion

This research demonstrated how to develop a DCE questionnaire of alcohol brief intervention services by pharmacists. The researcher used the mixed methods to determine the ABI service attributes and their levels. The six steps of DCE development were applied as guided by ISPOR[11,12] and Ryan et al.[10] The findings yielded five attributes that affect the ABI service's attendance: 1) *cost of service* (0, 50, and 100 Baht) 2) *counseling session* (10, 20, and 30 min) 3) *screening alcohol risk drinking method* (interview by pharmacist and self-assessment), 4) *conversation mode* (counseling room, shared space with partition, and telephone counseling), *and* 5) *a continuation of the conversation.*

This study has two strengths. First, the DCE was conducted by the software that was simpler and more efficient than manual operation. The priors estimates from the pilot study were used to determine in the syntax command. Thus, the DCE could result in a reliable estimating model. Second, this study proposed a step-by-step report of the development process from attribute selection in designing the DCE questionnaire to pilot study with a detailed description of the software package implementation to facilitate later application of other interested researchers. However, various software programs for DCE design were readily available such as SAS Macros, Sawtooth software, Sandor, and Wedel Designs. The software programs need different instruction codings.[39] The ISPOR's[11,12] and Ryan's[10] guidelines of conducting the DCE should be required adding to how to conduct the DCE with various software packages for health DCE.

There are two suggestions for future research. First, the think-aloud technique should be used for face validity testing or pretesting step to ensure that the respondent could be understand and complete the DCE questionnaire. All sections of the questionnaire were corrected, followed the respondents' comprehension, and reported every seven volunteers' findings. Janssen et al suggested reporting the findings of the face validity testing should follow the assessment three criteria including the DCE questionnaire's completeness, understanding of attributes, and no other attributes than the respondents' model.[40] Therefore, further research should report the findings following the well-known criteria to make this step a more comprehensive assessment.

Second, this research used a sample of 32 respondents and a self-assessed approach in the pilot study. It was found that all attributes in the model were not statistically significant at 5% level to affect the decision to choose the ABI service. This might be due to a small sample size with diverse participants. Obadha et al, for example, used a sample of 31 respondents with the DCE of eight choice-set of five attributes, two choices with an additional opt-out, using the think-aloud technique.[37] They found that the attributes did not significantly at 5 % level affect the decision to choose the ABI service.[37] Jannsen et al used a sample of 27 respondents with his on-line, self-assessed 12 choice-set of six attributes, two options, and forced-choice volunteers.[36] Unfortunately, there was no report of the quality of his model estimation. Abiiro et al interviewed 49 people with his 6-attribute DCE but there was no report of his designing process, number of questions, and model estimation.[38] de Bekker-Groub et al used a sample of 100 people with 16 choice-set of five attributes DCE.[39] These diverse reports suggested developing the sample size guidelines for pilot studies to gather appropriate model estimation approaches.

This research had a limitation. The pilot study did not conduct external validity testing. Thus, the difference between the hypothetical DCE questionnaire's decision-making and the real situation were not compared. Further studies should be tested for external validity in a pilot trial phase using qualitative research methods to make the DCE questionnaire more reliable to predict the respondents' choice.

In conclusion, this pilot research presented a detailed 6-step process for designing a DCE questionnaire, starting from the attribute and attribute-level identification and selection to be used in alcohol brief intervention by community pharmacists. This study showed a step-by-step designing process with detailed syntax command of software package, comprehension pretesting, pilot study, and its results to re-design the DCE main survey. The suggestions were proposed for future studies.

Acknowledgments

We would like to thank community pharmacists for their participation in this study. This study was funded by the Research and Training Center for Enhancing Quality of Life of Working Age People, Faculty of Nursing, Khon Kaen University; Center for Alcohol Studies (project code no.61-02029-035); and the Faculty of Pharmaceutical Sciences and Graduate School, Khon Kaen University.

Conflicts of interest

The authors have no conflict of interest to declare.

References

1. World Health Organization. Global status report on alcohol and health 2018. Geneva. World Health Organization, 2018.
2. National Statistical Office. The smoking and drinking behavior survey 2017. Bangkok. National Statistical Office, 2018. (in Thai)
3. Humeniuk R, Henry-Edwards S, Ali R, Poznyak V, Monteiro MG, World Health Organization. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): manual for use in primary care. Geneva. World Health Organization, 2010.
4. Humeniuk R, World Health Organization. The ASSIST-linked brief intervention for hazardous and harmful substance use: manual for use in primary care. Geneva. World Health Organization, 2010.
5. Kittiratpaiboon P. Guideline for screening and rehabilitation for alcohol use disorder. Nonthaburi. Ministry of Public Health of Thailand, 2018. (in Thai)
6. Louviere JJ, Hensher DA, Swait JD, Adamowicz W. Stated choice methods. Cambridge: Cambridge University Press, 2000.
7. Bridges JFP, Kinter ET, Kidane L, Heinzen RR, McCormick C. Things are looking up since we started listening to patients: Trends in the

application of conjoint analysis in health 1982 - 2007. *Patient* 2008;1(4):273–282.

8. de Bekker-Grob EW, Ryan M, Gerard K. Discrete choice experiments in health economics: a review of the literature. *Health Econ* 2012;21(2):145–172.
9. Mark TL, Swait J. Using stated preference and revealed preference modeling to evaluate prescribing decisions. *Health Econ* 2004;13(6):563–573.
10. Ryan M, Kolstad J, Rockers P DC. How to conduct a discrete choice experiment for health workforce recruitment and retention in remote and rural areas: A user guide with case studies. Geneva. World Health Organization, 2012.
11. Bridges JFP, Hauber AB, Marshall D, et al. Conjoint analysis applications in health - a checklist: A report of the ISPOR Good Research Practices for Conjoint Analysis Task Force. *Value Health* 2011;14(4):403–413.
12. Johnson FR, Lancsar E, Marshall D, et al. Constructing experimental designs for discrete-choice experiments: Report of the ISPOR Conjoint Analysis Experimental Design Good Research Practices Task Force. *Value Health* 2013;16(1):3–13.
13. Hattingh HL, Hallett J, Tait RJ. 'Making the invisible visible' through alcohol screening and brief intervention in community pharmacies: an Australian feasibility study. *BMC Public Health* 2016;16(1):1141.
14. Sheridan J, Stewart J, Smart R, Mccormick R. Risky drinking among community pharmacy customers in New Zealand and their attitudes towards pharmacist screening and brief interventions. *Drug Alcohol Rev* 2012;31(1):56–63.
15. Fitzgerald N, Youngson E, Cunningham S, Watson M, Stewart D. Support for community pharmacy-based alcohol interventions: a Scottish general public survey. *Pub Health* 2015;129(11):1431–1438.
16. Horsfield E, Sheridan J, Anderson C. What do community pharmacists think about undertaking screening and brief interventions with problem drinkers? Results of a qualitative study in New Zealand and England. *Int J Pharm Pract* 2011;19(3):192–200.
17. Sheridan J, Smart R, McCormick R. Estimating problem drinking among community pharmacy customers: what did pharmacists think of the method? *Int J Pharm Pract* 2010;18(5):290–296.
18. Dare J, Wilkinson C, Garlepp M, Lo J, Allsop S. Community pharmacists require additional support to develop capacity in delivering alcohol-related health information to older adults. *Int J Pharm Pract* 2017;25(4):301–310.
19. Sheridan J, Wheeler A, Ju-Hsing CL, Chen-Yun HA, Nga-Yee LI, Yow-Chyi TK. Screening and brief interventions for alcohol: attitudes, knowledge and experience of community pharmacists in Auckland, New Zealand. *Drug Alcohol Rev* 2008;27(4):380–387.
20. Krska J, Mackridge AJ. Involving the public and other stakeholders in development and evaluation of a community pharmacy alcohol screening and brief advice service. *Pub Health* 2014;128(4):309–316.
21. Dhital R, Whittlesea CM, Norman IJ, Milligan P. Community pharmacy service users' views and perceptions of alcohol screening and brief intervention. *Drug Alcohol Rev* 2010;29(6):596–602.
22. Brown S, Henderson E, Sullivan C. The feasibility and acceptability of the provision of alcohol screening and brief advice in pharmacies for women accessing emergency contraception: an evaluation study. *BMC Pub Health* 2014;14(1):1139.
23. Fitzgerald N, McCaig DJ, Watson H, Thomson D, Stewart DC. Development, implementation and evaluation of a pilot project to deliver interventions on alcohol issues in community pharmacies. *Int J Pharm Pract* 2008;16(1):17–22.
24. Payne K, Elliott R. Using discrete choice experiments to value preferences for pharmacy services. *Int J Pharm Pract* 2005;13(1):9–20.
25. Mackridge AJ, Krska J, Stokes EC, Heim D. Towards improving service delivery in screening and intervention services in community pharmacies: A case study of an alcohol IBA service. *J Pub Health (United Kingdom)* 2016;38(1):92–98.
26. Madden M, Morris S, Atkin K, Gough B, McCambridge J. Patient perspectives on discussing alcohol as part of medicines review in community pharmacies. *Res Social Adm Pharm* 2020;16(1):96-101.
27. McCaig D, Fitzgerald N, Stewart D. Provision of advice on alcohol use in community pharmacy: a cross-sectional survey of pharmacists' practice, knowledge, views and confidence. *Int J Pharm Pract* 2011;19(3):171–178.
28. Fitzgerald N, Watson H, McCaig D, Stewart D. Developing and evaluating training for community pharmacists to deliver interventions on alcohol issues. *Pharm World Sci* 2009;31(2):149–153.
29. Morris S, Madden M, Gough B, Atkin K, Mccambridge J. Missing in action: Insights from an exploratory ethnographic observation study of alcohol in everyday UK community pharmacy practice. *Drug Alcohol Rev* 2019;38(5):561–568.
30. Scott A, Bond C, Inch J, Grant A. Preferences of community pharmacists for extended roles in primary care: a survey and discrete choice experiment. *Pharmacoeconomics* 2007;25(9):783–792.
31. Seston EM, Elliott RA, Noyce PR, Payne K. Women's preferences for the provision of emergency hormonal contraception services. *Pharm World Sci* 2007;29(3):183–189.
32. Wang J, Hong SH, Meng S, Brown LM. Pharmacists' acceptable levels of compensation for MTM services: A conjoint analysis. *Res Soc Adm Pharm* 2011;7(4):383–395.
33. Naik-Panvelkar P, Armour C, Rose J, Saini B. Patients' value of asthma services in Australian pharmacies: The way ahead for asthma care. *J Asthma* 2012;49(3):310–316.
34. Naik-Panvelkar P, Armour C, Rose JM, Saini B. Patient preferences for community pharmacy asthma services. *Pharmacoeconomics* 2012; 30(10):961–976.
35. Chancheochai S, Sakulbumrungsil R, Ngorsurachet S. Preference on medication therapy management (MTM) service: Results from discrete choice experiment. *Thai J Pharm Sci* 2015;39(3):119-126.
36. Pasunon P. Validity of questionnaire for social science research. *J Srinakharinwirot Univ* 2015;18(1):375–396. (in Thai)
37. National Health Security. New information detail. (Accessed on Jan. 10, 2021, at https://www.nhso.go.th/frontend/) (in Thai)
38. ChoiceMetrics. Ngene 1.2 user manual & Reference guide. The cutting edge in experimental design end-user license agreement. ChoiceMetrics, 2018.
39. Hauber AB, González JM, Groothuis-Oudshoorn CGM, et al. Statistical methods for the analysis of discrete choice experiments: A report of the ISPOR Conjoint Analysis Good Research Practices Task Force. *Value Health* 2016;19(4):300–315.

40. Janssen EM, Segal JB, Bridges JFP. A Framework for instrument eevelopment of a choice experiment: An application to type 2 diabetes. *Patient* 2016;9(5):465–479.
41. Obadha M, Barasa E, Kazungu J, Abiiro GA, Chuma J. Attribute development and level selection for a discrete choice experiment to elicit the preferences of health care providers for capitation payment mechanism in Kenya. *Health Econ Rev* 2019;9(1):1–19.
42. Abiiro GA, Leppert G, Mbera GB, Robyn PJ, De Allegri M. Developing attributes and attribute-levels for a discrete choice experiment on micro health insurance in rural Malawi. *BMC Health Serv Res* 2014;14(1):235.
43. de Bekker-Grob EW, Swait JD, Kassahun HT, et al. Are healthcare choices predictable? The impact of discrete choice experiment designs and models. *Value Health* 2019;22(9):1050–1062.