Translation and Psychometric Testing of the Thai COVID-19 Vaccine Literacy Scale

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Abstract: Vaccine literacy is positively associated with vaccination, so assessment of COVID-19 vaccine literacy is essentially needed. This study translated the COVID-19 Vaccine Literacy Scale, English version into Thai, and tested the psychometric properties of the Thai version (Thai COVID-19 VL Scale). A cross-sectional survey was conducted online. Data comprising 1,002 participants aged 18 years or older were analyzed using exploratory factor analysis and confirmatory factor analysis to identify factor structure and construct validity of the Thai COVID-19 VL Scale. Also, construct validity using the known-groups technique and internal consistency reliability were employed to test the scale.

According to the exploratory factor analysis, the results revealed that the 12-item scale consisting of two factors, Interactive/critical vaccine literacy and Functional vaccine literacy explained 58.1% of the total variance. The confirmatory factor analysis indicated that the measurement model had relatively goodness of fit with the data. Cronbach's alpha coefficients were 0.81 for the overall scale, 0.85 and 0.86 for both subscales, respectively. By using a known-groups technique, it was revealed that the participants who were vaccinated against COVID-19 had significantly higher vaccine literacy scores than those who intended and who were not sure/ not willing to get vaccination. This study indicated that the Thai COVID-19 VL Scale has adequate validity and reliability for assessing vaccine literacy among Thai people. It has the potential for nurses to identify people with low vaccine literacy so that a public health intervention can be targeted more specifically to enhance vaccine literacy and increase vaccine uptake in Thailand.

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Introduction

Amid the COVID-19 pandemic, there is a rapid development of several COVID-19 vaccines.[1] COVID-19 vaccination recommendations prioritize high-risk groups such as frontline health care workers, older people, as well as people with underlying medical conditions.[2] High rates of immunization are needed to reduce death rates and control the pandemic.[1] However, a global

survey in 19 countries revealed that only 71.5% of people would accept the vaccination.[3] Poor health literacy was also associated with vaccine hesitancy.[4]

In response to this urgent pandemic situation, COVID-19 vaccine uptake needs to be increased so that herd immunity against COVID-19 can be achieved.[2] Amidst the COVID-19 pandemic, health literacy has been recognized as an essential tool to improve COVID-19 vaccine uptake.[5] Biasio and colleagues[6] developed the COVID-19 Vaccine Literacy Scale (COVID-19 VL Scale) based on Ishikawa's Health Literacy Scale.[7,8] This COVID-19 VL Scale is aimed to assess vaccine literacy (VL) regarding functional literacy skills and interactive/critical literacy skills specific to COVID 19 vaccine. Assessing people's language/semantic skills, decision making and problem-solving skills regarding COVID 19 vaccine is useful in identifying people with low VL skills so that a public health intervention can be targeted more specifically to enhance VL.[6] This validated scale can be used to assess people's VL skills and defining interventions aimed at increasing vaccine uptake.[6,9,10]

As of 30 June 2021, Thailand was in the third wave epidemic with a total of 235,301 COVID-19 cases and 2,023 cumulative deaths since the pandemic began last year.[11] Scaling up vaccination is urgent amid of COVID-19 surge in Thailand. While the vaccine coverage of at least 60% to 70% of the population is needed to stop the chain of transmission,[12] Thailand has started COVID-19 vaccination program in March 2021 and has a long road ahead for achieving its COVID-19 vaccination coverage target. The availability of the COVID-19 vaccine is necessary along with people's decisions to get vaccinated, which depend on VL.[13] Therefore, it is essential to improve the VL of the public. This points to a need for a valid and reliable tool for assessing VL in Thailand.

Review of Literature

Health literacy has gained more attention worldwide and recently been highly considered as one of critically-important determinants of health by the World Health Organization.[14,15] The Institute of Medicine defined health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions".[16] People need to develop health literacy skills to understand and use the information to judge and make health decisions for healthier living in different situations.[17,18] Using the concept of health literacy in personal communication and community-based educational outreach is beneficial for health promotion, disease prevention, and gains more successful self-management in people with medical conditions.[19]

Adequate health literacy helps to facilitate effective communication and promote empowerment which could help people to gain access to healthcare.[20] At the same time, low health literacy and poor health service utilization have been significantly associated.[21] Limited health literacy may cause barriers in patient-provider communication and lead to several adverse health outcomes as well as increased costs,[22,23] such as being more likely to lead to hospitalization.[24]

Health literacy should be considered as a potential determinant of vaccine hesitancy and vaccination-related behaviors.[25] Improving health literacy can influence vaccine uptake.[26] A significant association between health literacy and vaccination was documented,[26,27] however, a systematic review reported that the association between health literacy and vaccinations is still unclear. A more specific concept of health literacy regarding vaccines called "vaccine literacy" was suggested to be explored.[27]

The VL is more specific to vaccination as it involves "people's knowledge, motivation and competence to find, understand and use the information to make decisions about vaccination".[6] Several studies report a significant association between vaccine literacy and vaccination.[9,10,13] As VL enhances people's understanding of what they need to know and need to do to get vaccinated, it is recognized as a fundamental building block in the process of how people make decisions about vaccination.[13]

The COVID-19 VL Scale was developed by Biasio and colleagues in 2020.[6] The updated version in 2021 is composed of 12 questions and classified into two subscales: functional literacy (about language and semantic system); and interactive/critical literacy skills (about skills for decision making and problem-solving).[9,10] The subscale's internal reliability coefficients from a preliminary (0.85 and 0.77, respectively)[9] and second surveys (0.80 and 0.70, respectively)[10] were adequate.[28] Psychometric property testing of the COVID-19 VL Scale also showed suitable psychometric properties for the subjective measure of the VL.

The VL in this study is derived from "health literacy" construct in the Nutbeam's model.[6,17,29] Biasio's VL Scale was adapted from Ishikawa's Health Literacy Scale (HL Scale) which was based on the Nutbeam's model.[6,7,8] The three levels of VL include: 1) Functional literacy is a basic semantic skill to read and understand vaccine information and people with VL skills can acquire vaccine information; 2) Interactive literacy refers to cognitive ability and social skills to seek out, discuss, and derive about vaccine information; and 3) Critical literacy refers to ability to analyze, appraise, and use vaccine information for choice decisions. People with critical literacy skill can communicate vaccine information to manage their social influence, resulting in decision-making about vaccination.[6,9,10]

Study Aim

This study aimed to translate and test the psychometric properties of the Thai COVID-19 VL Scale for its use in Thailand.

Methods

Design: A cross-sectional survey was conducted online in late May 2021 to evaluate a Thai COVID-19 Vaccine Literacy Scale (Thai COVID-19 VL Scale). This report followed STROBE check lists of items that should be included in a report of cross-sectional studies.

Sample and setting: Participants were recruited using a convenience sampling. Online recruiting messages contained a URL link and a quick response code circulated via social media channels such as Facebook and LINE application of individuals' networks and community/social groups. People who received online recruiting messages were invited to participate in this study if they met the following inclusion criteria: aged 18 years and older; can read and understand Thai; and willing to participate in this study.

A total of 1,002 participants were recruited for this study: samples of 502 and 500 were used for an exploratory factor analysis and confirmatory factor analysis, respectively. A sample size of 500 is considered very good for psychometric property testing using a factor analysis.[30]

Ethical considerations: Prior to starting data collection, the study was approved by the Committee on Human Rights Related to Research Involving Human Subjects, Faculty of Medicine Ramathibodi Hospital, Mahidol University (COA.MURA2021/381). The potential participants gave informed consent online. We informed potential participants about this study. Participation in this study was voluntary and anonymity and confidentiality were addressed. Participants could refuse to participate. They could skip any questions they did not want to respond to, or they could stop answering at any time. Participants' online consent was done by clicking "accept" on the online consent form to confirm that they have read the form and accepted participating in this study.

Instruments: *The Thai COVID-19 VL Scale*

The original "COVID-19 VL Scale" was developed by Biasio and colleagues to assess Italian adult's vaccine literacy skills regarding the COVID-19 vaccine.[6] The updated version in 2021 was translated from Italian into English by a professional native-English reviewer, who is also fluent in Italian.[9,10] It is composed of 12 questions and classified into two subscales: functional literacy and interactive/critical literacy.[9,10] There are four items in the Functional VL subscale asking about

VL skills regarding language capabilities. For example, "When reading or listening to information about COVID-19 vaccines, did you find words you didn't know?". Responses to these questions were on a 4-point rating scale (4-never, 3-rarely, 2-sometimes, 1-often). While the Interactive/critical VL subscale has eight questions asking about communication, problem-solving, and decision-making skills. For example, "When looking for information about COVID-19 vaccines, have you consulted more than one source of information?", "Did you consider whether the information collected was about your condition?". Responses to the questions were on a 4-point rating scale (1-never, 2-rarely, 3-sometimes, 4-often). The score on each item ranged from 1 to 4. A higher average score in each subscale corresponds to a higher VL level.[9,10]

Translation process of COVID-19 Vaccine Literacy Scale

Prior to translating the COVID-19 VL Scale, the researcher obtained permission from the developer to translate an updated version of the COVID-19 VL Scale in English that was published in 2021.[9,10] The translation process was based on a symmetrical approach using the back translation technique, a committee approach, and pretesting.[31]

For forward translation, a native Thai nurse instructor whose research background is in nursing and epidemiology with a doctoral degree from the US translated the COVID-19 VL Scale (English version) into the Thai language. During the translation, some questions were adapted to the Thai context. For example, a question "Did you discuss...with your doctor or other people?" was modified to "Did you discuss... with a doctor or other people?" because people in Thailand may not see the same doctor each time when they used health services. After forward translation, the researchers worked together as a committee of experts reviewing and verifying the Thai-translated version and original version until an agreement has been reached. Another modification was made on part of question asking about "When you read or listen to information about future COVID-19 vaccine or current vaccine...". The terms 'information' was modified to 'information/news about COVID-19 vaccines' because Thai people in general also usually receive the COVID-19 vaccine information delivered via the news (The government or Ministry of Public health's information about COVID vaccines has been captured and recaptured in the News).

Next, back translation of the Thai version was performed by the second translator, a Thai nurse instructor in adult nursing who is studying PhD and working as a nurse in the US. Then, the back-translated English version was compared and verified equivalence with the original English version by the PI and the original developer (Dr.Biasio). Items with discrepancies between the two versions were re-checked and revised to reach equivalence of meaning.

After translation was completed, the Thai COVID-19 VL Scale was tried out for comprehension and consequently pretested online among 40 Thai adults >18 years old. Preliminary testing of the Thai COVID-19 VL Scale revealed an overall Cronbach's alpha reliability coefficient of 0.81, while reliability coefficients of Functional, Interactive, and Critical VL subscales were 0.81, 0.80 and 0.92, respectively.

Other survey instruments: There were two other questionnaires used in this study; Demographic information and the Acceptance of COVID-19 vaccination.

Demographic information questions included age, sex, education, marital status, occupation, income adequacy, and underlying diseases.

Acceptance of COVID-19 vaccination: This questionnaire was developed by the investigators. It included 2 questions: a) a question asking about COVID-19 vaccination "Have you already got COVID-19 vaccination?" (Responses 'yes' or 'no') and b) a question asking about intention to get COVID-19 vaccination "Will you get COVID-19 vaccine?" (Responses 'will get for sure', 'not sure' or 'will not get'). We formed these two questions for more accurate

data and to fit with Thailand report on COVID-19 vaccination as of May 2021. Since the Thai COVID-19 vaccination program has started in March 2021, only some prioritized groups have got the COVID-19 vaccine while general people have been registered for a queue, but they have not yet received a shot by the time of data collection. Hence, we also asked the people who have not yet got the COVID-19 vaccination about their intention to get this.

Data Analysis: Data were entered, and missing data were checked by Microsoft excel saved as a comma-separated values (CSV) file and then transferred to R version 3.6.3 for analysis. Descriptive statistics, reliability coefficients, and the exploratory factor analysis (EFA) were performed using the Psych package.[32] The confirmatory factor analysis (CFA) was carried out to verify the factorial structure of the Thai COVID-19 VL Scale identified in the EFA. The functional and interactive/critical domains were analyzed by the Lavaan package.[33] For a large sample size, a normality graphical test using the quantile - quantile (Q-Q) plot suggested that these datasets were approximately normal.

An assessment of the psychometric properties of the Thai COVID-19 VL Scale was carried out. We examined construct validity using the EFA to identify factors that define the construct of VL skills, followed by the CFA and a known-groups technique.[34,35]

To ensure an adequate sample, we used a recommended sample size estimation of 500 or more, which is considered very good for the EFA.[30] We examined sample adequacy for the EFA using the Kaiser-Meyer-Olkin (KMO) value >0.50 and Bartlett's test of sphericity (p-value <0.05).[35,36] We also identified stable and reliable factors using cut-off >0.5.[35] This study also used a scree plot and Kaiser's criterion (eigenvalues >1) to determine the number of factors that should be retained.[35] When the scree plot shows that the eigenvalue of the first and second components are larger than the rest, it indicates that the two important factors should remain. Additionally, we carried out the CFA on another sample to evaluate how well the hypothesized factor structure fitted with the data and evaluated the model's overall goodness of fit.[37] The non-significant result, χ^2 statistic with a p-value >0.05, indicated the overall model fitness. We used the root mean square error of approximation (RMSEA) of <0.6, the values of the Tucker-Lewis index (TLI) and comparative fit index (CFI) of >0.9, and the standardized root mean square residual (SRMR) of <0.1 as suggested.[38]

In this study, the known-groups method was used to test the construct validity of the Thai COVID-19 VL Scale.[34] We categorized the participants into three groups: 1) have got COVID-19 vaccination, 2) will get the vaccine for sure, and 3) 'not sure'/'will not get' the vaccine. A known-groups method comparing means of VL scores among the three known groups was performed using one-way analysis of variance and followed by the Tukey test for multiple comparison analysis.

After testing construct validity, we examined internal consistency using Cronbach's alpha.[39] Furthermore, we calculated average inter-item correlation[40], and item-rest correlations to test the scale's reliability.[35]

Results

About 93.8% and 99.4% of the people scanned the QR code or clicked the link to read the informed consent and agreed to participate in this study (Sample 1 and Sample 2). Overall participants were from all geographical areas of Thailand (Bangkok 31.9%, Central and the West 24.7%, the South 20.7%, the North-East 13.0%, the North 5.2%, and the East 4.6%). Data from Sample 1 were used for the EFA, while data from Sample 2 were used for the CFA. After deleting 11 cases with missing data, final samples comprised 502 and 500 participants, respectively.

Demographic characteristics of the samples were as follows. Almost 85% (84.5% vs. 82.6%) of the participants were female. Most of participants

were less than 50 years old (81.8% vs. 62.3%). Most (58.2% vs. 46.7%) had completed a college education. About one-third of them (33.7% vs. 41.6%) reported they were currently employed by government and state-enterprise. The majority reported having an adequate income (86.6% vs. 87.4%) and having no underlying diseases (73.1% vs. 64.2%). Similar in both groups, the most common sources of information were social media, health personnel, television, family, and friends, respectively.

Thai COVID-19 Vaccine Literacy Scores

Table 1 illustrates that participants in Sample 1 had an average score of functional VL skills ranging from 1 to 4 with a mean of 2.87 (SD=0.69), while their interactive/critical VL skills ranged from 1.25 to 4 with a mean of 3.32 (SD =0.53). Participants in Sample 2 had an average score of functional VL skills ranging from 1 to 4 with a mean of 2.78 (SD =0.73), while their interactive/critical VL skills ranged from 2 to 4 with a mean of 3.39 (SD =0.51).

Table 1. Descriptive Statistics of Thai-COVID-19 Vaccine Literacy

Thai COVID-19 Vaccine Literacy	Mean (SD)	Min-Max
Sample 1 (n = 502)		
Overall scale	3.17 (0.45)	1.58 - 4.00
Functional VL	2.87 (0.69)	1.00 - 4.00
Interactive/critical VL	3.32 (0.53)	1.25 - 4.00
Sample 2 (n = 500)		
Overall scale	3.19 (0.43)	1.92 - 4.00
Functional VL	2.78 (0.73)	1.00 - 4.00
Interactive/critical VL	3.39 (0.51)	2.00 - 4.00

Psychometric Properties Testing of the Thai COVID-19 Vaccine Literacy Scale

The EFA was carried out using the principal axis factoring method with orthogonal rotation using varimax. The overall KMO statistic was 0.85, while Bartlett's test of sphericity was significant ($\chi^2_{(66)}$ = 2,679.535, p<0.001). Anti-image correlation matrix diagonal values ranged from 0.79 – 0.92, indicating the adequacy of the sample. The determinant of the correlation matrix is 0.005, suggesting no multicollinearity.[41] We used the maximum likelihood factor analysis with a cut-off point of .50 and Kaiser's criterion of eigenvalues greater than 1. The scree plot showed that the eigenvalue of the first and second components are larger than the rest. We decided to retain two factors based on the Scree plot and eigenvalues **(Figure 1).**

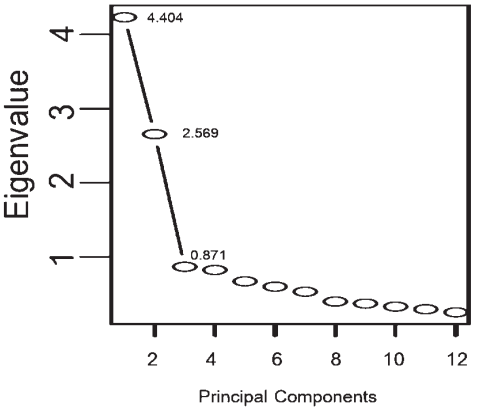

Figure 1. The Principal Component Analysis Scree Plot

Factor 1, namely Interactive/critical VL, included eight items which explained 36.7% of the variance with loadings range between 0.53 and 0.79, while Factor 2, namely Functional VL, had four items which additionally explained 21.4% of the variance with factor loadings range from 0.69 to 0.79. The two remaining factors accounted for 58.1% of the total variance (**Table 2**).

Table 2. Thai COVID-19 VL Items and Their Psychometric Properties by EFA (n=502)

	Item statements	Factor loadings		Communalities	Item-rest correlations
		Factor1	Factor2		
	Interactive/critical VL				
	When you look for information/news about COVID-19 vaccine,				
10	Have you considered the credibility of the sources?	**0.79**	-0.24	0.68	0.72
7	Have you had the opportunity to use the information?	**0.77**	-0.18	0.63	0.71
11	Did you check whether the information was correct?	**0.76**	-0.24	0.63	0.68
12	Did you find any useful information to make a decision on whether or not to get vaccinated?	**0.76**	-0.22	0.62	0.68
6	Did you find the information you were looking for?	**0.76**	-0.12	0.59	0.66
8	Did you discuss what you understood about vaccinations with a doctor or other people?	**0.59**	-0.15	0.38	0.51
5	Have you consulted more than one source of information?	**0.55**	-0.30	0.39	0.49
9	Did you consider whether the information collected was about your condition?	**0.53**	-0.13	0.29	0.44
	Functional VL:				
	When you read or listen information/news about COVID-19 vaccine,				
2	Did you find that the texts were difficult to understand?	0.38	**0.79**	0.77	0.76
3	Did you need much time to understand them?	0.42	**0.77**	0.77	0.76
1	Did you find words you didn't know?	0.27	**0.73**	0.61	0.61
4	Did you or would you need someone to help you understand them?	0.39	**0.69**	0.63	0.64

In CFA, the χ^2 test of model fit was low ($\chi^2_{(47)}$ = 63.452, p=.055). The model had a good fit as supported by the goodness of fit measures. TLI, CFI, RMSEA, and SRMR were 0.993, 0.991, 0.026, 0.029, respectively. The results confirm that the two factors extracted could characterize vaccine literacy in a theoretically meaningful way.

Known-Groups Validity

In **Table 3**, known-groups validity was performed to test the construct validity of the Thai COVID-19 VL Scale. We classified vaccine acceptance into three categories. The scores of each group were as follows: 'have got vaccination' (mean = 3.24, SD = 0.44), 'will get for sure' (mean = 3.16, SD = 0.43), and 'not sure'/ 'will not get' (mean = 3.02, SD = 0.46). By using the known-group methods, the Thai COVID-19 VL Scale was able to differentiate among these three groups. Average scores on the scale among the three groups were significantly different ($F_{(2, 999)}$ = 14.22, p< 0.001). Tukey test for multiple comparisons revealed significantly different average VL scores in three groups (p-values <.05). The vaccinated group had the highest mean VL score, followed by the intended group and the group who were not sure/not willing to get the vaccine.

Table 3. Comparing Means of VL among 3 Known Groups (n=1,002)

Source of variation	Sum of square	Degree of freedom	Mean square	F-ratio	p-value
Between groups	5.49	2	2.75	14.22	<.001
Within groups	192.98	999	0.19		
Total	198.47	1,001			

Group1= Have got COVID-19 vaccination, Group 2= Will get the vaccine for sure, and Group 3= Not sure/will not get COVID-19 vaccination

After confirming construct validity, internal consistency reliabilities were consequently analyzed. Overall Cronbach's alpha was 0.81. Cronbach's alphas of Functional and Interactive/critical VL subscales were 0.85 and 0.86, respectively. Item-rest correlations ranged between 0.44 and 0.76. Both subscales have average inter-item correlations of 0.45 and 0.59, respectively.

Discussion

This study employed a symmetrical translation process using the back-translation technique and pretesting to translate the COVID-19 VL Scale (English version) into the Thai language.[31] In this case, using a symmetrical translation is to reference a construct across cultures and contexts. It underscores both loyalty of meaning and equal familiarity in each language. During the translation, some questions were reviewed and adapted to social and health care in the Thai context. The translated version was tried out and refined to ensure participants' comprehensibility. The final draft of the Thai COVID-19 VL Scale was initially pretested for its internal consistency reliability. Cronbach's alphas of overall scale as well as functional, interactive, and critical VL subscales were above 0.81 (0.81, 0.80 and 0.92, respectively) indicating adequate internal consistency.[28]

EFA identified two factors that define the construct of the Thai COVID-19 VL Scale namely: Interactive/critical VL and Functional VL. This was incongruent with the HL Scale[7,8], from which the COVID-19 VL Scale was adopted, as the HL Scale had a different number of factors. The Ishikawa's HL Scale[7] was designed to measure three different HL levels: Functional, Interactive, and Critical HL, and confirmed theoretical framework of the HL construct.[8,29] The present study revealed that Factor 1 "Interactive/critical VL" was a combination of Interactive VL and Critical VL into the one factor, while Factor 2 represented Functional VL. The original COVID-19 VL Scale also showed that all items regarding interactive-critical VL loaded on one factor, while all items measuring functional VL loaded on the other factor. Within the same factor, a close correlation between a pair of items was observed. These similar findings evidenced that the Thai COVID-19 VL Scale and the COVID-19 VL Scale developed by Biasio et al.[9,10] have a similar structure comprising the same underlying factors namely: Interactive/critical VL and Functional VL.[9,10] Our study showed that all factor loadings were >0.5. According to Matsunaga,[38] factor loadings between 0.4 and 0.5 specify solid and stable factors. Hence, all items from the original COVID-19 VL Scale were retained in the Thai version. The two remaining factors, namely: Interactive/critical VL and Functional VL skills, accounted for 58.1% of the total variance. When the total variance explained is close to 60%, it is considered acceptable for a valid construct.[35]

Following the EFA, the CFA was conducted to further test the scale's construct validity by examining the extent to which the statistical model fits the actual data.[35] In Sample 2, the CFA revealed that the measurement model consisted of Interactive/critical VL skills and Functional VL skills had the goodness of fit with the data. The CFA of the Thai COVID-19 VL Scale

supported the use of a two-factor model, which had a good CFI and RMSEA. This is consistent with the underlying theory that the construct of HL is made up of all Functional, Interactive, and Critical HL.[7,8,17,18] Our study revealed that Interactive VL (Item 5 to 8) and Critical VL (Item 9 to 12) were highly correlated within the same factor called Interactive/critical VL. This was similar to the VL Scale developed earlier[9] in the way that the correlation of functional VL with communicative and critical VL scores was not statistically significant, whereas communicative VL and critical VL scores were positively-significantly correlated.

Scores of the Thai COVID-19 VL Scale can be calculated separately as a subscale score for each of the two factors (Functional VL versus Interactive/critical VL). Adequate performance of both the Functional, and Interactive/critical VL subscales lends support to using them both separately and together. The results confirm that the two factors extracted could characterize vaccine literacy construct in a theoretically meaningful way.[9,10]

Additional findings from construct validity testing using a known-groups method [34,39] revealed that average VL scores were significantly higher among the participants who have got vaccination against COVID-19 than other groups who intended and not sure/not willing to get the vaccine. As a result, the Thai COVID-19 VL Scale has adequately validated for its use in differentiating COVID-19 VL in Thai people. It can be used to identify people with low VL in Thailand.

The Thai COVID-19 VL Scale has adequate internal consistency reliability (Cronbach's alpha of overall and subscales = 0.81, 0.85, and 0.86, respectively).[29] Compared with the original COVID-19 VL Scale (0.85 and 0.77 for each subscale)[9], the Thai version shows a relatively better Cronbach's alpha for the interactive/critical VL subscale. Item-rest correlations ranged between 0.44 and 0.76. Both subscales' average inter-item correlations (0.45 and 0.59) were within the recommended range between 0.15 and 0.50. These indicate good internal consistency.[42] It can be explained that the scale's items are homogeneous in describing the same construct. Therefore, these findings support that the Thai COVID-19 VL Scale is a reliable instrument to be used in Thailand.

Strength and Limitations

This study has several strengths. First, the Thai COVID-19 VL Scale had a two-factor structure comprising 12 items, therefore it is short and convenient for the respondents. This type of rapid assessment or initial screening tool is ideally suited for a fast-paced healthcare facility such as primary care clinics and online surveys. Second, this study used online recruitment via social media channels is to recruit participants nationwide from every region in Thailand. Online recruitment can be used as an efficient data collecting method of large public health data in a timely manner.[43] Third, the samples in this study had an adequate size for psychometric property testing using a factor analysis.[30]

Although this survey study found the Thai COVID-19 VL Scale to be an appropriate instrument measuring COVID-19 VL among Thai people, there were limitations in this study that might be taken into consideration. Although participants were from geographically broad around the country, they cannot fully represent the Thai population because the samples underrepresent male participants and may underrepresent people with low socioeconomic status who have no internet access and older people who may not be familiar with using information technology devices. Further research is needed to test the psychometric properties of this scale and to use the scale to assess vaccine literacy of older people and people who are not able to access to online surveys. This study also employed convenience sampling which may reduce the generalizability of these findings.

Conclusions and Implications for Nursing Practice

Vaccine literacy research is limited in Thailand, and no Thai validated instrument for measuring VL specifically to COVID-19 vaccine has been available until now. This study translated the original COVID-19 VL Scale to Thai language and demonstrated that the Thai COVID-19 VL Scale has adequate construct validity and internal consistency reliability. This scale will be useful for nurses to assess COVID-19 VL in Thai people as VL has been highly recognized as a significant factor influencing vaccination. The Thai COVID-19 VL Scale has the considerable potential to identify people with low VL so that public health intervention with a more specific strategy can be targeted to enhance VL and increase vaccine uptake in Thailand.

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การแปลและการทดสอบคุณสมบัติการวัดเชิงจิตวิทยาของเครื่องมือวัดความรอบรู้เรื่องวัคซีนโควิด19 ฉบับภาษาไทย

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บทคัดย่อ: ความรอบรู้เรื่องวัคซีนมีความสัมพันธ์กับการฉีดวัคซีน ดังนั้น จึงมีความจำเป็นในการประเมินความรอบรู้เรื่องวัคซีนโควิด19 การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อแปลเครื่องมือวัดความรอบรู้เรื่องวัคซีนโควิด19 จากฉบับภาษาอังกฤษ และทดสอบคุณสมบัติการวัดเชิงจิตวิทยาของเครื่องมือฉบับแปลเป็นภาษาไทย การศึกษานี้ใช้การสำรวจภาคตัดขวางโดยการเก็บข้อมูลออนไลน์ จากกลุ่มตัวอย่างประชาชนที่มีอายุ 18 ปี ขึ้นไป จำนวน 1,002 คน ทดสอบความตรงเชิงโครงสร้างโดยใช้การวิเคราะห์องค์ประกอบเชิงสำรวจและการวิเคราะห์องค์ประกอบเชิงยืนยัน รวมทั้งการทดสอบความตรงเชิงโครงสร้างโดยเทคนิคการใช้กลุ่มรู้ชัด และการทดสอบความเที่ยงแบบความสอดคล้องภายใน

ผลการวิเคราะห์องค์ประกอบเชิงสำรวจของเครื่องมือวัด 12 ข้อ พบว่า ความรอบรู้เรื่องวัคซีนโควิด19 ประกอบด้วย 2 องค์ประกอบร่วม คือ ความรอบรู้ระดับปฏิสัมพันธ์/วิจารณญาณ และความรอบรู้ระดับพื้นฐาน ซึ่งสามารถอธิบายความแปรปรวนสะสมร้อยละ 58.1 ผลการวิเคราะห์องค์ประกอบเชิงยืนยันพบว่าโมเดลมีความตรงเชิงโครงสร้างทั้ง 2 องค์ประกอบ สอดคล้องกลมกลืนกับข้อมูลเชิงประจักษ์ เครื่องมือนี้มีค่าสัมประสิทธิ์แอลฟาของครอนบาค 0.81 สำหรับทั้งฉบับ 0.85 และ 0.86 สำหรับองค์ประกอบแต่ละด้านตามลำดับ การตรวจสอบความตรงเชิงโครงสร้างโดยเทคนิคการใช้กลุ่มรู้ชัดพบว่า กลุ่มที่รับการฉีดวัคซีนโควิด19 แล้ว มีคะแนนความรอบรู้เรื่องวัคซีนสูงกว่า กลุ่มที่ตั้งใจจะฉีดและกลุ่มที่ไม่แน่ใจ/จะไม่ฉีดวัคซีน การศึกษานี้พบว่า เครื่องมือวัดความรอบรู้เรื่องวัคซีนโควิด19 มีคุณสมบัติการวัดด้านความตรงและความเที่ยงอยู่ในเกณฑ์ดี สามารถนำไปใช้ในการประเมินความรอบรู้เรื่องวัคซีนโควิด19 ในประชาชนไทย เป็นประโยชน์สำหรับพยาบาลและทีมสุขภาพในการคัดกรองผู้ที่มีความรอบรู้เรื่องวัคซีนโควิด19 ในระดับต่ำ เพื่อมุ่งเป้าส่งเสริมความรอบรู้เรื่องวัคซีนโควิด19 อย่างเจาะจง และเพิ่มจำนวนผู้ฉีดวัคซีนโควิด19 ในประเทศไทย

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