ORIGINAL ARTICLE

Volume 18 No. 1 2026

DOI: 10.21315/eimj2026.18.1.3

ARTICLE INFO

Submitted: 20-12-2024
Accepted: 20-07-2025
Online: 31-03-2026

Validation of a Modified, Malay Version of Extended Technology Acceptance Model Questionnaire: Assessing User Acceptance in Health Education Videos

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To cite this article: Raja Abdul Rahman RNA, Nik Mohd Rosdy NMM, Md Sabri BA. Validation of a modified, Malay version of extended technology acceptance model questionnaire: assessing user acceptance in health education videos. Education in Medicine Journal. 2026;18(1):31–48. https://doi.org/10.21315/eimj2026.18.1.3

To link to this article: https://doi.org/10.21315/eimj2026.18.1.3

ABSTRACT

This study focused on development and evaluation a questionnaire based on the extended technology acceptance model (TAM) to assess user acceptance of health education videos. The process involved adapting, translating, and validating the instrument to ensure cultural and contextual relevance. Key steps included linguistic adaptation, expert review, and comprehensive psychometric testing to confirm the tool's validity and reliability. Validation processes included the content validity index (CVI) and the face validity index (FVI), which confirmed the relevance and appropriateness of the items. Exploratory factor analysis (EFA) was conducted on a sample of 345 participants to ensure adequate statistical power. The questionnaire evaluated constructs, such as social interaction, informativeness, perceived ease of use, perceived usefulness, attitude towards use, and help-seeking information in the context of user acceptance. Descriptive statistics showed high mean scores for social interaction, informativeness, video attitude, perceived usefulness, perceived ease of use, and help-seeking intention (4.13–4.63), indicating positive user perceptions, while low mean scores for intrusiveness (1.35–1.70) reflected minimal negative experiences. Kaiser-Meyer-Olkin (KMO) values (0.676–0.798) and significant Bartlett's test results ($p < 0.0001$) confirmed sample adequacy and strong interrelationships among variables. Principal component analysis revealed strong factor loadings (> 0.6) across all constructs, supporting the questionnaire's validity and reliability. Reliability analysis demonstrated high internal consistency, with Cronbach's alpha exceeding 0.7 across constructs. The findings confirm the questionnaire's validity and reliability in evaluating user acceptance of health education videos, underscoring its importance in guiding the development of effective educational content.

Keywords: *User acceptance, Modified extended TAM, Health education video, Dentistry*

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INTRODUCTION

In dentistry, dental education is being revolutionised by technology, allowing users to access large amounts of material from a variety of sources at their convenience, from virtually any location (1). Digital oral health promotion (OHP) or oral health education (OHE) can be implemented more widely by disseminating oral health messages and implementing social marketing through mass media campaigns, with specific aims to increase knowledge of the importance of oral health and oral health care, as well as ensuring that individuals of all ages have a healthy mouth (1). Digital technologies, such as social media, video streaming, smartphones, computers, and others, are examples of current technologies that can be utilised for digital OHP. Technology may also benefit parents and caregivers by enabling engagement with an online health message, allowing them to access information on their own schedules (2), and thus making it easier for them to gain new knowledge to disseminate to their children.

Besides that, technology-based programmes also encourage environmentally friendly behaviour (i.e., green) and reduce the cost of intervention supplies (2). In Malaysia, approximately 87.61% of the population used a smartphone in 2020, and this figure is expected to rise significantly in the next few years (3). Malaysians spent an average of 7.5 hours per day on the internet and 2.45 hours per day on social media, with smartphone ownership linked to internet and social media use (3). This report showed the relevance of digital OHP in the current situation, especially after the COVID-19 pandemic, which significantly impacted the use of digital technology not only in Malaysia but also globally. The digital transformation offers several substantial benefits, including the aforementioned online activities and education (4).

Moreover, ICT solutions could improve the delivery of education, research, and training, among other things (4). As the pandemic continues, digital technologies play an important role in a comprehensive response to outbreaks and pandemics, complementing conventional public health measures (5), including the dissemination of OHE. An example is the MySejahtera application, which allows users to access COVID-19 information, track their current COVID-19 status, and directly communicate with the Ministry of Health and others.

Thus, to develop effective methods for conveying health messages through OHE or OHP, user acceptance is a crucial consideration. Although social video platforms are recognised as valuable educational resources for informal, self-directed learning, little is known about how users engage with them as learning media. User acceptance ultimately determines the effectiveness of these interventions since users are the end consumers of health education videos. Models like the technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) are widely used to measure user acceptance of new technologies (6, 7).

Previous studies have demonstrated the utility of TAM in modelling and quantifying user acceptance of online advertising across various media and social platforms (6). A modified TAM incorporating factors such as social interaction, intrusiveness, informativeness, and relevance has been proposed to capture the dynamics of short-video commercials, positioning TAM as a robust framework for evaluating user acceptance of health education videos (6). Additional constructs, such as perceived usefulness and perceived ease of use, are crucial to enhancing the effectiveness of social marketing campaigns promoting oral health. Perceived usefulness refers to an individual's belief in the practical benefits of health education content, which can motivate engagement with materials and adoption of recommended practices (8), such as regular screenings or preventive measures for oral

cancer. Similarly, perceived ease of use refers to the accessibility and comprehensibility of educational content; simpler, more intuitive materials can reduce barriers to engagement (8). Both constructs significantly influence behavioural intentions, a key determinant of behaviour change, by fostering motivation and commitment among target audiences. Understanding these constructs enables social marketing campaigns to tailor messages that highlight benefits, utilise engaging platforms, and continuously refine strategies to maximise impact. These insights provide a framework for creating audience-centric health education initiatives that effectively promote positive behavioural outcomes (9).

Thus, this study focused on adapting, translating into Malay, and validating the modified extended TAM questionnaire to assess public user acceptance of health education videos, providing a critical tool to enhance the efficacy of digital OHE initiatives.

METHODS

Two main phases were involved: (a) Phase I: Adaptation, translation and validation of the questionnaire; and (b) Phase II: Pilot study. During the adaptation stage, the research team members were responsible for reviewing the relevant questions in the extended TAM questionnaire prior to translation and validation. The question selection was based on a thorough discussion of each item in the questionnaire for measuring user acceptance of an OHE video. Several modifications, including dropping irrelevant items and replacing them with relevant ones, were made to the questionnaire. Figure 1 shows the steps taken in preparing the questionnaire.

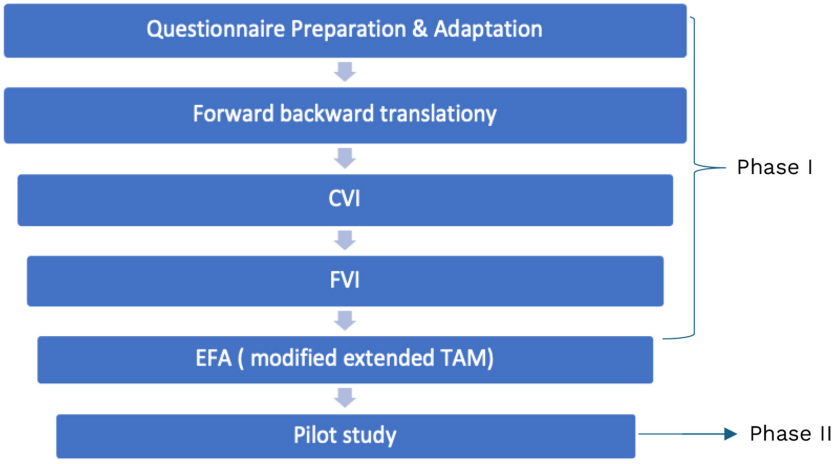

Figure 1: Schematic diagram of the questionnaire adaptation, validation and pilot study.

Phase I: Adaptation, Translation and Validation of Modified Extended TAM

The original extended TAM was adapted from Zhao and Wang (6), where they examined health advertising on short-video social media platforms. The adapted model comprised 8 constructs and 25 measurement items. It comprised closed-ended questions, including Likert-scale items, organised into different perceived ease of use, intention to use, and satisfaction with the system. Each question within the questionnaire was referred to as an item (6). All items were scaled using a 5-point Likert scale, with strongly disagree = 1; disagree = 2; neither agree nor disagree = 3; agree = 4; strongly agree = 5.

Forward-backward translation

The reconciliation process, which merges multiple independent forward translations into a single translation, is a crucial yet challenging step in translation (6). The initial phase of questionnaire translation involved forward translation, in which the questionnaire was translated from the source language (English) into the target language (Malay) by two certified, proficient bilingual translators. Each item was meticulously translated to capture the intended meaning for the target population. Subsequently, the forward translations were reconciled into a single interim Malay version by another certified and proficient bilingual translator. This version was then reviewed, discussed, and finalised to accurately reflect the nuances and intended meanings of the original questionnaire.

Following the forward translation, the questionnaire underwent backward translation into an English version, in which three independent translators proficient in both the target and source languages translated it back to the original language. This step aimed to determine discrepancies, ambiguities, or cultural nuances that might have been inadvertently altered during forward translation. Next, the forward and backward translations were meticulously compared and harmonised to ensure congruence across the research team's translations. Overview of the steps of forward-backward translation is shown in Figure 2.

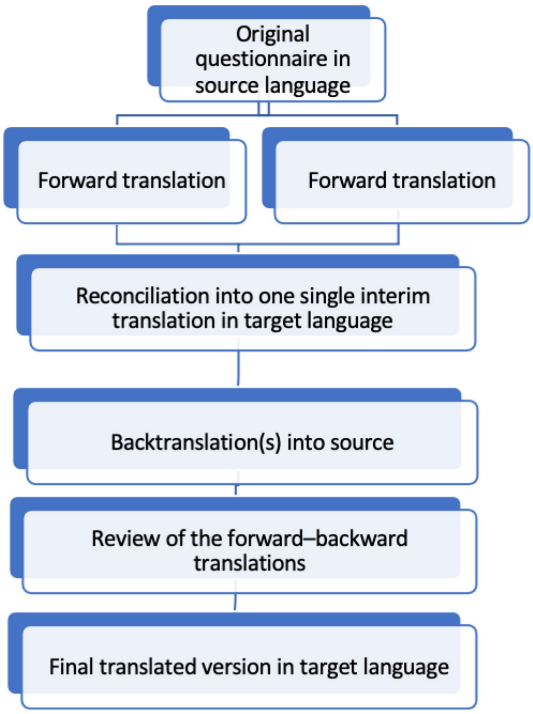

Figure 2: Elements of standardized forward–backward translation procedures adapted based on Koller et al. (10).

To address cultural nuances, terms and phrases were carefully rephrased for better understanding. Technical health education terms were translated into commonly used Malay expressions, and examples were tailored to reflect local values and experiences.

Challenges included finding suitable equivalents for concepts like 'perceived ease of use', which required careful adjustments for clarity. Pilot testing with a representative sample helped identify and refine ambiguous or culturally sensitive elements, thereby improving the questionnaire's relevance and effectiveness for the target population.

Content validity index

In this study, a softcopy version of the questionnaire was distributed to seven experts proficient in both English and Malay, who were also experts in the questionnaire's content. These experts evaluated the CVI to assess the appropriateness and adequacy of the included content items. The panel was asked to review the applicability of each questionnaire item. Four criteria were used in measuring the content validity: relevance, clarity, simplicity, and ambiguity (11, 12). Data from the content validation were extracted and transferred to Microsoft Excel, and further analysed using the same application. The scale-level content validity index based on the average method (S-CVI/Ave) was further calculated.

The item-level content validity index (I-CVI) was calculated as the proportion of experts who rated each item as either 3 (quite relevant) or 4 (highly relevant) on a 4-point relevance scale. This index reflects the level of agreement among experts regarding the relevance of individual items. At the scale level, two approaches were used to compute the S-CVI. The first was the average method (S-CVI/Ave), calculated by taking the mean of all I-CVI values across the items. The second approach was the universal agreement method (S-CVI/UA), which represented the proportion of items that achieved an I-CVI score of 1.00, indicating unanimous agreement among experts on their relevance (11, 13).

A panel of seven experts was meticulously selected to evaluate the CVI of the study materials, ensuring a comprehensive and multidisciplinary review. The panel included one medical public health specialist, two oral medicine and pathology specialists, two dental public health specialists, one specialist from the restorative department, and one expert from the Faculty of Film, Theatre, and Animation. This diverse group was chosen based on their professional credentials and relevance to the study's focus on OHE and digital media. The health specialists contributed their expertise in public health, oral medicine, and clinical dentistry to ensure the content was medically accurate and aligned with current practices. Meanwhile, the media expert provided insights into the audiovisual design, ensuring the materials were engaging, visually appealing, and suitable for digital platforms. This multidisciplinary approach enhanced the overall quality of the educational materials, making them both scientifically robust and user-friendly for the intended audience.

Face validity index

Next, the face validity index (FVI) commenced with the development of the response process validation form. Ten target respondents representing the future potential subjects (public population) were included for the face-to-face FVI process. Users were asked to rate the comprehensibility and clarity of the translated items in the questionnaire on a scale from 1 (not clear or intelligible) to 4 (extremely clear and understandable). Once the data were transferred into Microsoft Excel, they were reclassified as 1 (clear and understandable) for scores 3 and 4, and as 0 (not clear and understandable) for scores 1 and 2 (14). The scale average was used to calculate the FVI (14).

The item-level face validity index (I-FVI) was calculated as the proportion of respondents who rated each item as 3 (clear) or 4 (very clear) on a 4-point clarity scale, reflecting the clarity and understandability of each item to the target population. At the scale level, two methods were used to compute the scale-level face validity index (S-FVI). The average method (S-FVI/Ave) involved calculating the mean of all I-FVI scores across the items, representing the overall face validity of the instrument (14). In contrast, the universal agreement method (S-FVI/UA) was determined by calculating the proportion of items that received an I-FVI score of 1.00, indicating complete agreement among respondents regarding item clarity. These indices

provide a quantitative evaluation of how well the instrument's items are understood by its intended users.

Exploratory factor analysis

Subsequently, this study employed EFA to examine the questionnaire's underlying structure and to validate its domain. Census sampling was used to collect data from 345 undergraduate dental students in the Faculty of Dentistry, UiTM, from year 1 to year 5. The sample size was chosen to ensure adequate statistical power for factor analysis and represent a unique subset of the public population, as they are both potential users of health education videos and individuals with relevant knowledge and exposure to health-related content.

The data analysis was conducted using IBM SPSS Statistics (version 29.0). Factor extraction was performed using principal component analysis. The number of factors retained was determined based on the eigenvalue criterion (≥1) and analysis of the scree plot. Factors with eigenvalues greater than one were retained for further examination, as suggested by Shrestha (15).

Factor loadings were analysed to identify significant relationships between the variables and the factors. Loadings greater than 0.6 were considered indicative of strong associations, reflecting meaningful connections between the observed variables and their underlying constructs (16). The reliability of the identified factors was assessed using Cronbach's alpha, a measure of internal consistency. Factors exhibiting satisfactory reliability ($\alpha > 0.7$) were considered robust indicators of the underlying constructs (16, 17).

Phase II: Pilot Study

The pilot study was to elicit and assess participant responses. This phase aimed to gather comprehensive feedback from the target population and to measure the time required for participants to complete the questionnaires. A pilot study involving 36 participants from the public who attended the primary care clinic at the Faculty of Dentistry, UiTM, was conducted. These individuals were selected because they represented a segment of the public likely to use health education videos. The diverse pilot study sample ensured that the results were not only representative of young adults but also applicable to a broader demographic. This diversity enhanced the external validity of the findings, enabling generalisation of the insights to a wider public audience that might use digital health education materials.

The pilot utilised a hardcopy questionnaire to assess respondents' clarity, perception, and comprehension of the questionnaire. Additionally, the pilot study aimed to gauge the time required to complete the questionnaire. Each participant spent approximately 10 to 15 minutes completing the questionnaire, which encompassed responding to the questionnaire and viewing one of the health education videos.

RESULTS

Phase I: Adaptation, Translation and Validation of Modified Extended TAM

The research team revised the domains, reducing them to seven by dropping one and updating the wording of some to align with the relevant structure for assessing user

acceptance of health education videos. Out of 26 items, 3 were removed. Irrelevant items in the original questionnaire were identified through a thorough content review by a panel of experts. These items were assessed for their contextual and cultural appropriateness and relevance to the study's objectives. Items deemed unsuitable, such as those that did not align with the cultural context or focused on health education videos, were replaced or rephrased. The revised items were further refined during the translation process and validated through expert reviews and pilot testing to ensure clarity, relevance, and conceptual alignment with the original questionnaire.

Additionally, a detailed explanation of the construct was included to enhance the target audience's understanding of its scope. For this research, this version of the questionnaire will be known as the modified extended TAM.

Forward-backward translation

Discrepancies identified between the original and backward-translated versions were iteratively revised and consulted with translators and subject matter experts to maintain consistency and accuracy.

Subsequently, the finalised Malay translation of the questionnaire underwent pilot testing with a representative sample of target respondents to assess comprehension, clarity, and cultural relevance. Feedback and comments were taken to solicit feedback on item wording, format, and interpretation, facilitating further refinement and enhancement. An example of the combined forward translations after the reconciliation process is shown in Figure 3.

Bahagian B- Penerimaan pengguna terhadap OHP Digital
Penerimaan Pengguna terhadap Promosi Kesihatan Mulut secara Digital

Sila tandakan (✓) dalam salah satu kotak bagi setiap item di bawah. /berikut

Keupayaan	Item	Sangat Tidak Setuju	Tidak Setuju	Neutral	Setuju	Sangat Setuju
Interaksi Sosial (Untuk menggalakkan interaksi sosial – dari segi mendapatkan bantuan) (Untuk mempromosikan interaksi sosial – dari segi mendapatkan bantuan)	Video ini menggalakkan peluang untuk mendapatkan interaksi yang membina dengan orang lain. Video ini memberikan peluang untuk mendapatkan interaksi yang menarik dan menggalakkan dengan orang lain.					
	Secara umumnya, pada pendapat saya, video ini sangat membantu interaksi sosial. Pada amnya, saya fikir video ini amat membantu dalam interaksi sosial.					
	Secara keseluruhannya, Saya berpuas hati dengan pendekatan budaya/gaya hidup yang ditayangkan di dalam video ini. Pada keseluruhannya, saya berpuas hati dengan paparan pendekatan budaya/gaya hidup di dalam video ini.					

Figure 3: Example of the combination of forward translations after reconciliation.

Content validity index

Content validity was strong, as reflected in the CVI results presented in Table 1. The I-CVI was 0.98, indicating excellent expert agreement on the relevance and clarity of each item. The S-CVI/Ave also reached 0.98, demonstrating consistently high validity across all items. Using the universal agreement method (S-CVI/UA), a value of 0.87 was obtained, signifying substantial overall consensus among experts, albeit slightly lower than the average method.

Table 1: The clarity and comprehension ratings on the item scale by seven expert panels

Item	1	2	3	4	5	6	7	Raters in agreement	I-CVI	UA
Domain 1										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
Domain 2										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	0	1	1	1	0	1	5	0.7	0
4	1	1	0	1	1	1	1	6	0.9	0
Domain 3										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
Domain 4										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
Domain 5										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
Domain 6										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
4	1	1	1	1	1	1	0	6	0.9	0
Domain 7										
1	1	1	1	1	1	1	1	7	1	1
2	1	1	1	1	1	1	1	7	1	1
3	1	1	1	1	1	1	1	7	1	1
								S-CVI/Ave	0.98	
Proportion clarity and comprehension	1	0.96	0.96	1	1	0.96	0.96	S-CVI/UA		0.87
	Average proportion of items judged clarity and comprehension across the 7-expert panel (raters)							0.98		

Face validity index

Face validity was similarly strong, with an I-FVI of 0.98, demonstrating exceptional agreement among experts regarding the relevance and clarity of individual items. The S-FVI/Ave was 0.98, indicating robust overall validity across all items, while the universal agreement method (S-FVI/UA) yielded a score of 0.87, reflecting slightly lower but still high consensus among raters (Table 2).

Table 2: The clarity and comprehension ratings on the item scale by 10 raters

Item	1	2	3	4	5	6	7	8	9	10	Raters in agreement	I-FVI	UA
Domain 1													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
Domain 2													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	0	0	1	1	1	1	1	1	1	8	0.8	0
4	1	1	1	1	1	0	1	1	0	1	8	0.8	0
Domain 3													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
Domain 4													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
Domain 5													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
Domain 6													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
4	0	1	1	1	1	1	1	1	1	1	9	0.9	0
Domain 7													
1	1	1	1	1	1	1	1	1	1	1	10	1	1
2	1	1	1	1	1	1	1	1	1	1	10	1	1
3	1	1	1	1	1	1	1	1	1	1	10	1	1
											S-FVI/Ave	0.98	
Proportion clarity and comprehension	0.96	0.96	0.96	1	1	0.96	1	1	0.96	1	S-FVI/UA		0.87
	Average proportion of items judged clarity and comprehension across the 10 raters										0.98		

Exploratory factor analysis

Descriptive statistics revealed high mean scores across constructs promoting social interaction, informativeness, appropriateness, usefulness, ease of use, and help-seeking intentions. Conversely, intrusiveness received low mean scores, indicating positive reception and the educational videos' effectiveness (Table 3).

Table 3: Descriptive statistic of all constructs' items (n = 345)

Construct	Construct items	Mean (SD) of each item score	SD[a]	Analysis N[a]
Social interaction (To promote social interaction - in terms of getting help)	Q1	4.27	0.656	345
	Q2	4.30	0.691	345
	Q3	4.32	0.662	345
Intrusiveness	Q4	1.70	0.748	345
	Q5	1.40	0.503	345
	Q6	1.39	0.516	345
	Q7	1.35	0.478	345
Informativeness				
Accuracy-credibility of content, and/or	Q8	4.57	0.572	345
Scientifically correct information	Q9	4.56	0.588	345
Evidence-based practices	Q10	4.45	0.659	345
Video attitude (appropriateness)	Q11	4.13	0.738	345
	Q12	4.22	0.709	345
	Q13	4.18	0.718	345
Perceived usefulness	Q14	4.46	0.604	345
	Q15	4.51	0.523	345
	Q16	4.37	0.651	345
Perceived ease of use	Q17	4.51	0.620	345
	Q18	4.57	0.577	345
	Q19	4.63	0.514	345
	Q20	4.41	0.701	345
Help seeking intention	Q21	4.45	0.559	345
	Q22	4.44	0.608	345
	Q23	4.41	0.672	345

Next, the Kaiser-Meyer-Olkin (KMO) values for all constructs ranged from 0.676 to 0.798, surpassing the acceptable threshold of 0.6 (18). The KMO values for specific constructs were social interaction (0.731), intrusiveness (0.792), and informativeness (0.714), all indicating good sampling adequacy. These findings confirmed the sample's suitability for factor analysis and ensured reliable results in assessing the instrument's constructs. Bartlett's Test of Sphericity was significant for all constructs, validating the interrelatedness of variables and justifying factor analysis (Table 4).

Table 4: KMO and Bartlett's test for all constructs

Construct	KMO and Bartlett's test		
Social interaction (To promote social interaction - in terms of getting help)	KMO measure of sampling adequacy		0.731
	Bartlett's test of sphericity	Approx. chi-square	506.030
		df	3
		Sig.	0.000
Intrusiveness	KMO measure of sampling adequacy		0.792
	Bartlett's test of sphericity	Approx. chi-square	1223.794
		df	6
		Sig.	0.000
Informativeness Accuracy-credibility of content, and/or Scientifically correct information Evidence-based practices	KMO measure of sampling adequacy		0.714
	Bartlett's test of sphericity	Approx. chi-square	504.521
		df	3
		Sig.	0.000
Video attitude (appropriateness)	KMO measure of sampling adequacy		0.676
	Bartlett's test of sphericity	Approx. chi-square	513.065
		df	3
		Sig.	0.000
Perceived usefulness	KMO measure of sampling adequacy		0.698
	Bartlett's test of sphericity	Approx. chi-square	459.329
		df	3
		Sig.	0.000
Perceived ease of use	KMO measure of sampling adequacy		0.798
	Bartlett's test of sphericity	Approx. chi-square	696.799
		df	6
		Sig.	0.000
Help seeking intention	KMO measure of sampling adequacy		0.708
	Bartlett's test of sphericity	Approx. chi-square	455.843
		df	3
		Sig.	0.000

In this study, EFA was conducted separately for each domain rather than across the whole questionnaire because each TAM construct (such as perceived usefulness, perceived ease of use, and attitude towards use) represented a distinct conceptual area. Analysing them separately allowed us to more precisely explore the internal structure of each domain without the risk of cross-construct contamination, ensuring clearer interpretation of factor loadings within each theoretical framework.

Although the theoretical domains of the TAM were established, EFA was performed to examine whether the items were grouped into factors as expected within our specific study population and context.

Consequently, the factor loadings and reliability scores shown in Table 5 indicated that all items exhibited strong loadings, exceeding the critical threshold of 0.6, thereby affirming their substantial contributions to their respective constructs. Additionally, Cronbach's alpha coefficients for all constructs exceeded 0.7, confirming the instrument's high internal consistency and reliability. These findings validated the robustness of the scale in capturing user perceptions effectively.

Table 5: Extracted factors, factor loadings, and reliability

Construct	Item	Factor loading	Cronbach's alpha
Social interaction (To promote social interaction - in terms of getting help)	Q1	0.893	0.867
	Q2	0.906	
	Q3	0.868	
Intrusiveness	Q4	0.696	0.872
	Q5	0.944	
	Q6	0.926	
	Q7	0.945	
Informativeness Accuracy-credibility of content, and/or Scientifically correct information Evidence-based practices	Q8	0.886	0.859
	Q9	0.916	
	Q10	0.855	
Video attitude (appropriateness)	Q11	0.902	0.848
	Q12	0.922	
	Q13	0.802	
Perceived usefulness	Q14	0.877	0.838
	Q15	0.912	
	Q16	0.833	
Perceived ease of use	Q17	0.847	0.855
	Q18	0.900	
	Q19	0.870	
	Q20	0.757	
Help seeking intention	Q21	0.896	0.840
	Q22	0.898	
	Q23	0.829	

Phase II: Pilot Study

Reliability analysis

Cronbach's alpha was utilised to assess test reliability (19). The reliability analysis was conducted to assess the internal consistency of the survey instrument used to measure participants' acceptance of digital OHP. Cronbach's alpha coefficient was computed to evaluate the scale's reliability, indicating how consistently the items within the scale measure the same underlying domain.

The study found that all measured constructs demonstrated strong internal consistency, with Cronbach's alpha values exceeding the acceptable threshold of 0.7. Intrusiveness and informativeness showed the highest reliability (0.94 and 0.95, respectively), indicating well-defined and cohesive measures. Help seeking intention also exhibited strong reliability (0.86), while social interaction, video attitude (appropriateness), perceived usefulness, and perceived ease of use showed acceptable reliability, with alpha values ranging from 0.79 to 0.88. These results affirmed the questionnaire's effectiveness in capturing user perceptions and behavioural intentions. The findings of the reliability analysis indicated acceptable to good internal consistency across all domains, with each domain exceeding Cronbach's alpha

of 0.70, as noted in Table 6. This suggests that the survey instrument provided dependable and consistent measurements of participants' acceptance levels.

Other than that, participants in the pilot study provided useful feedback on the video content. For Video 1, one participant mentioned that the audio was slightly too soft, which could affect understanding, while another said everything was good and that they learned something new. Feedback on Video 2 showed that the content was simple and easy to understand. For Video 3, participants appreciated the visuals, saying they matched the content well and made it more appealing. However, one participant suggested adding real-life examples or using a real actor to make the video more relatable. Overall, the feedback highlighted both the strengths of the videos and areas that could be improved, especially in terms of clarity and engagement. Revisions were made to the videos where appropriate, based on the feedback received.

Table 6: Value of Cronbach's alpha for pilot study

Construct	Cronbach's alpha	Cronbach's alpha based on standardised items	N of items
Social interaction (To promote social interaction - in terms of getting help)	0.84	0.84	3
Intrusiveness	0.94	0.94	4
Informativeness Accuracy-credibility of content, and/or Scientifically correct information Evidence-based practices	0.95	0.95	3
Video attitude (appropriateness)	0.88	0.88	3
Perceived usefulness	0.79	0.81	3
Perceived ease of use	0.82	0.84	4
Help seeking intention	0.86	0.86	3

DISCUSSION

A questionnaire can either be newly developed or adapted from existing tools. In this study, we adapted the extended TAM-based questionnaire to assess user acceptance of health education videos (10). These constructs are particularly relevant when evaluating the acceptance of digital tools in health education, as they provide insights into the likelihood of adoption and sustained use by the target audience.

Adapting a valid, culturally appropriate questionnaire is essential for its applicability across diverse populations, including those with different cultural and linguistic backgrounds (20). Cross-cultural translation and validation go beyond direct translation; they ensure that the instrument remains valid and relevant for use across various populations, cultures, and languages (21).

In adapting the questionnaire, care was taken to ensure its validity and reliability, and to accurately reflect the constructs it measures. This process involved expert reviews and a pilot study to assess the appropriateness of the questions for the context of OHE videos. Feedback from these stages led to refinements, including adjustments for clarity, relevance,

and cultural sensitivity. This focus on ensuring validity and reliability aligns with the growing need for tools to assess user engagement and acceptance as digital health interventions become more prevalent in healthcare settings.

Given the increasing integration of technology in healthcare, robust instruments are essential for identifying barriers to adoption and improving digital health interventions. Thus, this study contributes to the growing body of knowledge necessary to optimise the use of technology in health education and enhance health outcomes. The adaptation and validation of the modified extended TAM questionnaire for OHP have demonstrated its robust psychometric properties, making it a reliable instrument for assessing user acceptance of health education videos. This enhanced model integrates additional dimensions, including social interaction, intrusiveness, informativeness, video attitude, and help-seeking intention, broadening the framework to capture complex user dynamics and behavioural change. The inclusion of help-seeking intention further underscores the model's capacity to assess the likelihood of actionable health behaviours arising from video engagement.

Globally, research highlights the effectiveness of digital health tools in promoting health education and behaviour change. Research by Zhang et al. (22) and Perski and Short (23) further supported these enhancements. For example, research by Zhang et al. (22) emphasised the relevance of social interaction and informativeness in influencing user engagement with health communication tools, supporting their inclusion in this framework. Similarly, Perski and Short (23) highlighted the role of behavioural intention, such as help-seeking, in predicting engagement with digital health interventions, reinforcing the importance of this construct in assessing health education videos. These findings aligned with Davis's foundational TAM constructs of perceived usefulness and perceived ease of use, as further adapted by Venkatesh and Bala for broader technology contexts (24, 25).

Additionally, constructs such as perceived usefulness, perceived ease of use, and social interaction are consistently recognised as significant factors influencing user engagement (23). The role of informativeness and behavioural intention has also been underscored as critical to the success of health communication tools. Our findings align with these global trends, supporting the integration of these constructs into the modified extended TAM framework for assessing health education video.

Locally, however, research on the acceptance of digital health interventions in Malaysia, particularly in the context of OHE, is more limited. This study contributes to filling this gap by adapting the extended TAM model to the local context and ensuring the constructs' cultural relevance. The addition of help-seeking intention is particularly notable, as it captures users' readiness to seek additional healthcare information or services, which has been shown to be a significant predictor of health behaviours across various digital health interventions (26). This local adaptation expands the applicability of the TAM framework to the Malaysian population, addressing cultural nuances and promoting greater user engagement with health education videos.

The results of this study also contrast with some findings in the literature, particularly regarding the inclusion of more localised, context-specific constructs. For example, while global studies have often focused on core TAM constructs, our study's inclusion of social interaction, intrusiveness, and video attitude provides a more holistic view of the factors influencing user acceptance of health education videos. These additional dimensions offer deeper insights into the complexities of user engagement with digital health tools, which is an essential consideration for future interventions in Malaysia and similar settings. Thus,

our findings contribute to both the growing body of literature on digital health education tools and to the broader understanding of user engagement across diverse cultural contexts. Furthermore, the systematic development and validation process employed in this study confirms the questionnaire's effectiveness as a robust tool for assessing user acceptance of health education videos, grounded in the extended TAM. The validation process, which included high CVI and FVI scores, supports the instrument's relevance, clarity, and appropriateness.

Moreover, to ensure that the instrument measured what it intended to, an EFA was conducted for each TAM domain. This analysis utilised an orthogonal rotation method, specifically Varimax rotation, which assumes that the factors are uncorrelated, thereby simplifying the interpretation of the factor structure (27). This methodological choice aligns with previous research where Varimax rotation has been successfully applied to preserve conceptual clarity among distinct constructs. Varimax is commonly used in EFA when the theoretical framework assumes that factors are independent or uncorrelated as it simplifies the interpretation of factor loadings (28). Nonetheless, it is important to acknowledge that the assumption of uncorrelated factors may not always hold in real-world data. Some researchers advocate for oblique rotation methods, such as Promax, which allow for correlations among factors and may provide a more accurate representation of the underlying data structure, particularly when constructs are theoretically related (29). Thus, the choice between orthogonal and oblique rotation should be guided by both theoretical underpinnings and empirical evidence.

Regarding the instrument's validation, principal component analysis yielded strong factor loadings (> 0.6) across the constructs, affirming the meaningfulness of the identified dimensions. Furthermore, KMO values and Bartlett's Test of Sphericity confirmed the adequacy of the sample and the inter-item correlations necessary for factor analysis. Regarding reliability, it is essential to ensure the translated version of the instrument is accurate, including semantic equivalence, technical precision, and textual completeness. The translated version was found to be clear and grammatically appropriate, adhering to the target language's linguistic norms (30). Reliability analysis demonstrated high internal consistency, with Cronbach's alpha values exceeding the acceptable threshold of 0.7 across all constructs. This reflects the instrument's robustness in capturing key dimensions, such as social interaction, intrusiveness, informativeness, video attitude, perceived usefulness, perceived ease of use, and help-seeking intention.

Overall, the validated, Malay version of this extended TAM questionnaire has demonstrated strong validity and reliability, providing valuable insights into user acceptance and behaviours in digital OHP. These positive results indicate its effectiveness in capturing key dimensions relevant to digital health education. While further research across diverse demographic groups would help enhance its generalisability, the tool has shown significant promise for advancing digital health education. In conclusion, the instrument offers a robust foundation for understanding user acceptance and behaviour, making it a valuable resource for future applications in the field.

CONCLUSION

To the best of our knowledge, this is the first instrument translated and validated in Malay for assessing user acceptance of health education videos, marking a significant advancement in the development of culturally and linguistically appropriate tools for evaluating digital

health interventions. The findings underscore the instrument's potential as a reliable tool for evaluating user perceptions and behaviours in digital health promotion. By incorporating key constructs such as social interaction, perceived usefulness, perceived ease of use and help-seeking intention, this instrument provides valuable insights into the factors influencing user acceptance of health education videos. As digital technology continues to play a central role in healthcare and education, the availability of a validated and reliable instrument is crucial for understanding user engagement and acceptance, ultimately enhancing the effectiveness of digital health education interventions.

ACKNOWLEDGEMENTS

We want to express our sincere gratitude to the participants for their involvement in this study. We also appreciate the expert panels that helped validate the video content and ensured its quality. Finally, thank you to everyone who contributed to the success of this study.

ETHICAL APPROVAL

The study was obtained from UiTM Research Ethics Committee REC/04/2022 (PG/MR/80), for research involving human subjects.

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