

RESEARCH ARTICLE

Tobacco Use Prevention for the Young (TUPY-S): Development, Validity and Reliability of an Interactive Multimedia Strategy from the Adolescents' Perspective in Malaysia

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Abstract

Objective: This study aims to develop, validate and determine the reliability of an interactive multimedia strategy to prevent tobacco use among the young (TUPY-S) from an adolescents' perspective. **Methods:** A descriptive study design was utilized. A modular instruction guideline by Russel (1974) was followed in the entire process, comprising a feasibility study, a review of existing modules, specification of the objectives, identification of the construct criterion items, learner analysis and entry behavior specification, establishment of the sequence instruction and media selection, a tryout with students and a field test. **Result:** Feasibility was agreed among the researchers and the school authorities. Culturally suitable rigorously developed tobacco use preventive strategies delivered using information technology (IT) are lacking in the literature. The objective of TUPY-S is to prevent tobacco use among adolescents living in Malaysia. Identified construct criterion items include knowledge, attitude, intention to use, self-efficacy, and refusal skill. The target population was early adolescents belonging to generation-Z. Content was developed from the adolescents' perspective and delivered using IT in Malay language. Content validity, assessed by six experts in the field and module development, was good at 86%. The students' tryout showed satisfactory face validity subjectively and objectively (85.5%) and high alpha Cronbach reliability (0.91). **Conclusion:** TUPY-S was confirmed to suit early adolescents of the current generation living in Malaysia. It demonstrated good content validity among the experts, satisfactory face validity and reliability among the target population. TUPY-S is ready to be evaluated for its effectiveness among early adolescents.

Keywords: Tobacco- prevention- multimedia- adolescence

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Introduction

Tobacco use claims the lives of about 6 million every year. At its current rate, it is capable to cause more than 8 million deaths a year by 2030 (WHO, 2017). There is no denying that tobacco use among youth is a serious problem worldwide. The Tobacco Free Initiative (TFI), through the Global Youth Tobacco Survey (GYTS) as a medium to collect statistical data from all WHO regions, reported among 2 million students aged 13 to 15 years old participated in the 2010 GYTS survey, 16% of boys used tobacco compared to only 6% among girls. Local epidemiological studies on the prevalence of smoking among adolescents reported percentages between 14 to 37% (Lee et al., 2005; Lim et al., 2006; Kin and Lian, 2008; Lim et al., 2010; Santhna et al., 2013). Alarming, these findings are similar to adult as reported in the National Health and Morbidity Survey whereby 21% of the Malaysian population were smokers in 2006 (NHMS III, 2006).

Up to 80% of tobacco users initiate smoking during

their teenage years (Hammond et al., 2008; WHO, 2013; Bauer and Kreuter, 2015; Center of Disease Control, 2015). The age of smoking initiation varies between 11 and 14 years old in Malaysia (Lim et al., 2010; Lipperman-Kreda et al., 2014). Moreover, among those who become daily smokers in adult lives, only 9% initiated smoking after high school (Chassin et al., 1991). Apart from that, smoking behavior in adolescents has been considered as a transition through multiple stages. The process of turning into regular or nicotine dependent smokers generally takes up to three years (McNeill, 1991; Department of Health Human Services USA, 1994). Studies have shown that smoking behavior among adolescents commonly reaches a stagnant stage until adulthood (Wetter et al., 2004). Thus, producing a window of opportunity for prevention strategy.

Tobacco use among adolescents has become more than smoking cigarettes. The consumption of other tobacco products such as Shisha and e-cigarette has become recently more popular (Center of Disease Control, 2015). Poor understanding regarding the similar health effects

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between these methods and cigarette smoking has been blamed to be the reason behind the increment of this phenomenon.

In Asia, between the year 2005 and 2016, eight rigorously developed tobacco use preventive strategies were available in the literature and focused mainly on cigarette smoking. In China, three studies were adapted from prior health education programs (Zheng et al., 2005; Chen et al., 2006; Chou et al., 2006) while one was developed from the underlying social theories related to tobacco use initiation (Wen et al., 2010). All studies were school-based, involving multiple sessions, and were driven by researchers or educators. The target groups were between 13 to 18 years old except for a younger population by Tahlil et al (Tahlil et al., 2013). All interventions increased knowledge and attitude after 1 week to 6 months. Three of the studies reduced smoking initiation (Zheng et al., 2005; Lee et al., 2007; Bate et al., 2009). Improvement in refusal skills was achieved in four studies (Chen et al., 2006; Lee et al., 2007; Bate et al., 2009; Wen et al., 2010).

Gen-Z are those who were born in or after 1990 which is known as the technology era (McCrandle, 2012). The birth of Gen-Z coincides with the introduction of the internet making them internet searchers and information technology (IT) literate. They prefer computers since it would provide satisfactory live visuals and allow interaction (Geck, 2007; McCrandle, 2012). There is an increasing need for the usage of sophisticated computer-assisted interventions since the late 90's (Secker-Walker et al., 1997; Aveyard et al., 1999). The use of this technology seems to have fixed the problem of sustainability with the conventional method especially in terms of labor intensive and time consuming. Despite these promising facts, a rigorously developed, culturally adapted, interactive program is still not available to our knowledge in the Asian region.

Hence, there is an urgent need to develop a new tobacco use prevention strategy for the current generation to suit the adolescents of Malaysia. A need assessment done among 40 Malaysian adolescents, between the age of 15 and 16 years old, revealed a mutual agreement among all the participants along this issue (Zin et al., 2016). TUPY-S is an interactive multimedia tobacco use prevention strategy aims to prevent initiation among those who had never used and prevent progression among those who have tried tobacco product (Department of Health and Human Services USA, 1994; Johnston et al., 2012). Herewith, we report its rigorous development, validation and reliability which were accomplished as a preparation for a school based intervention study.

Materials and Methods

Study design and protocol

A descriptive study design was utilized as it will provide data without intervening with the ongoing process (Chua, 2012). The study protocol was approved by the School of Applied Psychology, Social Work and Policy, College of Arts and Sciences, College of Art and Sciences, Universiti Utara Malaysia and the Ministry of Education

of Malaysia.

A modular instruction guideline by Russel (1974) was followed in the entire process which composed of a feasibility study, a review of existing modules, specification of the objectives, identification of the construct criterion items, learner analysis and entry behavior specification, establish the sequence instruction and media selection, a tryout with students and a field test (Figure 1). Originally, Russel (1974) designed a basic concept of modular instruction to aid teachers in improving their teaching and learning sessions towards individualized instruction. This study chose to follow this guideline due to its comprehensiveness, clarity and rigorous development.

Population and Sampling

The final target group for TUPY-S is the early adolescents. Purposive sampling was used to select different group of individuals in each stage of development. Details are included in the results section. Consents were obtained from the school headmasters who is legally responsible on the pupils through the Doctrine of In Loco Parentis. On top of that, assent consent was obtained from the parents or guardians, and participants were allowed to leave the session at any time during the session.

Instrument and Data analysis

Two main instruments, five point Likert scale questionnaires, used in this study were developed from the modular instruction guideline by Russell (1974). They are used to assess content validity among the experts, face validity and reliability among the target group.

$$\text{Percentage of validity} = \frac{\sum \text{Total score by expert/ reviewer (x)} \times 100}{\sum \text{Total score (y)}}$$

Firstly, a modular instruction has a good content validity when the module has the following conditions (Russell, 1974): 1) It covers the targeted population; which means the module has been developed in accordance with the background aspects and the behavior of the subjects in the research, 2) The module has been implemented during a normal and satisfactory situation, 3) Time allocated to the individuals to complete the module was sufficient and appropriate, 4) The performance of the individual was enhanced after the completion of the module, and 5) There was an attitude change towards betterment after the completion of the module.

Secondly, a feedback questionnaire composed of 30 items evaluating their understanding on each activity of each submodule and their experience in undertaking the module. Examples of the questions for activity 1 in submodule 1 (Tobacco Product): "I am able to understand the types of tobacco products" and "I am able to execute the activities easily". The participant is considered have agreed to the statements when score is more than 2.5 (50%). Subsequently, focus group discussions were done among the girls and boys separately for subjective feedbacks.

Thirdly, the reliability test for this study deployed a questionnaire as outlined by Noah and Ahmad (2005)

which was developed based on the steps within the module. The questionnaire is a five point Likert scale questionnaire assessing participants' understanding of each activity within the module and ability to complete the module. The reliability analysis was done using SPSS version 20.0 to determine the internal consistency through alpha Cronbach.

Results

Step 1: A feasibility study

Site visits to the potential schools and discussions with the school authorities were done to discuss the feasibility of the study. Study protocol was discussed and agreement was achieved on the dates and venue to conduct the study. Each school appointed a correspondent teacher to assist the researcher throughout the study. The information obtained from the schools were discussed among the researchers and concluded that the study is feasible.

Step 2: A literature review of the existing modules

The researcher intended to develop a tobacco use prevention module which suits the current youth of Malaysia. According to Russell (1974), the relevant modules should be inspected using a checklist assessing the objectives, test items, entry behavior, media, content, and field test data.

The literature was explored to review tobacco use preventive strategies developed in Asian countries specifically Malaysia (Table 1). In terms of objective, all of the studies reviewed intended to prevent youth from using tobacco. However, only cigarette smoking were included and none of the other type of tobacco products including e-cigarette or shisha. All of the studies have similar test items analyzed as the main outcomes. Although the entry behavior varies between studies, some of them have similar target population as ours. None of the studies used information technology as the delivery medium. Concerning the content, most of the studies emphasized on the health effects of smoking and skill to reduce smoking temptation. The field test data of the studies showed positive short term effect which does not seemed to sustain in long term run.

Thus, to our knowledge, rigorously developed tobacco use preventive strategies are still lacking in this region let alone being delivered using information technology. On top of that, the adolescents' perspective has not been considered in the development. Hence, the researcher concluded that there is no relevant strategy suitable to our need and decided to develop a new module.

Step 3: Specification of the objectives

Specification of the objectives is an essential initial stage in a modular development (Russell, 1974). A well written objective would be able to: 1) guide the developer in designing a module, 2) assists teachers in selection and evaluation of a module, and 3) enable the students to have a clear goal.

The general objective for TUPY-S is to prevent tobacco product use among early adolescent in Malaysia. The specific objective for each activity are outlined in

Table 2.

Step 4: Identification of the construct criterion items

The construct of criterion items involves the development of a criterion test or an instrument which is able to guide the module development and evaluate its effectiveness (Russell, 1974). A criterion test would determine whether the performance standard or criterion has been met.

TUPY-Q is a questionnaire specifically developed to evaluate TUPY-S. TUPY-Q was developed using the constructs items in the Health Belief Model which was adapted by the adolescents' perspective (Figure 2). The domains in TUPY-Q include: 1) Knowledge, 2) Attitude, 3) Intention to use, 4) Refusal skill and self-efficacy, with internal consistency alpha Cronbach of 0.7, 0.7, 0.8 and 0.9 respectively. The Knowledge is composed of items with answer options of: true, false and do not know. The Attitude and Self efficacy were assessed using five point Likert scale questions with the options of: strongly disagree, disagree, not sure, agree and strongly agree. Intention to use and Refusal were assessed using five point Likert scale questions with the options of: strongly will

Table 1. Tobacco Use Prevention Modules in Asian Countries

Source	Intervention/ Entry behavior/ Content	Test item/Outcome/Field test data
Zheng et al., (2005), Shanghai	One year comprehensive Elementary school children n=566	Increased knowledge Improved attitude Reduced smoking attempt Reduce passive smoking
Chen et al., (2006) Beijing	SAFT 13-15 years old n=381	Improve attitude Reduce smoking Improve refusal skills
Chou et al., (2006), Wuhan	WSPT, 7th grade n=2,661	Reduce smoking No significant improvement in smoking initiation
P.-H. Lee et al., (2007) Taiwan	School wide and Classroom-based strategy, 7th to 9th grade, n=469	Increased knowledge Improved attitude Reduced intention to smoke Improve refusal skills
Bate et al., 2009 India	MYTRI, 6 to 8th grade n=8,369	Increased knowledge Improved attitude Reduced intention to smoke Improve refusal skills
Wen et al., (2010) Guagzhou	Theory based	Increased knowledge Reduce smoking Improve refusal skills
Tahlil, Woodman et al., (2013) Indonesia	Health based Islamic based Combined 11-14 years old n=477	Increased knowledge Improved attitude Increased knowledge Improved attitude

Table 2. Content of TUPY-S

Submodul	Activities	Objectives
Submodul 1: Tobacco products	1. Getting to know tobacco products 2. Tobacco products and human body 3. Reinforcement exercise	1. To learn the types and content of tobacco products 2. To learn about nicotine addiction
Submodul 2: Tobacco products and Health	1. Tobacco is bad 2. Tobacco smoke is bad 3. Me without tobacco 4. Reinforcement exercise	1. To learn about the effects of tobacco use on health 2. To learn about the effects of tobacco use on primary, secondary and tertiary smokers 3. To learn the benefits of not using tobacco
Submodul 3: Tobacco products and Friends	1. Say "NO" to smoking 2. Reinforcement exercise	1. To learn the refusal techniques to avoid influence
Submodul 4: Tobacco products and Religions	1. Tobacco use in Islam 2. Tobacco use in Buddhism 3. Tobacco use in Hinduism 4. Tobacco use in Christianity	1. To learn the common Malaysian religion's perspective regarding tobacco use
Submodul 5: Tobacco products and Law	1. Malaysian law on underage smoking 2. Malaysian school regulation	1. To learn about the law and regulation available in Malaysia regarding tobacco use among the minors.
Submodul 6: Self Efficacy	1. I am smart 2. I am firm 1. I am precious	1. To increase the self-efficacy against tobacco use
Submodul 7: Healthy life style	2. Stress management 3. Let's exercise	1. To increase self-appreciation 2. To learn on causes of stress and how to manage them 3. To learn the benefit of exercise
Submodul 8: My Family and I	1. I am an adolescent 2. My parents 3. My family	1. To learn about the characteristics of an adolescent 2. To increase parental appreciation 3. To understand one's role and responsibility for own family
Finale	1. Reinforcement exercise	1. To learn the life experiences of ex-tobacco users with chronic lung disease and laryngeal cancer

not, will not, not sure, will and strongly will. The details of the development, validation and reliability assessments are reported elsewhere (Zin et al., 2017).

Step 5: Learner analysis and entry behavior specification

Russell (1974) professed that the characteristics of the target population must be determined precisely before designing modular activities. There are two groups of characteristics which are: 1) the general learner characteristic, and 2) the specific entry behavior.

TUPY-S is designed for the early adolescents in Malaysia. According to WHO, early adolescents include those aged 10 to 14 years old (UNICEF, 2011). Early adolescents were chosen since almost all smokers started to smoke during their youth, smoking behavior in adolescents has been considered as a transition through multiple stages, local studies in Malaysia shows age of initiation between 11 to 14 years old (Lim et al., 2010; Lipperman-Kreda et al., 2014), the formal operational stage of cognitive development is reached from the age of 11 years onwards (Piaget, 1976), and they belonged to the Gen-Z (Geck, 2007; McCrindle, 2012). Since TUPY-S is designed for prevention, the most suitable time for its intervention would be before entry to the secondary schools (13 years old) during which the greatest exposure towards tobacco occurs. Thus, the learner characteristic for TUPY-S are: 1) aged 10 to 12 years old, 2) computer literate, 3) Malay language literate.

Step 6: Establish the sequence instruction and media selection

Establish sequence instruction

Development of TUPY-S is an integration between the adolescent's perspective on an effective tobacco use preventive strategy and relevant social theory. The content of TUPY-M is outlined in Table 2.

Adolescents' perspective

The adolescent's perspective was explored in a qualitative study through focus group discussion among the adolescents including the current smokers, ex-smokers and nonsmokers (Zin et al., 2016). Among the recommendations for the content of the program are negative health outcomes, how to deal with peers' influence, religious education related to tobacco use, negative economic impact, family value, legislation, self-efficacy or resilient, refusal skill and to encourage alternative activities especially sports.

Theoretical foundation

Among the vast numbers of social theories have been used in tobacco use prevention strategies, the adolescents' perspective on an effective tobacco use preventive strategy seems to have agreed with the Health Belief Model (HBM) with some additional values (Rosenstock, 1974; Rosenstock, Strecher, and Becker, 1988). Figure 2 and Figure 3 illustrate the original HBM and the modified HBM with the adolescents' perspective taken into consideration.

Table 3. Percentage of Content Validity by Experts

No.	Item	Expert reviewer						Average score per item	Percentage of total score per item (%)
		R1	R2	R3	R4	R5	R6		
1	This module is suitable for the target population.	4	5	5	5	5	4	4.7	94
2	This module is feasible to be delivered to target population.	4	4	4	5	5	4	4.3	86
3	The time allocated is adequate.	2	3	4	3	4	5	3.5	70
4	This module is able to prevent tobacco product use among adolescents.	3	4	5	5	5	5	4.5	90
5	This module is able to change the attitude of the adolescents towards tobacco product use.	3	4	5	5	5	5	4.5	90
Average score per expert		16	20	23	23	24	23		
Percentage of total score per expert (%)		64	80	92	92	96	92		
Overall percentage of content validity (%)									86

Score: 1, strongly disagree; 2, disagree; 3, undecided ; 4, agree; 5, strongly agree

Media Selection

The adolescents’ in a preliminary study suggested the use of information technology as the medium of choice for the current era (Zin et al., 2016). They proposed the use of live pictures, live videos with interview with tobacco use related diseases affected individuals, interactive games or quiz with rewards, and cartoons. The development of TUPY-S was anchored by the Microsoft® powerpoint 2010 version. The individual activities were developed using multiple softwares including Sparkol®, PowToon® and Biteable.com® which are available online upon subscription. The videos and photographs were contributed with permission by the National Poison Centre of Malaysia and Ministry of Health of Malaysia, or produced by the researcher.

in the field and modular instruction development. A questionnaire outlined by Russell (1974) which comprised of five statements with five points Likert scale was utilized. General recommendations were also obtained subjectively. The experts panel was composed of a child psychologist, a sociologist, a counselor expert, an expert in tobacco use among adolescents, a spiritual expert and an expert in information technology. Each assessor was supplied with a copy of the content of the module and an assessment form. Assessment was done individually and feedbacks were either discussed openly or emailed to the researcher. Feedbacks were analyzed quantitatively and qualitatively, and subsequent consensus was made with other co-researchers.

Content validity

The content validity was done among six experts

The related items and scoring by each content expert are summarized in table 3. TUPY-S has a good overall content validity at 86%. The minimum score at 70% was obtained for statement on “The time allocated is adequate”.

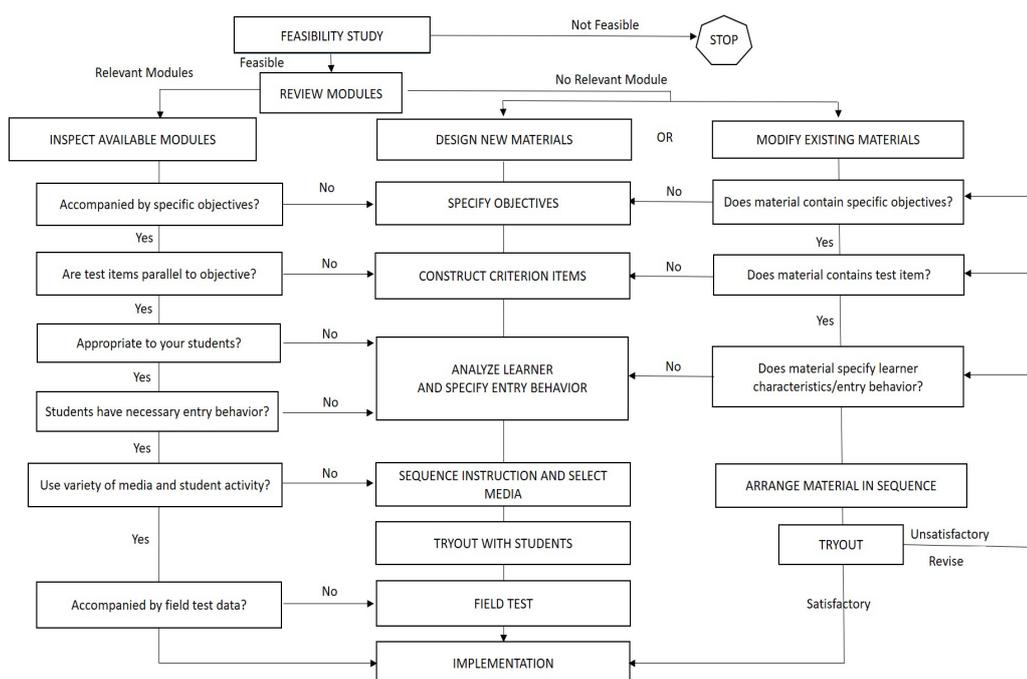


Figure 1. Modular Instruction by Russell (1974)

Table 4. Objective Evaluation for Face Validity

Activity	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Average Score per activity	Percentage of score per activity(%)
Submodul 1	4.0	4.0	5.0	4.0	4.0	3.0	1.0	4.0	3.0	3.0	3.7	74.0
Submodul 2	5.0	4.0	5.0	4.0	5.0	3.0	4.0	3.0	5.0	5.0	4.2	84.0
Submodul 3	5.0	4.0	4.0	5.0	5.0	4.0	2.0	3.0	4.0	4.0	4.4	88.0
Submodul 4	3.0	5.0	5.0	5.0	5.0	3.0	2.0	3.0	3.0	3.0	4	80.0
Submodul 5	5.0	5.0	5.0	5.0	5.0	4.0	4.0	3.0	4.0	3.0	4.6	92.0
Submodul 6	5.0	4.0	5.0	5.0	5.0	5.0	3.0	4.0	4.0	3.0	4.3	86.0
Submodul 7	5.0	3.0	4.0	5.0	5.0	5.0	2.0	4.0	5.0	4.0	4.4	88.0
Submodul 8	4.0	5.0	4.0	5.0	5.0	5.0	4.0	4.0	3.0	3.0	4.5	90.0
Average score per reviewer	4.5	4.3	4.7	4.7	4.9	4.5	2.6	3.5	3.9	3.5		
Percentage of score per reviewer	90	86	94	94	98	90	55	70	78	70		
Overall percentage of face validity												85.5

Score: 1, strongly disagree; 2, disagree; 3, undecided ; 4, agree; 5, strongly agree

The Health Belief Model

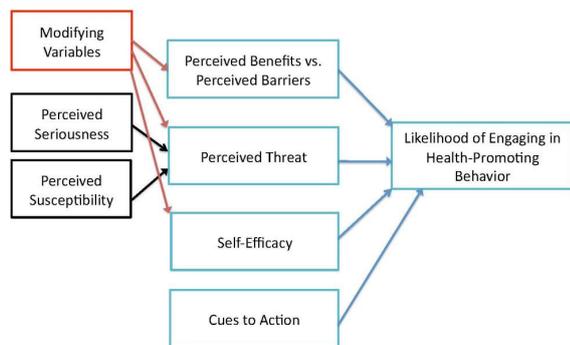


Figure 2. The Health Belief Model by Rosenstock, Strecher, and Becker (1988).

The maximum score was obtained for statement “This module is suitable for the target population” at 94%. Since the scores obtained for all statements were above 70%, we concluded that TUPY-S has a good content validity (Noah and Ahmad, 2005). On top of that, subjective feedbacks from the experts were taken into consideration in improving the module. Generally, the main concern of all the experts are the feasibility of time allocated in the overall conduct of the module.

Step 7: Tryout with students

Russell (1974) advocated observation of the participants’ ability to follow steps in a module as an essential part to evaluate a module. The main objective of this stage is to improve the material to meet the objectives of the module. This module undergone two stages of tryouts which are the face validity and the reliability test.

The face validity

Considering the cognitive development of the early adolescents, the face validity utilized a structured feedback questionnaire with five points Likert scale to ease the participants in evaluating TUPY-S. Focus group

discussions were done subsequently to allow subjective discussion between the researcher and the participants. Subsequently, the researcher identified the weaknesses of the module in terms of the suitability of activities, time duration to complete the modul, feasibility to reach the objectives, and capability of the target population to follow the instructions.

Ten early adolescents between the age of 10 and 11 years old participated in this phase of the study. They were from the third class of 7 classes which was ranked according to the academic performance. The class was purposively chosen by the school due to their availability during data collection as to avoid classes which were having formal teaching and learning sessions.

The participants were instructed to answer a feedback questionnaire after completing each submodule. The questionnaire is composed of 30 items evaluating their understanding on each activity of each submodule and their experience in undertaking the module. Examples of the questions for activity 1 in submodule 1 (Tobacco Product): “I am able to understand the types of tobacco

Table 5. Characteristics of Adolescents for Reliability Test

Items	Mean (SD)	n (%)
Age (years)	10.4 (0.67)	
Pocket money (RM)	6.9 (12.6)	
Race		
Malay		121 (100.0)
Sex		
Male		64(52.9)
Female		57(47.1)
Having house members smoking		
Yes		31 (28.0)
No		80 (72.0)
Ever tried smoking		
Yes		6 (5.0)
No		115 (95)

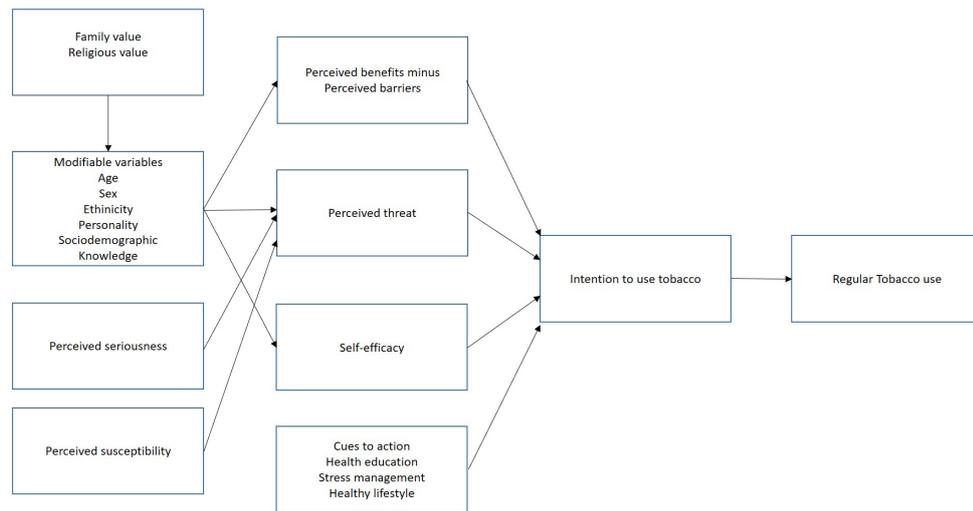


Figure 3. Modified HBM Based on Adolescents' Perspective

Table 6. Reliability Test Results for TUPY_M

Submodule TUPY-M	Number of activities	Cronbach alpha
Submodul 1: Tobacco products	3	0.68
Submodul 2: Tobacco products and Health	4	0.62
Submodul 3: Tobacco products and Friends	2	0.51
Submodul 4: Tobacco products and Religions	4	0.75
Submodul 5: Tobacco products and Law	2	0.54
Submodul 6: Self Efficacy	2	0.59
Submodul 7: Healthy life style	3	0.69
Submodul 8: My Family and I	3	0.60
Reliability Coefficient of the Module	23	0.91

products” and “I am able to execute the activities easily”. The participant is considered to have agreed to the statements when score is more than 2.5 (50%). Subsequently, focus group discussions were done among the girls and boys separately for subjective feedbacks.

Subjectively, all participants expressed satisfaction with the module and no new recommendations were proposed by both groups. Summary of the objective evaluation is illustrated in table 4. Objectively, all participants agreed to be able to understand objectives of each activity evidenced by the percentage score between 74 and 92 %. Percentage of score per reviewer is also satisfactory with score between 55 and 98 %. The overall percentage of face validity is high (85.5%) which implies a satisfactory tryout phase of TUPY-S development.

The Reliability

The characteristics of the 121 early adolescents participated in the study are summarized in Table 5. Table 6 shows the detail results of the reliability test for TUPY-S. The overall reliability coefficient is high at 0.91 despite the relatively low values (<0.6) for

submodules 3, 5 and 6. Submodule 3 composed of two video presentations on refusal techniques and the effects of using tobacco on friendship. Submodule 5 composed of two video presentations on the Malaysian Law and School Regulations regarding tobacco use among the under-aged. Submodule 6 composed of two self-directed interactive quizzes on decisions when being provoked to use tobacco products. The smaller number of activities in these submodules could have contributed to the lower reliability. Moreover, the cognitive development of the early adolescents which varies between individuals could have further depreciate the consistency among the participants. As a countermeasure, assistant was provided to the participants upon request throughout the session. On top of that, animated presentations were used to improve the understanding and interest. However, since the overall alpha Cronbach value is very high, possibly indicating a synergistic effect among the submodules, all the submodules were retained in the module. The overall result is consistent with a claim by Russell (1974) whereby the ability of participants to reach the objective of a module is determined by every step of module's activity. Thus, the module is complete and ready to undergo an intervention study to determine its effectiveness.

Step 8: A field test (Evaluation)

Evaluation of the module is the final step in designing a modular instruction (Russell, 1974). The purpose of this stage is to evaluate the effectiveness of TUPY-S among the target population. The effectiveness of TUPY-S is evaluated in a quasi-experimental study among early adolescents at risk to use tobacco product. The researcher monitored the performance of the participants and necessary revisions are made to ensure objectives are reached satisfactorily. A modular instruction is ready to be used when such achievement is accomplished. The details on the protocol and results are reported in elsewhere (Zin et al., 2017).

Discussion

A rigorous development of an effective modular instruction involves multiple comprehensive steps to ensure the ultimate objectives are reached. Hereby, the development, validation and reliability assessment were reported as a preparation for a school based intervention study to evaluate its effectiveness.

Development of TUPY-S

TUPY-S was developed following an extensive guideline on development of modular instruction by Russell (1974). Although there are multiple other guidelines have been proposed in the literature, the researcher chose the prior method due to its comprehensiveness, transparency and has been adapted by local researchers (Noah and Ahmad, 2005), and used effectively in many local research (Ahmad et al., 2008; Madihie and Noah, 2013; Zuki and Hamzah, 2014; Nawi et al., 2015; Jalil and Mahfar, 2016).

Prior to the development, a need assessment was done qualitatively among the adolescents' through focus group discussion (Zin et. Al, 1974). "Needs assessment" is a method of determining if a training need exists and, if it does, what training is required to fill the gap. The gap between the present status and desired status, would indicate an area for a training need. Subsequently, training aims to reduce the gap, by providing the participants with knowledge and skills and encouraging them to build and enhance their capabilities (Gupta et al., 2007). The discussion on the steps of the development is incorporated in the results' section.

Translating TUPY-S into the Health Belief Model

The adolescents' perspective on an effective tobacco use preventive strategy seems to have followed the Health Belief Model (HBM) with some additional values (Becker and Rosenstock, 1998; Rosenstock, 1974). Figure 2 and Figure 3 illustrate the original HBM and the modified HBM with the adolescents' perspective taken into consideration.

The Health Belief Model (HBM) is a conceptual frame-work used to understand health behavior and possible reasons for non-compliance with recommended health action Rosenstock (1974). It can provide guidelines for health program development allowing planners to understand and address reasons for non-adherence to the recommendations. The HBM addresses four major components which influence health behavior: perceived barriers of recommended health action, perceived benefits of recommended health action, perceived susceptibility of the disease, and perceived severity of the disease. In addition, there are modifying factors that can affect behavior compliance including media, health professionals, personal relationships, incentives, and self-efficacy of recommended health action. Tobacco use prevention program addressed several of the components on major reasons for non-adherence on the recommendations for tobacco use prevention. Several perceived barriers deter participant participation in health promotion programs. These include inconvenient program days and time, inaccessible location, lack of time and

cost. Being an interactive multimedia delivered strategy, TUPY-S was designed to address these common barriers to ensure sustainability.

The adolescents' in this study suggested strategies to overcome self-perception for being healthy will improve effectiveness of a tobacco use prevention module. According to the Health Belief Model, people are most likely to make health behavior changes when they perceive that the disease is serious and are less likely to practice healthy behaviors if they believe that the disease is not severe (Maddux and Rogers, 1998; Rosenstock, 1974). TUPY-S demonstrated the severity of the health effects of tobacco use in multiple of its submodules including the health effects of primary, secondary and tertiary smokers. The construct of perceived benefits is a person's opinion of the value or usefulness of a new behavior in decreasing the future risk of developing a disease. People tend to adopt healthier behaviors when they believe the new behavior will decrease their risk of developing a disease. In TUPY-S, the benefits of not using tobacco which include living a healthy life, avoiding tobacco related diseases and not harming others, were presented in the activity "Me Without Tobacco".

In addition to the four beliefs or perceptions and modifying variables, the HBM suggests that behavior is also influenced by cues to action including events, people, or things. TUPY-S exposed the adolescents on how to overcome such cues especially on the way to say 'No' to using tobacco. Another variable recently added into HBM was self-efficacy (Rosenstock, Strecher and Becker, 1988). Self-efficacy is the one's belief in one's own capability to perform a behavior (Bandura, 1977). Thus, shaping such belief will enable to shape a behavior. Since one's belief could be changed by having knowledge and skills to avoid tobacco use, TUPY-S exclusively provides these elements.

Modifying variables included in HBM are age, sex, ethnicity, personality, socio-economics and knowledge. Since personality is shaped by one's background, the adolescents suggested accordingly as they stressed on good family and religious value as the positive factors contributing to the lesser intention to use tobacco. They also expressed that a good stress management and living a healthy lifestyle would add to the less intention to use tobacco. TUPY-S included activities focusing in these matters.

In conclusion, TUPY-S is rigorously developed to suit the early adolescents of the current generation living in Malaysia. It has good content validity among the experts, and satisfactory face validity and reliability among the target population. TUPY-S is ready to be evaluated for its effectiveness among the early adolescents. The strength of this study is the comprehensive steps followed in its development as outlined by Russell (1974) and is highly recommended in developing a modular instruction in the future.

Statement conflict of Interest

The author and co-authors have no conflicts of interest to declare.

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