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Developing Female-Genital Infection Preventive Behavior Tool (FgIPBT) for Islamic Boarding School Population Based on The Integrated Behavior Model



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Abstract

Female-genital infection in adolescence causes discomfort and may develop into a serious issue. Islamic boarding school female students are a population at risk of getting a female-genital infection due to the lack of hygiene practice sum up with the lack of parental control. Prevention of female-genital infection through behavioral change is mandatory but the changes in behavior are not an effortless thing. There are underlying constructs that predispose the behavior as described in the Integrated Behavior Model (IBM). Dealing with those constructs will facilitate the change of behavior. However, there was no exact tool for assessing construct that determines the female-genital infection preventive behavior, especially for Islamic boarding school female-student population. That was the major reason for the Female-genital Infection Preventive Behavior Tool (FgIPBT) development. We generated a tool based on IBM constructs and the Indonesian Society of Dermatology and Venereology (INSDV) recommendation regarding genital infection preventive behavior. A deductive method of item generation, expert judgments, and internal consistency test involved 143 female-student from 3 different Islamic boarding schools was done to generate a valid and reliable tool. Total 177 valid items composed on the first phase and two different arrangements of items has subjected the reliability on the second phase. Items that were arranged based on behavior items and assessed every IBM construct (Type 1) had higher reliability value than items that were arranged based on IBM construct for all behavior items (Type 2). Assessing different construct for each point of behavior at the same time generate more reliable data than assessing the same construct for all points of behavior.

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INTRODUCTION

Female-genital infection is a pathological condition that commonly happens during a women's lifetime. This infection is mostly caused by yeast infection with the common pathogen is *Candida albicans*. Nevertheless, some other pathogens such as bacteria viz. *Gardnerella vaginalis*, *Chlamydia trachomatis*, and *Mycoplasma*; protozoan parasite i.e. *Trichomonas vaginalis* (Deligeoroglou et al., 2004); even pox virus namely *Molluscum contagiosum*, inflict infection on the genital area (Vilano & Robbins, 2016). The presence of pathogens in the female sensitive area is not always related to sexually transmitted infection.

The female-genital infection known as vulvovaginitis is the most common gynecological complaint among child and adolescent girls (Loveless & Myint, 2018), yet causes discomfort and elicits serious concern for parents due to its sensitive location. The etiology of vulvovaginitis in the pre-pubertal or sexually inactive adolescent is not specific, possibly associated with hygiene practice (Loveless & Myint, 2018). Infrequently handwashing, do not thoroughly wiping after urinate or bowel movement, wearing tight-fitting synthetic clothing and underwear, also contact with chemicals contain in soap, detergent (Zuckerman & Romano, 2016), or sanitary pad, lead up to vulvar infection. Furthermore, some type of pathogen specifically *Molluscum contagiosum* which is common in children, transmitted skin to skin through sharing of towels or any other bathing items (Vilano & Robbins, 2016).

One of the populations at risk of getting a female-genital infection is female students at Islamic boarding schools. These students most likely have poor hygiene practice due to the lack of parental control along with poor knowledge on maintaining female genital organs. Lived in a crowded dormitory with limited care from parents or guardians, and not having trusted adults to share their genital problem may let their genital infection unspoken and unhandled.

Even though female-genital infection in sexually inactive adolescents especially in the Islamic boarding school population could be prevented by maintaining good hygiene practice, but first we have to understand factors affecting that behavior. As disclosed by Fishbein et al. (2001), understanding why people behave the way they do is the first step to change their behavior. The more we compre-

hend the variables behind their action, the more likely behavioral intervention program could succeed. However, there were no valid and reliable instruments for assessing female-genital infection preventive behavior and factors affecting that behavior in the Islamic boarding school setting. This study aims to develop a valid and reliable instrument for assessing female-genital infection preventive behavior and its determinants, especially for the Islamic boarding school population. Integrated Behavior Model (IBM) as published in Montaño & Kasprzyk (2015) was chosen to be an instrument framework regarding its comprehensive variables to predicting behavior.

METHOD

FgIPBT was developed based on IBM main constructs i.e. attitude toward behavior consists of experiential and instrumental attitude; perceived norm consists of the injunctive and descriptive norm; perceived control and self-efficacy as part of personal agency; knowledge and skill to perform behavior; the salience of the behavior; environmental barrier; intention to perform the behavior; also the habit/ behavior itself. Deductive methods were used to identify proper questions that fit into the questionnaire. As reviewed by Boateng et al., (2018), the deductive method on item generation could be done through literature review and/or assess the existing scale and indicators. Since there was no existing scale on female-genital infection preventive behavior for the Islamic boarding school population that developed based on IBM's construct, we merely used literature review to generate question items.

Two-phase questionnaire development was conducted in this study. Three types of tests were conducted to generate a valid and reliable questionnaire, viz. content-validity test, face-validity test, and reliability test. The content-validity test was the initial test, done by asked judgment from experts for the appropriateness of the items. A panel discussion with reproductive health and health promotion and behavioral science experts was conducted to generate the items pool. The face-validity test was conducted by asked respondents to leave a mark on the item that was difficult to understand or simply left the respond column blank. Items with that mark were then revised and re-tested. Both of content-validity and face-validity test was administered in the first phase. A list of valid items from

this phase was then tested in the second phase to assess their reliability. Two types of items templates were tested in the second phase. The first template arranged questions based on the points of female-genital infection preventive behavior while in the second template, questions were arranged by separating each of the IBM constructs. The reliability test was done by assessing the internal consistency of each scale. As stated by Tavakol & Dennick (2011) that to ensure validity, the internal consistency of a scale should be subjected before it could be employed in the research. The Cronbach's alpha coefficient was used to evaluate the consistency in every scale. Meanwhile, the correlation coefficient was used to check whether each item was quite related to the measured construct. Items with a correlation coefficient less than the minimum value were considered to be excluded.

There were three groups of the respondent participated in this study. The first group for the first phase test while the second and third groups for the second phase test. As noted above, the first group clarified the face-validity of the tool, after that, the tool's reliability was acquired from the second and third groups based on two different types of items template. Respondents were chosen conveniently. We specified that the respondent must be pubertal female students aged 10-19 years old (refer to World Health Organization [WHO] - SEARO (2018) categorization of adolescent) who stayed at least six months in the dormitory, then the dormitory caretakers decided on students who took the test based on the dormitory schedule. Informed consent was obtained from all respondents. A paper-based questionnaire was distributed to the selected respondents and collected right away after it was completed. Data from the completed questionnaire was then tabulated into a Microsoft Exel format before being copied and analyzed in version 13 of Stata by StataCorp.

RESULT

Item Generation

FgIPBT was generated in Indonesian. In the first phase, FgIPBT contains 36 question items. However, those questions judged by experts had less appropriateness and could not define IBM construct enough. Furthermore, a recommendation from the Indonesian Society of Dermatology and Venereology (INSDV, 2018) on preventing genital infection was used to generate items for behavior and its determinants. There were nine points of preventive behavior on the INSDV recommendation that we elaborated into 17 behavior items for the second phase test. Items for the other constructs (except knowledge and environmental barrier) were developed based on those behavior items. Hence the second phase used developed questionnaire consist of 177 question items.

FgIPBT has 11 constructs generally based on IBM's main construct. The entire construct was directly measured with a modification of the bipolar Likert scale. Score range varied from 1 to 4 or 1 to 3 and reversed for items with negative statements. This small range of the response option was created based on experts' recommendations to simplify the tool so that it would be more suitable for the targeted subject.

Two types of tool templates were tested in the second phase. Those templates used the same questions in a different order. The Type 1 tool that was tested in the second group has 17 sections to assesses the IBM's construct for each female-genital infection preventive behavior plus 2 sections assessing knowledge and skill to perform the behavior and also the environmental barrier. Meanwhile, the Type 2 tool that was tested in the third group has 11 sections assessing each IBM's construct related to entire female-genital infection preventive behavior.

Table 1. Behavior items generation based on INSDV's recommendation

INSDV Recommendation	FgIPBT Behavior Item
Wiping genital thoroughly	(1) handwashing before touching genital area; (2) wiping from front area to back when taking bath, (3) after voiding, (4) after a bowel movement, (5) when changing menstrual pad

Keep the genital area dry	(6) dry wiping genital area before putting underwear; (7) change the underwear immediately when feeling moist on the genital area; (8) change the menstrual pad immediately when feeling moist on the genital area
Avoiding panty-liner used	(9) avoiding panty-liner to detain vaginal discharge
Frequently changing menstrual pad	(10) changing menstrual pad every 3-4 hours a day
Frequently shaving thorough genital area	(11) shaving routinely; (12) using private shaving tools
Avoiding tight-fitting underwear	(13) avoiding tight-fitting underwear
Avoiding insert any instrument into the vagina	(14) avoiding inserting any instrument into the vagina
Ensure sanitary practice while using a public toilet	(15) using clean water running directly from pipe to wipe
Immediately do a check-up when got a genital issue	(16) discussing any genital issues with a trusted adult; (17) seeking treatment immediately when having genital issues

Table 2. Construct identification

No	Construct	Definition	Response Opt.
1.	Female-genital Infection Preventive Behavior / Preventive Habit	Certain behavior to prevent female-genital infection	Always; Often; Seldom; Never
2.	Salience of the female-genital preventive behavior	The perception that certain behavior is important to do in order to prevent female-genital infection. The key expression used such as “It is important for me to do ...”	Strongly Relate; Relate; Unrelated; Strongly Unrelated
3.	Subjective (Injunctive) Norm	Strong opinion about whether most members of the population agree or disagree to a certain female-genital infection preventive behavior. The key expression used such as “Most female students believe that ...”	Strongly Agree; Agree; Disagree; Strongly Disagree
4.	Descriptive Norm	Strong opinion about whether most members of the population perform or not perform a certain female-genital infection preventive behavior. The key expression used such as “Most female students do ...”	Strongly Agree; Agree; Disagree; Strongly Disagree
5.	Experiential Attitude (Affect)	Affective evaluation like a pleasant/ unpleasant or enjoyable/ unenjoyable to perform a certain female-genital infection preventive behavior. The key expression used such as “I feel comfortable to do ...”	Strongly Relate; Relate; Unrelated; Strongly Unrelated
6.	Instrumental Attitude	General evaluation of a certain female-genital infection preventive behavior, like good/ bad or wise/ foolish. The key expression used such as “Doing ... is a good thing to do.”	Strongly Agree; Agree; Disagree; Strongly Disagree

7. Self-efficacy	Belief about own ability to perform a certain female-genital infection preventive behavior. The key expression used such as “I am capable to do ...”	Strongly Relate; Relate; Unrelated; Strongly Unrelated
8. Perceived Behavioral Control	Perceived control over a certain female-genital infection preventive behavior. The key expression used such as “It is easy for me to do ...”	Strongly Relate; Relate; Unrelated; Strongly Unrelated
9. Intention to perform female-genital preventive behavior	Perceived likelihood to perform a certain female-genital infection preventive behavior. The key expression used such as “I intend to ...”	Yes; No; Doubt
10. Knowledge and skill to perform female-genital preventive behavior	Skill to perform a certain female-genital preventive behavior based on the right knowledge.	Strongly Relate; Relate; Unrelated; Strongly Unrelated
11. Environmental barrier	The possible boarding school environment constraint that hinders female-genital preventive behavior.	Strongly Agree; Agree; Disagree; Strongly Disagree

Table 3. Differences of Type 1 and Type 2 tools

Type 1	Type 2
Number of items: 177	Number of items: 177
Number of sections: 19	Number of sections: 11
Number of items per section: 9 / 10 / 14	Number of items per section: 17/ 10 / 14
Question details (e.g. section 1):(1) I wash my hand before touching my genital area, (2) It is important for me to wash my hand before touching my genital area, (3) Most female students believe that wash hands before touching the genital area is a must, (4) Most female students wash their hand before touching the genital area, (5) I feel comfortable to wash my hand before touching my genital area, (6) Washing my hand before touching genital area is a good thing to do, (7) I am capable to I wash my hand before touching my genital area, (8) It is easy for me to wash my hand before touching my genital area, (9) I intend to always wash my hand before touching my genital area	Question details (e.g. section 1):(1) I wash my hand before touching my genital area, (2) I use clean water running directly from pipe to wipe, (3) I wipe from front area to back when taking bath, (4) I wipe from the front area to back after voiding, (5) I wipe from front area to back after a bowel movement, (6) I wipe from front area to back when changing the menstrual pad, (7) I dry wipe genital area before putting underwear, (8) I prefer changing underwear frequently to using panty-liner to detain vaginal discharge, (9) I change my underwear immediately when feeling moist on the genital area, (10) I avoid wearing tight-fitting underwear, (11) I shave routinely, (12) I use my personal shaving tool, (13) I change the menstrual pad 3-4 times a day, (14) I change the menstrual pad immediately when I feel moist in the genital area, (15) I avoid inserting any tool inside the vagina, (16) I discuss any genital issue with a trusted adult, (17) I see health provider immediately when I have a genital issue

Participant

Three groups with a total of 143 female students who lived in the dormitory were included as respondents in the validity and reliability test for

developing FgIPBT. Every group consisted of 41-60 female students from three different Islamic boarding schools yet have some common characteristics. This number met the requirement of a

minimal subject for measured Cronbach's alpha, as formulated by Bujang et al. (2018). The mean age of respondents was 15,1 with a range of 5 years (13-17 years old). The age of menarche varies between 9-15 years old and almost half of respondents (41,28%) got menarche at 12 years old. Half of the respondents (52,29%) ever received information regarding reproductive and genital health from various sources. 41 Female students in group 1 were asked to give their response on how clear every item in the tool is written. Another 42 and 60 female students in the second and third groups respectively, were asked to complete different templates of FgIPBT.

Validity and Reliability

The type of validity test that was used in FgIPBT development was the content and face

validity. There were two experts in reproductive health and one expert in health promotion and behavioral science who gave their opinion and content validation on the question items. The next step was the face validity done by asking the Islamic boarding school female students' opinions on how clear the questions were written. Unclear question items were modified and corrected two times to be impeccable.

Each item in every construct of every tool was tested for reliability. Item reliable and considered to be valid if its correlation coefficient is greater than the minimum value. The minimum value of the correlation coefficient used in this study was based on the *r* table critical value for a certain number of samples i.e. 0,26 and 0,21 for the second and third groups respectively. Cronbach's alpha coefficient with an acceptable threshold was 0,70 used to determine the reliability of every construct of the tool.

Table 4. Reliability test

Construct	Total Item	Average of Correlation			
		Coefficient (<i>r</i>)		Cronbach alpha	
		Type 1	Type 2	Type 1	Type 2
Behavior / Habit	17	0,45	0,35	0,76	0,49
Saliency of the behavior	17	0,55	0,46	0,85	0,76
Subjective (Injunctive) norm	17	0,61	0,45	0,89	0,74
Descriptive norm	17	0,59	0,54	0,88	0,84
Experiential attitude (Affect)	17	0,63	0,51	0,90	0,81
Instrumental attitude	17	0,66	0,54	0,91	0,84
Self-efficacy	17	0,60	0,54	0,89	0,84
Perceived behavioral control	17	0,61	0,51	0,89	0,82
Intention to perform behavior	17	0,53	0,37	0,83	0,56
Knowledge and skill to perform behavior	14	0,62	0,45	0,87	0,68
Environmental barrier	10	0,69	0,56	0,88	0,75

The numbers of items that should be deleted from the tools based on the correlation coefficient were in contrast. There were 2 items from Type 1 i.e. intention to wiping the genital area from front to back when taking bath ($r = 0,22$), and intention to wiping the genital area from front to back when changing menstrual pad ($r = 0,26$). Meanwhile, from Type 2 there were 11 items considered to be deleted viz. 4 behavior/ habit items (behavior/ habit on handwashing before touching the genital area, avoiding tight-fitting underwear, using private shaving tools, and discussing any genital issues with a

trusted adult), a subjective norm item i.e. subjective norm on avoiding panty-liner to detain vaginal discharge, 5 intention items (intention to handwashing before touching genital area, using clean water running directly from pipe to wipe genital area, intention to shaving routinely, and intention to avoiding inserting any instrument into the vagina), and an item from knowledge and skill to perform behavior i.e. wearing tight-fitting underwear. Those unacceptable items either from Type 1 or Type 2 were different. There was no single item that was unacceptable in both types.

DISCUSSION

All scales in FgIPBT are based on the Likert scale, as its purpose to distinguish the attribute of the respondent. Krabbe (2017) noted that the Likert scale is a type of scale that focuses on the subject, known as subject-centered scaling or subject-centered approach. One's response on every scale differentiates them from another individual. We made a modification to the Likert scale that was used in this tool. Usually, the Likert scale has odd response categories with the distance between every point of categories assumed to be linear. So, there always be a neutral option on the Likert scale. This situation might be unfavorable for data collection, as respondents naturally choose that neutral option when there was a question that was hesitant to be answered. That was the major reason FgIPBT mostly used an even number of response categories. We clearly distinguish options as strongly positive, strongly positive, negative, or strongly negative. The only construct in FgIPBT that used odd response categories on its item was the intention to perform behavior. This construct has three options in the response column i.e. "Yes – No – Doubt". FgIPBT also has narrow response categories, mostly 4 points and 3 points for a single construct as mentioned before. This decisiveness due to the characteristics of the targeted population. This tool was developed especially for the Islamic boarding school female-student population which is pubertal adolescents who study equally at the middle or senior high school. A board of response categories would be perplexed them and that would affect the accuracy of the response.

FgIPBT is a tool contain 12-13 pages that could be completed within 45 minutes. As shown in Table 3, 2 types of tools consist of different number of sections, rated the reliability in this study. To compute the alpha coefficient as a reliability score of a tool that contains multiple constructs measured at the same time, recommend by Nimon et al. (2012) to be done at the construct level rather than on a global test level. Based on that recommendation, the reliability test in this study was done for each IBM construct (Table 4) despite the items being arranged differently.

Reliability defines as the ratio between the true score variance of the scale and observed variance which is the true score plus the error score. If the reliability value is 1, means that there was no single error on the measurement. However, it is hard to

get perfect reliability in educational and psychological research (Nimon et al., 2012). The reliability value of the scale is linear with the reliability of the measurement; it is important to use a high-value reliability scale to produce reliable research. A technique that is frequently used to increasing the reliability value of the scale is increasing the number of items. A scale consist <10 items tend to has a lower reliability value (Bolarinwa, 2015). Another way to increase the reliability value is by increasing the sample size. As reviewed by Nimon et al. (2012), studies that used a small sample size and new instrumentation likely had a reliability value equal to 0,70 or < 0,60. Nevertheless, a high score of reliability sometimes means unfavorable. Scholtes et al. (2011) noted the upper threshold of the reliability value i.e. 0,95. A reliability value that is higher than that point indicates a high level of item redundancy as it has items that assessing the same aspect of a construct.

A contrast reliability value is shown in Table 4 from both types of tools. Based on the correlation coefficient between every item in every construct, Type 1 has a higher average score and less number of deleted items than Type 2. The value of Cronbach alpha also likely indicated better reliability on Type 1. Even 3 scales (viz. Behavior/ Habit, Intention to perform behavior, and Knowledge and skill to perform behavior) did not meet the reliability criteria i.e. the score of Cronbach alpha less than 0,70. Practical reasons came up with this condition. As Type 2 consists of items that are arranged based on the same construct, it was written in similar opening sentences so respondents tend to read the items carelessly and simply choose the same response as the early items. Another problem caused by arranging items based on construct was respondents naturally choose the expected response rather than a response that fit their condition. Keszei et al. (2010) noted that random responses from the respondent or their tendency to not giving the true answer caused an error on the measurement because items mostly answered/ responded in one way or the other that decreased the variance.

CONCLUSION

Despite FgIPBT did not provide a construct validity test, this tool was rated to be valid for assessing IBM's construct on female-genital infection preventive behaviors. Approval from the experts and items enhancement based on the subject's

response, also the measurement of the tool's internal consistency made it quite reliable to be used. We highly recommend to use Type 1 of FgIPBT in order to gain reliable data, with the same number of items it has minimum risk of bias.

SUGGESTION

Regardless of the validity and reliability of this tool, progressive research should be done to improve the expediency of FgIPBT. A broad sample size could precede a precise validity measurement such as CFA (Confirmatory Factor Analysis). Moreover, this tool could be a reference for further tool development with the complete item generation method through both deductive and inductive methods. Last, another way of construct measurement which is indirect measure is worth doing.

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