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Development and Psychometric Testing of the Pap Smear Intention Questionnaire

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Abstract

The Pap Smear Intention Questionnaire (PSIQ) was developed and psychometrically tested as an instrument to determine Pap smear intention among women in rural Southeast Louisiana. The theory of Planned Behavior (TPB) guided the development of the PSIQ instrument. The items of the PSIQ were derived from the results of elicitation interviews conducted among a representative group of the target population. The sample, n=32, provided information related to referents, salient, and control beliefs through a semi-structured interview format. The psychometric properties of the PSIQ were demonstrated through content and face validity, test-retest and internal consistency reliability. The PSIQ was reliable and valid based on a content validity index of 0.84, test-retest reliability, alpha of .585 to .889 and internal consistency of the direct measures, attitude (alpha = .870), subjective norm (alpha = .72). Internal consistency of the items of the perceived behavioral control subscale was not conducted because there were two items, one measuring controllability and the other measuring capability

Keywords: Cervical cancer, Pap smear, Theory of Planned Behavior, rural women, reliability, validity, intention, cervical cancer screening, instrument testing development and testing

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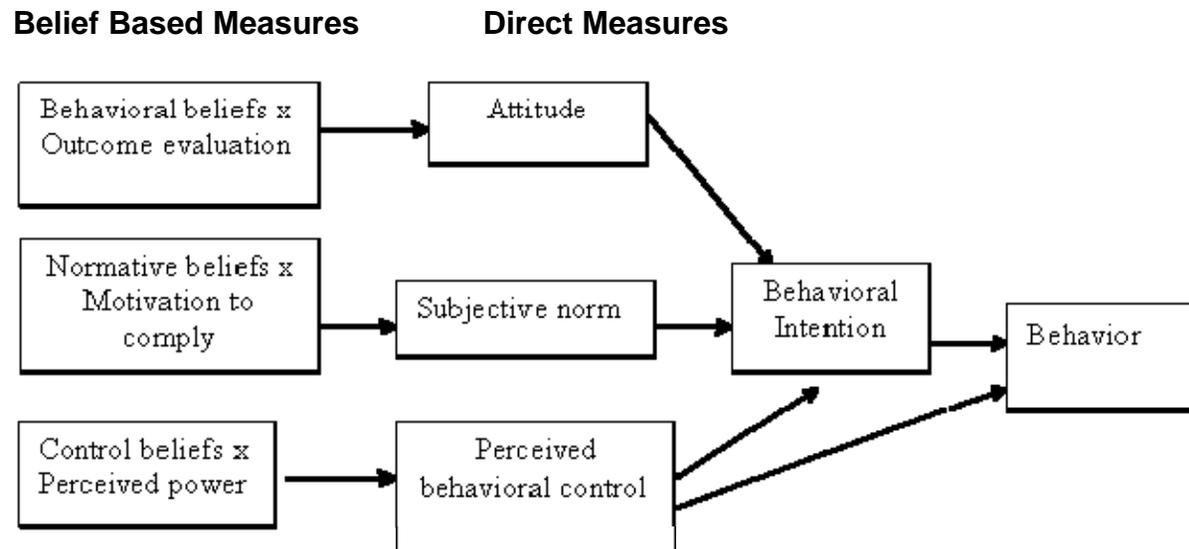
Introduction and Overview

The Pap smear facilitates the identification and treatment of precancerous cells before they become symptomatic^{1,2} thus preventing progression to cervical cancer. Approximately 11, 000 women in the United States are diagnosed with cervical cancer each year, and approximately 4, 000 women in the United States die from cervical cancer each year.³ Incidence of cervical cancer is higher in geographic areas where women are less likely to obtain regular screening with the Pap smear.⁴ There is disparity of incidence of cervical cancer among women in rural Southeast Louisiana,⁵ which could be attributable to low Pap smear use. Since behavioral intention is a strong predictor of the decision to engage in health behavior,⁶ the Pap Smear Intention Questionnaire (PSIQ) was developed to measure Pap smear intention among rural Southeast Louisiana women. Before attempting to determine intention to obtain a Pap smear, it was appropriate to obtain the referents, salient, and control beliefs from a representative sample of the target population to develop items for the instrument.⁷ The study participants were recruited from Tangipahoa and Washington Parishes because they were similar in terms of demographic factors⁸ and cervical cancer rates.⁵ Provided here is an overview of the Theory of Planned Behavior (TPB), definition of the direct and belief based measures, procedures for item development of the belief based measures and the direct measures, followed by report of psychometric testing of the PSIQ and discussion.

Theoretical Framework: The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is a behavioral change theory that consists of the direct measures of attitude, subjective norm, perceived behavioral control, and the belief based measures of attitude (behavioral beliefs times outcome evaluation), subjective norm (normative beliefs times motivation to comply), and perceived behavioral control (control beliefs times perceived power). Behavioral, normative and control beliefs guide human behavior.⁷ Figure 1 depicts the relationship between the belief based and direct measures, intention, and behavior.^{7,9}

Figure 1. Theory of Planned Behavior, Direct and Belief Variables



Definition of Belief Based and Direct Measures

Attitude, which is defined as the favorable or unfavorable beliefs regarding participating in a behavior⁷ is affected by beliefs that are associated with the outcomes (behavioral beliefs) and consequences (outcome evaluation) of participating

in the behavior.^{7,10} Subjective norm, or the perception regarding the opinion of “important others”¹⁰ regarding participation in a behavior is affected by their approval (normative belief) regarding participation in the behavior and whether they themselves participate (motivation to comply) in the behavior.^{7,10} Perceived behavioral control is belief regarding the ease of participating in a behavior and it is affected by barriers and facilitators (control beliefs) and the power of these factors (perceived power) on individual’s ability to participate in the behavior.⁷ It is the combination of attitude, subjective norm, and perceived behavioral control that result in the formation of intention to carry out a behavior.⁷ Finally, intention is the possibility that an individual will participate in a behavior, and it immediately precedes the behavior.^{7,10}

Procedures for Item Development: Belief Based Measures

The items for the belief based measures of the PSIQ instrument were developed from the results of elicitation interviews using Ajzen’s model and methods.⁷ Elicitation interviews were conducted among a representative sample of the target population in order to determine their referents (person(s) of influence), salient beliefs (advantages and disadvantages), and control beliefs (enable or prevent women from participating in obtaining a Pap smear).^{7,10}

Elicitation Interviews

After receiving Institutional Review Board approval, permission was obtained from the directors of two rural clinics to conduct the elicitation interviews. Upon obtaining informed consent, participants completed a demographic survey, and a semi-structured interview. Participants who completed the interview process received a Pap smear pamphlet and a mug in appreciation of their time and effort. Although the services were not needed, a mental health advanced practice registered nurse was available to provide counseling and/or advice to participants who may have experienced negative psychological effects from participating in the study.

Setting and Sample

Participants who met the inclusion criteria were recruited from a rural health clinic in Tangipahoa Parish and a hospital clinic in Washington Parish. The elicitation interview sample depicted in Table 1, comprised 16 women from Tangipahoa Parish and 16 women from Washington Parish, n = 32. More than a quarter of the participants were 18 to 29 years of age, and almost half of them had a yearly income of \$20,000. Almost 40 percent of the participants were uninsured and approximately 66 percent were white.

Table 1. Elicitation Interview Sample Demographics

Variable	Frequency	Percent
<i>Age</i>		
18-29	11	34.4%
30-39	5	15.6%
40-49	7	21.9%
50-59	8	25.0%
60-70	1	3.1%
<i>Yearly Family Income</i>		
< 20, 000		
\$20,001- \$40,000	14	43.8%
>40,000	7	22.0%
No Response	10	31.3%
	1	3.1%
<i>Heath Insurance Type</i>		
None		
Private	12	37.5%
Medicaid	11	34.4%
	9	28.1%

Ethnic Background		
White		
Black	21	65.6%
Hispanic	10	31.2%
	1	3.1%

N = 32

Item Development

The items for the belief based measures were developed from the elicitation interview results. Similar themes that were present in the transcribed interviews were identified and grouped.^{7,10} The beliefs that were selected were identified and audited by more than one member of the research team in order to reduce researcher bias and enhance the credibility of the results.¹¹ Additionally, one research study participant validated the results.¹¹ The most frequently occurring themes of the elicitation interviews and their use in the development of the belief based measures subscales are presented below.

Behavioral Beliefs and Outcome Evaluation Subscales

Participants agreed that the major advantages of obtaining a Pap smear included screening for cervical cancer, early identification and treatment, and general health maintenance. The major disadvantages expressed by the participants included “embarrassment, uncomfortable feeling about the Pap smear, the provider, and lying on the table.” The eight most salient beliefs of the sample were used to develop items for the behavioral beliefs and outcome evaluation scales.^{7,10} The behavioral beliefs and outcome evaluation scales were scored by multiplying corresponding item responses that were obtained on each 5-point scale then summing them for a possible range of 8-200. A behavioral belief subscale item is, “Getting a Pap smear in the next 1-3 years would let me know that I have cervical cancer strongly agree/strongly disagree.” An outcome evaluation subscale item is, “Getting a Pap smear every 1-3 years in order to find out whether I have cancer is very good/very bad.”

Normative Belief and Motivation to Comply Subscales

The family was the referent that was identified by women as the most influential group in their decision to obtain a Pap smear. The 12 most salient beliefs of the sample were used to develop items for the normative beliefs and motivation to comply scales. The normative beliefs and motivation to comply scales were scored by multiplying the corresponding item responses that were obtained on the 5-point scale then summing them for a possible range of 12-300. A normative belief subscale item is "Getting a Pap smear every 1-3 years in order to find out whether I have cancer is very good/very bad." A motivation to comply subscale item is "My family thinks that I should get a Pap smear every 1-3 years strongly agree/strongly disagree."

Control Belief and Perceived Power Subscales

Insurance status was identified both as a facilitator and a barrier to obtaining a Pap smear. Many women would obtain a Pap smear if they had symptoms, such as pelvic pain, bleeding, and/or signs of infection. The 10 most salient beliefs of the sample were used to develop items for the control beliefs and perceived power scales. The normative beliefs and motivation to comply scales were scored based on multiplying the corresponding responses that were obtained on the 5-point scale then summing them for a possible range of 10-250. An item of the control belief subscale is "Getting a Pap smear if I had a problem would be very easy/very hard." while a sample item of the perceived power subscale is "I usually get a Pap smear every 1-3 years if I have any problem strongly agree/strongly disagree."

Procedures for Item Development: Direct Measures

The items for the direct measures subscales were developed after the development of the items of the belief based measures subscales. The procedures that were used are discussed in the following section. The items for the direct measures of attitude, subjective norm, perceived behavioral control, and intention "must be directly compatible with the behavior in terms of action, target, context, and time."¹² Therefore, the direct measures of the PSIQ were constructed in terms of action, target, context, and time using stem structure. Action (Pap smear) refers to the behavior to be measured,¹² the target (18 to 70 year old women residing in Tangipahoa and Washington Parishes - rural Southeastern Louisiana), refers to a general or a specific instance,¹² context is variable and refers to wherever the action can be performed,¹² and time (every one to three years) refers to when the action is performed.¹² The researcher should use a "scoring scheme that produces the best results."¹² A 5-point Likert scale was used by Jennings in her study to measure

Pap smear intention among Latina and African American women,¹³ therefore, a 5-point Likert scale was used to obtain responses for the variables in this study. The 5-point Likert scale comprise a range from strongly disagree to strongly agree, very bad to very good, and strongly disapprove to strongly approve with the extreme negative receiving a score of 1 and the extreme positive receiving a score of 5.

Attitude Subscale

When constructing items for the attitude scale, “care should be taken to counter balance positive and negative endpoints to counteract possible response sets.”¹² For example, “when I think about getting a Pap smear in the next one to three years I feel it is harmful/beneficial.” Harmful/beneficial are the examples of negative and positive endpoints respectively. The attitudinal scale was scored based on the responses that were obtained on the 5-point scale. The sum of the responses was 4-20 with a high score indicating a positive attitude towards obtaining a Pap smear.

Subjective Norm Subscale

Important others tend to approve and practice the desirable behavior and disapprove of undesirable behavior therefore the subjective norm scale should comprise items with “injunctive quality” and “descriptive norms.”¹² The subjective norm scale was scored based on the responses that were obtained on the 5-point scale. The sum of the responses was 5-25 with a high score indicating that important others have great influence towards the participant obtaining a Pap smear. A sample item of the subjective norm subscale that is injunctive is, “Most people who are important to me think that I should get a Pap smear every 1-3 years strongly agree/strongly disagree,” while “Most people who are important to me have a Pap smear every 1-3 years strongly agree/strongly disagree” is an example of descriptive norm item.

Perceived Behavioral Control Subscale

The perceived behavioral scale should comprise items that determine whether the participant is capable of conducting the behavior and also has control over performing the behavior.¹² The perceived behavior control scale was scored based on the responses that are obtained on the 5-point scale. The sum of the responses was 2-10 with a high score indicating great control over obtaining a Pap smear. The sample item “For me to obtain a Pap smear every 1-3 years would be very easy/very control hard” is an example of an item that determines capability “while “It is mostly up to me whether or not I have a Pap smear in the next 1-3 years strongly agree/strongly disagree” is an item that measures controllability.

Intention Subscale

More than one item was used to assess behavioral intention.¹² For example, “I plan to have a Pap smear in the next one to three years” where action is represented by “to have a Pap smear,” target by “I” and context and time “in the next one to three years.” This scale was scored based on the response obtained on the 5-point Likert scale. The final score is the sum of the responses with a possible range of 2-10 with the higher score indicating high intention to obtain a Pap smear.

Psychometric Testing: PSIQ Instrument

The PSIQ instrument that resulted from the aforementioned procedures comprised 82 items; the first 74 items were measures for the constructs of the TPB while the last eight were measures for demographic factors. The readability of the 82-item PSIQ was 73.9% while the Flesch Kincaid grade Level was 6.2. The reliability and validity of an instrument should be demonstrated among a representative sample of the study population prior its use in field testing.¹⁴ Therefore, psychometric testing of the PSIQ was conducted by content and face validity, test- retest and internal consistency reliability.

Content Validity Testing

The content validity testing was conducted by five experts who reviewed the items of the PSIQ for accuracy, appropriateness, and representativeness on a 4-point scale ranging from not relevant (1) to very relevant (4). The content experts comprised two gynecologists with experience in oncology and are employed among rural Southeast Louisiana women, a rural health doctorally prepared nurse, one TPB expert, and one questionnaire development expert. Items that were considered not relevant and somewhat relevant by four or more experts were deleted. Those items that were considered quite relevant and very relevant by four or more content experts were retained. The content validity index of the subscales ranged from 0.6 – 1.0; a CVI less than .8 is acceptable for the beliefs and attitude subscale.¹⁵ The CVI of the instrument was acceptable at 0.84.¹⁶

The PSIQ was revised based on the results of the content validity assessment. Subsequently, twelve items were deleted. The remaining items were then randomly distributed¹² and the revised PSIQ after content validity comprised 70 items, 64 measuring the concepts of the TPB and eight measuring demographic factors. The readability of the revised PSIQ was 72% and Grade Level was 6.3.

Face Validity Testing

Face validity of the 70-item PSIQ was conducted because the appearance of an instrument can affect participants' willingness to complete the instrument.^{14,16} Furthermore, it allowed the researcher to determine whether there were any problems with the administration of the instrument and the time required to complete the PSIQ.^{14,16} The face validity testing was conducted among four women who were similar to the target population after obtaining informed consent. The changes that were made to the PSIQ included correcting a grammatical error in an item, adding widow as an option in the response to the marital status question, and placing the options at the end of the response set instead of at the beginning. The latter was applied to the items that measured normative beliefs, motivation to comply, and some of the items of the control beliefs and perceived power subscale. Each participant received a mug and an informational Pap smear pamphlet in appreciation of their time and effort.

Reliability Testing

Reliability was determined by test retest and internal consistency. Test retest was conducted by having 30 women who were recruited from a community clinic complete the PSIQ on two separate occasions two weeks. An eligibility criteria form was completed by potential study participants and those who were eligible to participate did so after informed consent was obtained. Participants who completed the PSIQ the first time received a mug in appreciation of their time while those who completed the PSIQ the second received a Pap smear pamphlet. Although the services were not needed, a mental health advanced practice registered nurse was available to provide counseling or advice to participants who may have experienced negative psychological effects from participating in the study.

Setting and Sample

The participants for the reliability testing were recruited from a community clinic that provides healthcare services to clients from Tangipahoa and Washington Parishes.

The demographic characteristics of the participants are depicted in Table 2.

Table 2. Test-Retest Sample Demographics

Variable	Frequency	Percent
<i>Age</i>		
18-29	10	33.3%
30-39	8	26.7%
40-49	4	13.3%
50-59	8	26.7%
<i>Yearly Family Income</i>		
< 30, 000	4	13.3%
\$30,001-\$45,000	3	10%
>45,000	21	70%
No Response	2	6.67%
<i>Ethnic Background</i>		
White	29	96.7%
Black	1	3.3%

N=30

Test-Retest Participants

Of the 30 participants who completed the questionnaire during time one, 13 participants returned for the retest although reminder calls were made one day before the retest day. Each of the 13 returning participants received an informational Pap smear pamphlet in appreciation of their time and effort.

Comparison of Test and Test-Retest Reliability: Demographics

Since less than half of the study participants returned for the retest, a comparison of the demographics of the test only (n=17) and test-retest (n=13) participants was conducted. Additionally, an independent t test was calculated in order to determine whether there was a difference between the test and the test-retest group of participants. Most test participants in both groups had a yearly family income of more than \$45,000 and had private insurance. The independent t test demonstrated that there was no statistically significant difference, $p > .05$, between the test and the test-retest participants.

Data Analysis: Test and Test-Retest Reliability

The scores that were obtained from each test-retest participant were correlated to determine the amount of consistency in the data. Data were obtained by calculating paired *t* tests¹⁷ using SPSS for Windows in order to obtain the test-retest reliability coefficient. The subscales and the corresponding test-retest correlation ranged from .510 to .889. A correlation coefficient of .50 is acceptable “when studying the relationship among various aspects of human behavior.”¹⁸ The test-retest correlation of the belief based and direct measures subscales are presented in the following section.

Belief Based Measures Subscales: Test-Retest Correlation

Test-retest correlation of the 7-item behavioral belief and 5-item outcome evaluation subscales were acceptable at .768 (high correlation) and .510 (moderate correlation) respectively. Subsequently, all items of the subscales were retained. The test-retest correlation of the 9-item normative belief and 10-item motivation to comply subscales were acceptable with a high correlation of .889 and .871 respectively. Therefore, all the items of the subscales were retained. The test-retest correlation of the 9-item control belief and 10-item perceived power subscales were unacceptable at less than .500. The four items that lowered the correlation coefficient, after testing various combinations, of the control belief subscale were deleted. The test-retest correlation of the remaining 4 items of the control belief subscale or domain was acceptable with a high correlation¹⁸ of .762. However, items regarding “getting a Pap smear if I had insurance...” and “getting a Pap smear if

it was free...” were retained on the premise that there was a potential selection bias related to the insurance status of the study participants since most of the participants were insured, $n = 28$ (93.3%). On the other hand, two items were deleted from the perceived power subscale, and the test-retest correlation of the remaining items was acceptable with a moderate correlation of .585.

Direct Measure Subscales: Test-Retest Correlation

Test-retest correlation of the 4-item direct measure of attitude subscale was acceptable at .822. But, an additional item was deleted because it lowered the Cronbach alpha during internal consistency testing. The new coefficient alpha of .874, a high correlation,¹⁸ was acceptable; therefore, three items were retained. The test-retest coefficient correlation of the 3-item subjective norm subscale was acceptable with a moderate correlation of .524. Therefore, all three items were retained. The test-retest correlation coefficient of the 2-item perceived behavioral control subscale was acceptable with a moderate correlation of .750. Therefore, both items were retained. The test-retest correlation of individual items of the intention subscale was not conducted because they were redundant. The item that was retained had an acceptable high correlation of .822 compared to a correlation of .195 of the other item that was deleted.

Internal Consistency Reliability Testing

Internal Consistency Reliability was conducted on the data that was from the total sample ($n=30$) for the direct measures of attitude, subjective norm, and perceived behavioral control and not of the beliefs because they are not expected to be internally consistent.¹² Internal consistency of intention and behavior comprised one item; therefore, internal consistency reliability was not calculated. The 3-item subjective norm subscale was acceptable with a Cronbach alpha of .72 but that of the 4-item attitude subscale was unacceptable at .59. Therefore, the item that lowered the score was deleted¹⁹ and after deleting that item, an acceptable Cronbach alpha of .870 was obtained. Both items that measured the perceived behavioral control subscale were retained because one measured capability while the other measured controllability.¹²

Discussion

The revised PSIQ is valid and reliable based on content and face validity, test-retest, and internal consistency reliability results. Construct validity of the PSIQ was conducted later using model and hypotheses testing²⁰ because “construct validation is essentially a hypothesis-testing endeavor, typically linked to a theoretical perspective ...”²¹

The results of the elicitation interviews and test-retest are limited to women in Tangipahoa and Washington Parishes. Additional limitations are as follows, (1) there was less than a 50% return of the test participants for the retest (n=13), (2) most of the participants within the test-retest group had private insurance (n=28) and, (3) most of the test retest participants were White (n=29). These results provide clinicians in the targeted Parishes with some of the determinants of Pap smear use. Researchers who would like to determine the intention of women in Tangipahoa and Washington Parishes to obtain a Pap smear can use the PSIQ as their instrument. Nurses' knowledge regarding Pap smear intention can be further increased by replicating this study among women (a) in other Louisiana Parishes, (b) in a different age group, (c) in different settings, and (d) with different inclusion criterion, for example, include women with a history of abnormal Pap smear and cervical cancer.

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