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# Factors Affecting Hispanic Women's Participation in Screening for Cervical Cancer

Arelis Moore de Peralta · Bonnie Holaday ·  
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**Abstract** Hispanic women's cervical cancer rates are disproportionately high. The Health Belief Model (HBM) was used as a theoretical framework to explore beliefs, attitudes, socio-economic, and cultural factors influencing Hispanic women's decisions about cervical cancer screening. A cross-sectional survey was conducted among Hispanic women 18–65 years old ( $n = 205$ ) in the Upstate of South Carolina. Generalized Linear Modeling was used. Across all models, perceived threats (susceptibility and severity), self-efficacy, and the interaction of benefits and barriers were significant predictors. Significant covariates included age, marital status, income, regular medical care, and familism. A modified HBM was a useful model for examining cervical cancer screening in this sample of Hispanic women. The inclusion of external, or social factors increased the strength of the HBM as an explanatory model. The HBM can be used as a framework to design culturally appropriate cervical cancer screening interventions.

**Keywords** Cervical cancer screening · Pap test · Cervical cancer · Health Belief Model · Hispanic women · Cultural modifiers

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## Introduction

Cervical cancer is one of the most common reproductive cancers among women in the United States (US) [1]. Cervical cancer is considered highly preventable, due to its long pre-invasive stage, availability of the Cervical Cancer Screening (Pap test), and the effectiveness of existing treatment options for pre-invasive lesions. The U.S. Preventive Services Task Force (USPSTF) recommends screening for cervical cancer in women ages 21–65 with cytology (Pap test) every 3 years or, screening with a combination of cytology and human papillomavirus (HPV) testing every 5 years for women ages 30–65 who want to lengthen the screening interval [2]. An estimated 3,644 deaths from cervical cancer could be prevented annually if all eligible Americans received appropriate cancer screening services [3]. According to the 2010 National Health Interview Survey, overall, 83.0 % (CI 82.0 %–84.0 %) of women with no hysterectomy reported having a Pap test within the past 3 years [4]. This percentage was significantly less than the Healthy People 2020 target of 93.0 % [5]. According to the CDC, 2010, following Asians (75.4 %; 95 % CI 71.1–79.3), Hispanics were the least likely to be screened for cervical cancer in the last 3 years (78.7 %; 95 % CI 76.3–80.8); as compared to African-Americans (85.0 %; 95 % CI 82.8–87.0) and Whites (83.4 %; 95 % CI 82.3–84.5) [4]. In addition, disparities based on place of birth have been observed among Hispanic women. According to the American Cancer Society (ACS), in 2010 79 % of US-born Hispanic women had a recent Pap test as compared to just 60 % of foreign-born women who had resided in the US during the prior 10 years [6].

Screening tests offer the best chance to detect cervical cancer at an early stage when successful treatment is most

likely. The Papanicolaou (Pap) test is the main screening test for cervical cancer and can identify pre-cancerous changes (pre-cancers) which can be treated before developing into a cervical cancer [7]. This has been validated by numerous studies [8]. In the United States, the reasons for not obtaining a Pap test within the last 3 years vary among women from different racial-ethnic groups due to a variety of factors. Socio-economic, cultural, and language barriers can affect an individuals' capacity to process information about screening [1]. For example, foreign-born Latina immigrants face more barriers accessing health care and screening services than US-born Latinas [9, 10]. According to the ACS, [1] from a cultural standpoint, lack of language services, beliefs about disease and screenings, lack of knowledge about screenings, trust in the medical institution, and poor physician-patient communication can delay or cause individuals to forego cancer screenings. Findings from a 2007 study [11] showed that Spanish speaking women who had access to preventive care services where Spanish was spoken, were twice as likely to be up-to-date with all their cancer screenings (OR 1.98) as were women who did not have access to these language services (OR 1.00) [1].

Racial and ethnic minorities, persons of lower socioeconomic status (SES), and the uninsured are more likely to be diagnosed with some cancers in later stages when the severity is likely to be greater and survival rates are decreased [1]. The CDC reported 10.4 new cases of cervical cancer for every 100,000 Hispanic women in the United States in 2008, and only 6.5 new cases among White women during the same period [12]. Research shows that among Latinas cervical cancer is regularly found at more advanced and less treatable stages [10, 13]. Lack of health insurance, low-income, embarrassment, fear of finding cancer, and lack of doctor's recommendation for screening may be relevant factors in explaining late diagnosis of cervical cancer in Latinas [6, 14–17]. These findings indicated that the likelihood of obtaining a Pap test varied significantly by ethnicity. This indicates a need to develop cultural and group specific interventions to ensure adequate cervical cancer screening rates and appropriate follow-up among minority populations, including Hispanics.

The Health Belief Model (HBM) is one of the major conceptual frameworks guiding current research related to cancer screening [18]. However, few studies have used the HBM as a theoretical framework when examining the health beliefs unique to Hispanic women relative to cervical cancer and to cervical cancer screening and none of those studies have included cultural predictors for screening participation in their model [19–23]. The purpose of this study was to utilize the HBM to determine South Carolina Upstate Hispanic women's cervical cancer screening

behavior by examining selected cervical cancer and screening beliefs, Perceived Threats (i.e., susceptibility plus severity), Benefits, Barriers, and their degree of self-efficacy. In addition, how selected "Cues to Action" (e.g., media or a doctor's reminder note), and modifiers (e.g., socio-demographic, socio-economic, and cultural predictors) influenced their perceptions and thus their cervical cancer screening compliance within national guidelines. Hispanic women ages 18–65 who resided in or near seven selected cities in the Upstate of South Carolina were surveyed. The HBM provided the theoretical framework for conceptualizing the directions and analyses of the study. The underlying goal was to explain cervical cancer screening behaviors in a population of Hispanic women who are at risk of non-participation in cervical cancer screening programs, as a result of cultural as well as linguistic barriers, low SES, and fear of disclosure of undocumented immigration status.

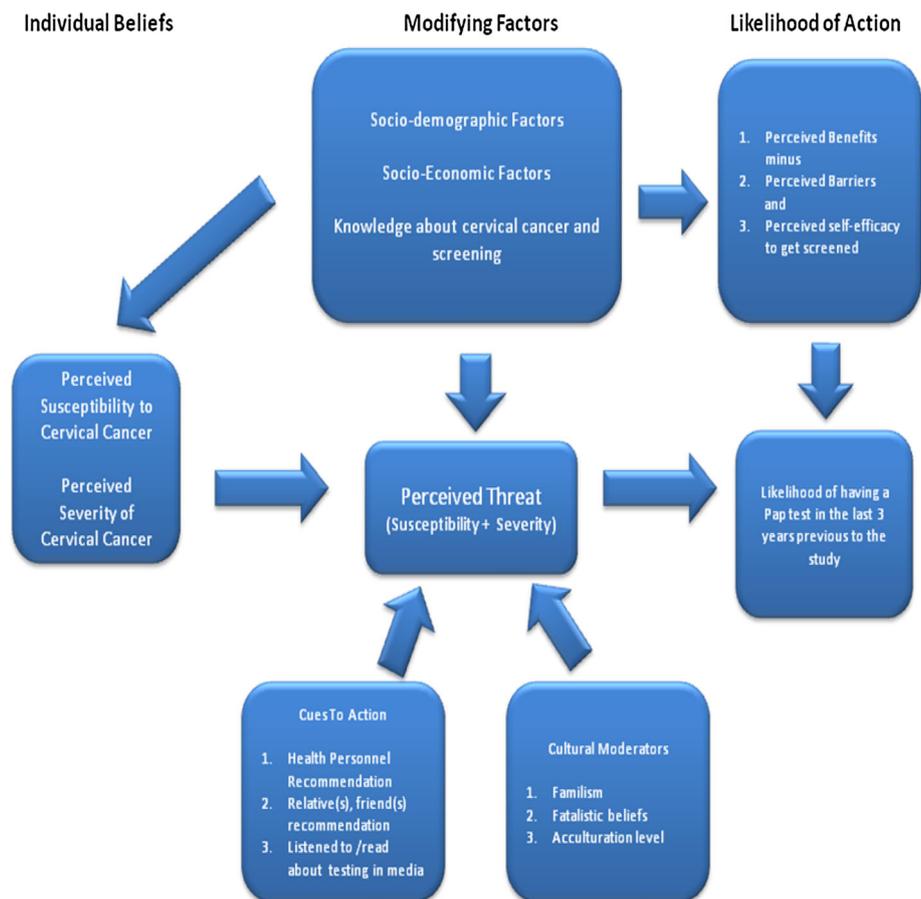
### Theoretical/Conceptual Framework

The HBM is a psychosocial model developed in the 1950s to predict whether individuals will participate in disease prevention programs [24]. The HBM consists of five key constructs or perceptions, assumed to influence the likelihood that a person would engage in a health behavior in order to avoid a negative health outcome [18, 25]. These constructs consist of:

1. Perceived susceptibility (perception of the likelihood that one would experience the outcome such as cervical cancer);
2. Perceived severity (perception that the outcome has potentially serious consequences);
3. Perceived benefits (potential causative positive outcomes from engaging in the health behavior such as cervical cancer screening);
4. Perceived barriers (potential obstacles to taking preventative actions);
5. Perceived self-efficacy (one's perception of being capable of engaging in the preventative health behavior).

The HBM uses an individual-level approach to predict health behavior, and also assumes that health decision making is a deliberative process. Therefore, it provides a means to obtain specific cervical cancer screening information from a population of women who are at risk of non-participation in the current surveillance system. Researchers have initiated studies of minority cultures in the U.S. to determine what their health beliefs and actions are, and how they differ from the dominant cultural traditions. The HBM has been used extensively to examine Hispanic

**Fig. 1** A modified Health Belief Model used as the conceptual and analytic framework for the study of Upstate South Carolina Hispanic women's cervical cancer beliefs, knowledge and screening behavior. *Source* Reproduced and modified from Janz, Champion and Strecher [18]. Used with permission



women's beliefs relative to breast cancer screening, [26–28] but rarely used to examine the health beliefs unique to Hispanic women relative to cervical cancer and cervical cancer screening. None of those studies included cultural predictors for screening participation within their model [19–23].

Figure 1 portrays a modified version of the HBM adapted for this study. The HBM model highlights threat perceptions (i.e. perceived susceptibility, perceived severity) as a central component of motivation. Threat Perception provides the energy or force to act. The perception of benefits combined with the least amount of barriers increases an individual's likelihood to seek screening [18, 24, 29, 30]. According to the HBM, modifying variables and cues to action affect an individual's perception of susceptibility, severity, benefits, barriers, and self-efficacy, and therefore impacts behavior.

Researchers have argued that the HBM is based on the premise that health is a highly valued concern or goal for most individuals across racial-ethnic groups in the United States. However it has been noted that the model does not include relevant culturally-related health beliefs that may be important in the explanation of health screening behaviors [31, 32]. Hayden argued that behavior is

significantly influenced by culture. Cultural values are “what people hold in high regard, and include normative beliefs regarding all aspects of life including nature, truth, honesty, beauty, education, integrity, friendship, and family” (p. 4) [30]. Cultural beliefs and attitudes play a major role in one's health-seeking behavior and health care utilization [33]. Cultural values influence cervical cancer screening behavior among Hispanic women [33–35]. Based on the review of the literature, three culturally-related modifying factors that influence Hispanic women's cervical cancer screening behaviors were added to the HBM model (i.e., acculturation, fatalism, and familism) [36]. The potential moderator role of these predictors in Hispanic women's beliefs of cervical cancer and screening was examined.

Acculturation has been widely used as a research variable to measure the effects of changes in beliefs, behavior, and values in health, as well as to study how these effects may change as individuals begin to integrate some of the values of the mainstream culture [37]. Studies have found an association between acculturation and cervical cancer screening among U.S. Hispanic women. Generally, more acculturated women were more likely to obtain a Pap smear than those with low levels of acculturation [16, 38].

Familism is “a cultural value that involves individuals’ strong identification with and attachment to their nuclear and extended families, and strong feelings of loyalty, reciprocity, and solidarity among members of the same family” (p. 13) [39]. Familism is related to acculturation among Latinos. Even highly acculturated Latinos held more familistic attitudes than White non-Latinos [40]. Individuals who reported higher levels of familism were more likely to engage in healthy behaviors and less likely to practice risky ones [41].

Cancer fatalism was described as “the belief that cancer is unavoidable regardless of personal actions or that death is certain when cancer appears” (p. 153) [42]. This concept has been described as a significant part of the Latino culture and religious beliefs [43]. Cancer fatalism was identified as a barrier to participation in cancer screening, detection, and treatment [34, 35, 44, 45]. However, Abraido-Lanza et al. [42] argued that there is little evidence to support the proposition that fatalism among Latinos posed a barrier to screening. It was stated that most studies presented contradictory results, and most failed to control for socio-demographic characteristics that were associated with fatalism and screening.

In addition to three culturally-related modifiers, the following modifying factors were incorporated into the HBM for this study: (1) socio-demographic variables (i.e. age, marital status, foreign vs. native born, country of birth, language spoken (Spanish vs. English), current or recent pregnancy (previous 3 years), and length of residence in the U.S.); (2) socio-economic variables (i.e. income, educational level, availability of health insurance, and availability of a regular source of health care); (3) knowledge about cervical cancer and screening; and, (4) cues to action (i.e. physician recommendation, family and friends recommendations, availability of educational materials, and exposure to media messages about cervical cancer and cervical cancer screening).

This study used a modified version of the HBM to evaluate South Carolina Upstate Hispanic women’s cervical cancer screening behavior by examining cervical cancer and screening perceived threats, benefits, barriers and self-efficacy. This study differs from other studies as it incorporates and combines familism and fatalism, in addition to acculturation, as cultural modifiers that may influence Hispanic women’s perceptions of cervical cancer and screening (Fig. 1). Based on the review of the literature, it was hypothesized that:

(1) When S.C. Upstate Hispanic women’s perceived threats (i.e. susceptibility, severity), benefits, and self-efficacy are high, and perceived barriers are low, then they would have a greater likelihood of having been screened for cervical cancer within the past 3 years; and

(2) Selected Cues to action, socio-economic, socio-demographic, and cultural factors would modify the effects of perceived threats (i.e. susceptibility, severity), benefits, barriers and self-efficacy on Hispanic women’s cervical cancer screening behavior.

## Methods

### Participants

The correlational design used in this study consisted of a cross-sectional survey using a convenience sample, without a comparison group, of Hispanic women 18–65 who at the time of the survey resided in or near the seven cities of four counties in the Upstate of South Carolina. Data were collected at selected test sites including faith-based organizations, ESL schools, Hispanic associations, and community centers where Hispanics gathered on an ongoing basis. Sample size was determined through a power analysis based on a review of previous research [20, 46–48]. The power analysis indicated that 173 respondents were needed to achieve a reliable sample. A total of 250 questionnaires were collected. Of these, participants answered all the items of the CPC-28 scale that measured the HBM components in 220 (88 %) questionnaires [49]. These 220 questionnaires were considered sufficiently complete to be included in this study and represented the total sample.

### Data Collection

The questionnaire, comprised of nine sections, included a total of 124 questions. The questionnaire was back-translated into Spanish by an independent translator [50]. A pilot study with seven participants was conducted to gauge readability, item comprehension, and time of completion. Based upon recommendations of the pilot study participants, no modifications of the questionnaire were made. Program coordinators and directors received a research site letter to schedule an appropriate time for questionnaire completion. Trained data collectors and the principal investigator were present at the sites and oral consents were obtained from all participants.

### Measures

The dependent variable, cervical cancer screening compliance, was measured using four yes/no items including whether respondents: (a) ever had a Pap smear test; (b) had a Pap smear test within the last 3 years; (c) had a Pap smear test within the last 2 years; and (d) had Pap smear test the

**Table 1** Reliability and frequencies of the scales reported by the original authors and those obtained in the study about cervical cancer screening behaviors among S.C. Upstate Hispanic women

Factor	Alpha source study	Alpha in this study	Mean	SD	Skewness	Min. value	Max. value	# of items
Perceived barriers	0.85	0.86	3.49	0.58	−1.29	1.22	4	9
Perceived benefits	0.64	0.49	3.72	0.48	−2.20	1	4	3
Perceived self-efficacy	0.95	0.98	9.17	1.45	−3.07	1	10	8
Perceived susceptibility	0.65	0.58	3.33	0.51	−.76	1.67	4	6
Perceived severity	0.84	0.75	3.56	0.65	−1.91	1	4	4
Perceive threats	–	0.75	3.42	0.48	−1.11	1.9	4	10
Cues to obtain Pap test	0.85	0.86	2.6	0.91	−0.21	1	4	6
Knowledge	–	0.53	5.69	7.86	−.47	0	10	10
Acculturation	0.90	0.91	1.85	0.48	0.53	1	3.13	24
Familism	0.83	0.81	7.89	1.23	−.60	3.38	10	18
Fatalism	0.81	0.78	3.67	2.9	0.97	0	15	15

past year. Several instruments, created or adapted by other researchers for use with Hispanics, were incorporated into this study. Four of the six scales used were available from the original authors in both English and Spanish (See Table 1 for scales' reliability results). Written consent was obtained from the researchers who created or adapted these instruments. S.C. Upstate Hispanic women's cervical cancer and screening beliefs were assessed using the Beliefs, Papanicolaou, Cancer - 28/"Creencias, Papanicolaou, Cancer - 28" [CPC-28] scale developed by Urrutia [49]. A scale was developed by the principal investigator to measure participants' knowledge about cervical cancer and screening. Acculturation was measured using the Bi-dimensional Acculturation Scale (BAS) developed by Marin and Gamba [51]. Familism was measured using the Attitudinal Familism Scale (AFS) created by Lugo-Steidel and Contreras [52]. Fatalism was assessed using the Spanish version of the Powe Fatalism Inventory (SPFI), translated and culturally adapted by Lopez-McKee et al. [53]. Table 2 includes the instruments, authors, and the scales' description.

### Analysis

The data were analyzed using SPSS 17.0. Scale items were examined for reliability and the scales were computed. Bivariate analyses were carried out using correlations and Chi square. Hypotheses were tested within a Generalized Linear Model framework. This study received human subjects' protection approval from Clemson University's Institutional Review Board (IRB). Letters of approval from participating sites were submitted to the IRB before data collection was initiated.

### Results

Two-hundred and twenty Hispanic women between ages 18–65 participated in this study. The characteristics of the sample are shown in Table 3. On average participants were under 40 years of age and participants were mostly married (54.9 %;  $n = 121$ ) or living with a partner (20.5 %;  $n = 45$ ). In general, participants were born in Mexico (54.5 %;  $n = 121$ ), had at least a high school education (65 %;  $n = 143$ ) and had an income under \$20,000 (55.4 %;  $n = 122$ ). Only a quarter of the participants reported having health insurance at the time of the survey (23.9 %;  $n = 53$ ). Eighteen percent of the participants reported they never had a Pap test or had been screened just once in their life ( $n = 40$ ). Thirty-six percent reported they had a Pap test once or twice in the last 3 years ( $n = 72$ ). Forty-six percent reported they had a Pap test every year in the last 3 years ( $n = 92$ ).

Being pregnant is considered a factor that protects against cervical cancer because pregnant women have access to the Pap test as part of the prenatal examination [16]. Although only 4 % ( $n = 9$ ) of the participants were pregnant at the time of the survey, 25 % ( $n = 55$ ) reported being pregnant during the last 3 years. Seventy-five percent ( $n = 165$ ) of the participants recognized HPV as a cause of cervical cancer; however, they had very little knowledge about how HPV was diagnosed (9.1 %;  $n = 20$ ), or how to interpret negative Pap test results (23 %;  $n = 51$ ). Smoking was the least identified risk factor (44 %;  $n = 97$ ) when compared to family history of cervical cancer (78 %;  $n = 172$ ) or multiple sexual partners (71 %;  $n = 156$ ). Fifty-nine percent ( $n = 130$ ) of the participants scored as

**Table 2** Instruments and scales used in the study about cervical cancer screening behaviors among S.C. Upstate Hispanic women

Construct	Instrument	Domains	Scale	Author
Cervical cancer and screening beliefs	Beliefs, Papanicolaou, Cancer - 28/[CPC-28]	Four domains of participants' beliefs about cervical cancer and screening and one modifying factor	29 items with a four point scale ranging from "strongly agree" to "strongly disagree"	Urrutia [49]
Self-efficacy beliefs	Cervical Cancer Screening Self-Efficacy Scale (CCSSE)	One domain of self-efficacy beliefs	Eight items on a 100-point scale, ranging in 10-unit intervals from 0 ("Cannot do"); through to, 100 ("Highly certain can do")	Fernandez et al. [58]
Knowledge about cervical cancer and screening	HPV, cervical cancer and screening knowledge scale	Four domains related with Knowledge on HPV, risk factors, usefulness of the Pap test, and cervical cancer screening guidelines	10 items including dichotomous responses: true or false.	Developed by principal investigator for this study
Acculturation	Bi-dimensional Acculturation Scale (BAS)	Two cultural domains (Hispanic and non-Hispanic)	24 items in on a four points scale ranging from "almost never" to "almost always", or "very poorly" to "very well" depending on the domain. Score range 1–4 for each cultural domain. Higher scores indicates higher degree of acculturation. A score above 2.5 in both domains indicates biculturalism	Marin and Gamba [51]
Familism	Attitudinal Familism Scale (AFS)	Four domains: Familial Support, Familial Interconnectedness, Familial Honor, and Subjugation of Self for Family	22 items in a 10 points scale ranging from "strongly disagree" to strongly agree". Higher values expressed higher levels of familistic attitudes	Lugo-Steidel and Contreras [52]
Fatalism	Spanish version of the Powe Fatalism Inventory (SPFI)	Four factors: predestination, pessimism, imminent death, and fear	15 items Higher values expressed higher level of fatalistic beliefs	Lopez-McKee et al. [53]

low-accultured in the BAS, with 39 % (n = 86) having scores indicating their being bicultural. Respondents reported high average levels of familistic attitudes ( $\bar{X} = 7.89$ ;  $SD = 1.23$ ; range 3.38–10.00), according to the AFS. The cervical cancer fatalistic beliefs reported by the participants, based on the SPFI, were low ( $\bar{X} = 3.67$ ;  $SD = 2.90$ ; range 0.00–15.00).

The participants reported high percentages of perceived susceptibility to cervical cancer as 75 % (n = 165) either strongly agreed or agreed that they were at risk for developing cervical cancer, and 88 % (n = 194) indicated that cervical cancer is one of the most common cancers in women their age. Similarly, perceived severity-related items had high scores with more than 90 % (n = 198) of the sample reporting that cervical cancer is a serious illness and that it might lead to death. High perceived benefits from the Pap test were reported as eighty-nine percent (n = 196) of the participants indicated that screening might save their life. Lack of knowledge about when to obtain a Pap test was found to be a barrier since 18 % (n = 40) of the participants strongly agreed or agreed that they did not get a Pap test because they did not know at

what age they needed to start screening or how often they needed to obtain the Pap test.

Generalized Linear Modeling was used to predict the probabilities of cervical cancer screening compliance among Hispanic women. Table 4 presents the results of the base model which included only the dimensions of the HBM (benefits, barriers, threats [susceptibility and severity], and self-efficacy) as predictors of cervical cancer screening behavior. The overall model was significant ( $\chi^2 = 25.03$ ,  $p = 0.001$ ), indicating that the linear combination of health beliefs significantly predicted cervical cancer screening behaviors. The results showed that as perceived benefits increased, barriers decreased, threats increased, and self-efficacy increased, the likelihood of obtaining a Pap test increased. This was the case for "at least once in one's lifetime" (OR = 4.152; 95 % CI 4.150–4.160), "once in the past 3 years" (OR = 8.617 95 % CI 8.611–8.637), and "twice in the past 3 years" (OR = 22.027 95 % CI 21.989–22.099). Therefore, respondents who reported high perceived benefits from screening, high perceived threats to cervical cancer, and low perceived barriers to screening had a significantly

**Table 3** Socio-demographic and socio-economic characteristics of Hispanic Women from seven cities in Upstate South Carolina

Variable	Categories	Total	%
Age (years)	15–19	2	1.0
	20–29	49	23.9
	30–39	66	32.2
	40–49	56	27.3
	50–59	24	11.7
	60–65	8	3.9
Total		205	100.0
Marital Status	Single	26	12.0
	Partnered	44	20.5
	Married	118	54.9
	Widowed/separated/divorced	27	12.6
Total		215	100.0
Native versus foreign born	Native born (U.S.)	8	3.6
	Foreign born (P.R. and other LA countries)	212	96.4
Total		220	100.0
Country of birth	Mexico	114	54.5
	Central America	23	11.0
	South America	60	28.7
	Caribbean	4	1.9
	USA	8	3.8
Total		209	100.0
Length of residence in the U.S. (years)	Less than 5	30	14.6
	6–10	84	41.0
	11–14	43	21.0
	More than 15	48	23.4
Total		205	100.0
City of residence	Laurens City	21	9.5
	Greenville	64	29.1
	Simpsonville	25	11.4
	Fountain Inn	9	4.1
	Greer	58	26.4
	Spartanburg City	20	9.1
	Walhalla	23	10.5
	Total		220
Language	Speak English poor to very poorly	123	55.9
	Speak English well to very well	97	44.1
Total		220	100.0
Education attainment	Less than high school	77	35.0
	High school or GED	57	25.9
	Technical or vocational	23	10.5
	Some college	27	12.3
	College degree	29	13.2

**Table 3** continued

Variable	Categories	Total	%
	Master degree or graduate studies	7	3.1
Total		220	100.0
Family income	\$10,000.00 or less	58	28.2
	\$10,001.00 to \$19,999.00	56	27.2
	\$20,001.00 to \$39,999.00	68	33.0
	\$40,001 or more	24	11.7
Total		206	100.0
Current pregnancy	Yes	10	4.6
	No	209	95.4
Total		219	100.0
Last 3 years pregnancy	Yes	54	25.1
	No	161	74.9
Total		215	100.0
Availability of health insurance	Yes	51	23.9
	No	162	76.1
Total		213	100.0
Availability of a medical home	Yes	73	34.3
	No	140	65.7
Total		213	100.0
Source of regular medical care	Private physician/group practice same Dr.	73	34.3
	Group practice, different Dr./hospital outpatient dept./clinic not with hospital	95	44.6
	Free clinic/hospital emergency room	24	11.3
	I do not go for regular medical care	21	9.9
Total		45	100.0

greater occurrence of having received a Pap test every year during the 3 years prior to the study. Perceived self-efficacy to obtain screening for cervical cancer (Wald's  $\chi^2 = 12.99$ ,  $p = 0.000$ ) and perceived threats (susceptibility and severity) to cervical cancer (Wald's  $\chi^2 = 5.93$ ,  $p = 0.015$ ) were significant predictors of the respondent's compliance with cervical cancer screening guidelines. Thus, high perceived self-efficacy and threats increased the odds of having obtained a Pap test every year during the last 3 years. However perceived benefits of the Pap test and barriers to screening were not significant.

After the inclusion of selected socio-demographic modifiers (age, marital status, pregnancy in the past 3 years, and English speaking proficiency) the model continued to be significant ( $\chi^2 = 41.13$ ,  $p = 0.000$ ), and the interaction between benefits and barriers was significant (Wald's  $\chi^2 = 8.389$ ,

**Table 4** Generalized Linear Model including Only S.C. Upstate Hispanic women’s perceptions of cervical cancer and Pap test

Tests of model effects	$\chi^2$		<i>df</i>		<i>p</i>			
<b>Predictors</b>								
Benefits	0.196		1		0.658			
Barriers	0.787		2		0.675			
Threats	5.926		1		0.015			
Self-efficacy	12.994		1		0.000			
<b>Parameter estimates</b>								
	<i>b</i>	SE <i>b</i>	Wald’s $\chi^2$	<i>df</i>	<i>p</i>	OR	95 % CI	
<b>Criterion</b>								
<b>Compliance</b>								
Never	−3.920	0.3928	99.614	1	0.000	0.000	Ref.	
At least once in lifetime	−2.444	0.2859	73.080	1	0.000	4.152	4.150–4.160	
Once in past 3 yrs.	−1.659	0.2555	42.176	1	0.000	8.617	8.611–8.637	
Twice in past 3 yrs.	−0.627	0.2335	7.208	1	0.007	22.027	21.989–22.099	
Every year past 3 years	Reference category							
<b>Predictors</b>								
<b>Benefits</b>								
Low-mod low	−0.131	0.2972	0.196	1	0.658			
<b>Barriers</b>								
Low	0.298	0.3461	0.743	1	0.389			
Mod low	0.053	0.3146	0.029	1	0.865			
<b>Threats</b>								
Low-mod low	−0.710	0.2916	5.926	1	0.015			
<b>Self-efficacy</b>								
Low-mod low	−0.978	0.2712	12.994	1	0.000			
<b>Test</b>						$\chi^2$	<i>df</i>	<i>p</i>
Model $\chi^2$						25.03	5	0.000
Goodness-of-fit = 1.138								

*p* = 0.015). Age (Wald’s  $\chi^2 = 4.527, p = 0.033$ ) and marital status (Wald’s  $\chi^2 = 7.278, p = 0.007$ ) were significant covariates. In addition, the likelihood of obtaining a Pap test at least once in one’s lifetime (OR = 4.551; 95 % CI 4.439–4.727), once in the past 3 years (OR = 9.472 95 % CI 9.150–9.991), and twice in the past 3 years (OR = 22.966 95 % CI 22.087–24.467) increased. After inclusion of selected socio-economic modifiers (income, education, availability of health insurance, and access to regular medical care) the overall model remained significant ( $\chi^2 = 43.076, p = 0.000$ ). Income (Wald’s  $\chi^2 = 4.98, p = 0.026$ ) and regular medical care (Wald’s  $\chi^2 = 8.94, p = 0.003$ ) were significant covariates. Perceived threats of cervical cancer (Wald’s  $\chi^2 = 6.01, p = 0.014$ ) and self-efficacy to screening (Wald’s  $\chi^2 = 8.90, p = 0.003$ ) continued to be significant predictors. Similarly, the interaction between perceived benefits of screening, and barriers to screening also continued to be significant (Wald’s  $\chi^2 = 9.29, p = 0.010$ ). After incorporating selected socio-economic modifiers, the probability of obtaining a Pap test at

least once in one’s lifetime (OR = 4.16), once in the past 3 years (OR = 8.19), and twice in the past 3 years (OR = 21.00) increased.

The modifying effect of the three cultural factors (familism, fatalism, and acculturation) was also analyzed. After including these three cultural factors in the model, only familism (Wald’s  $\chi^2 = 5.62, p = 0.018$ ) was a significant covariate; and the model also continued to be significant ( $\chi^2 = 30.758, p = 0.000$ ). It is important to note that this study population reported low acculturation or biculturalism, as well as a low average level of cervical cancer fatalism score. After the inclusion of familism as a modifier, the linear combination of cervical cancer and Pap test perceptions continued to significantly increase the likelihood of Hispanic women obtaining a Pap test in the last 3 years. In addition, perceived threats (Wald’s  $\chi^2 = 3.93, p = 0.048$ ) and self-efficacy (Wald’s  $\chi^2 = 13.60, p = 0.000$ ) continued to be significant. The probability increased for getting a Pap test at least once in

one's lifetime (OR = 4.43), once in the past 3 years (OR = 9.11), and twice in the past 3 years (OR = 24.21). Therefore, Hypothesis 2, "Selected socio-demographics and socio-economic variables and cultural factors significantly modified the statistical power of perceived threats (i.e. susceptibility, severity), benefits, barriers and self-efficacy to predict S.C. Upstate Hispanic women's cervical cancer screening behaviors", was supported.

## Discussion

In this study, a modified version of the HBM was used to examine the effect of selected empirically supported HBM perceptions in explaining the differences in motivation of Hispanic women's decisions to obtain screening for cervical cancer according to national guidelines [2].

The inclusion of external or social factors such as economic, demographic, and cultural predictors strengthened the exactness of the HBM as an explanatory model in this study. Findings suggested that the modified HBM was an effective method for examining cervical cancer screening in this sample of Hispanic women. The results of the study supported the major tenants of the theory. Participants who reported high perceived benefits from screening, self-efficacy to screening, and threats to cervical cancer, as well as low perceived barriers to screening had a significantly greater chance of obtaining a Pap test every year during the 3 years prior to the study. Perceived self-efficacy and threats were the strongest predictors of Hispanic women's cervical cancer screening behaviors. A significant interaction between benefit and barriers was identified after the inclusion of selected socio-demographic variables, which expressed the combined effect of these two predictors on Hispanic women's cervical cancer and Pap test perceptions.

Previous studies found that a Hispanic woman's perceived susceptibility to and severity of cervical cancer was influenced by a lack of knowledge about cervical cancer [53, 54]. This study found that the majority of the participants provided responses that reflected a high level of knowledge about the importance of the Pap test. These results differed from previous findings which suggested a significant proportion of Hispanic women believed that cervical cancer screening was unnecessary [54, 55]. The high level of knowledge about cervical cancer and the Pap test reported by participants in this study could have partially explained the significant effect of perceived threats. In addition, there was a positive correlation between knowledge about cervical cancer and the Pap test and perceived susceptibility; indicating that as a woman's knowledge increased their perceived susceptibility to cervical cancer also increased. Similar correlations were found

in other studies [23, 56]. This study, as in previous studies, found that participants displayed both accurate and inaccurate knowledge about cervical cancer screening guidelines and HPV testing [57]. This indicated a need for education about the most recent cervical cancer screening guidelines and about HPV.

Together with perceived threats, perceived self-efficacy was the strongest predictor of the participants' compliance with Pap test guidelines. In this study the hypothesized relationships between the theoretical constructs of the HBM and self-efficacy were supported. Generalized Linear Modeling results supported the theoretical relationships between self-efficacy and cervical cancer screening behavior. Participants with higher self-efficacy were more likely to have obtained a Pap test every year during the last 3 years than women with lower self-efficacy. According to the HBM, the perception of the benefits of cervical cancer screening combined with less perceived barriers to obtain screening leads to the greatest likelihood of an individual seeking screening [18]. In agreement with this theory, the model tested showed that for Hispanic women perceived benefits and barriers acted together to determine women's likelihood of obtaining a Pap test. These results demonstrated that there was a combined effect between these two predictors in Hispanic women's cervical cancer and Pap test perceptions. Therefore, Hispanic women did not weigh the benefits of the screening independently of the perceived barriers to screening. Similar results were found in a previous study [18].

Although this study sample was represented primarily by low income, low educational level, recent immigrants, and uninsured Hispanic women; we found a reported level of Pap test compliance (82 %) close to the US Healthy People 2020 objective. This objective specified that 85 % of all women should have had at least one Pap test the preceding 3 years [5]. Being pregnant would bring these women into contact with a physician and this might have influenced their reported knowledge about cervical cancer and the Pap test. This might account for some of the 82 % compliance with cervical cancer screening guidelines in the last 3 years [58]. Age, marital status, income, and availability of a regular source of care were significant covariates in this study, and influenced participants' perceptions about cervical cancer and Pap test screening behaviors. Participants who reported higher income levels and access to a regular source of care were significantly more likely to have reported a Pap test every year during the last 3 years. This finding is similar to results of other studies conducted among U.S. Hispanic women about the relationship between access to a regular source of care and Pap test compliance [58–60]. Despite the participants' low level of access to a medical home, most of them reported access to some type of medical care, and this could also have

increased their likelihood of obtaining cervical cancer screening.

Previous research has shown that cultural factors influenced cervical cancer screening behavior among Hispanic women [33–35]. Familism was a strong predictor of Hispanic women's Pap test compliance while fatalism and acculturation were not significant predictors. Participants in this study reported low average levels of fatalistic beliefs and acculturation. This contradicted the findings of previous studies that reported Hispanic women extreme cervical cancer fatalistic beliefs (i.e., that cervical cancer cannot be cured, or perceived it as a death sentence) [16, 35, 45]. The low acculturation scores found in this study might reflect the study participants' recent immigrant status, and the strong value given to family relationships (i.e., familism). This study added to the literature about acculturation. It demonstrated that the broad construct of "acculturation" is complex and multidimensional. The results of this study demonstrated that one should not assume that low levels of acculturation would be indicative of low levels of Pap test compliance. Measures of acculturation should take into account attitudes and behaviors, country of origin, length of time in-country, language, and concepts relevant to Hispanic women such as familism and fatalism.

The results of this study are important to understanding cervical cancer screening behaviors in states with rapidly growing Hispanic communities. This study's HBM can be used to understand cervical cancer screening behaviors among low-acculturated or bicultural Hispanic women immigrants to the U.S. This research study has four limitations. This study used a cross-sectional design; therefore, assessment of temporal relationships among variables could not be examined. The researcher's reliance on self-reports about the participant's perceptions and beliefs might have underestimated the real frequency of cancer screening and over-estimated participants' intentions and beliefs. It was possible that self-report was biased and influenced by a cultural inclination to appear cooperative, or *simpatia* [61, 62]. Since this study was based on the selection of a convenience sample, selection bias might also have been present.

### New Contribution to the Literature

This study used a theoretically driven analyses to determine why S.C. Upstate Hispanic women engaged or did not engage in cervical cancer screening. Using the HBM [29] as a framework the study found evidence to support the hypothesized relationships between cervical cancer screening and health beliefs. The inclusion of external, or social, factors (i.e., economic, demographic, and cultural factors) that influence one's perceptions and ultimately

health behavior, was proven to increase the strength of the HBM as an explanatory model in this study. Study results found evidence to support the hypothesized relationships between cervical cancer screening and health beliefs. The importance of familism demonstrated the need to incorporate relevant cultural concepts when examining screening behaviors among Hispanics.

Perceived threats and perceived self-efficacy were the strongest predictors of the participants' compliance with Pap test guidelines. This study demonstrated that self-efficacy had significant explanatory power to predict cervical cancer screening behaviors among Hispanic women. Consideration must be given to the nature and extent of social relationships and how these relationships influence perceptions of self-efficacy and attempts to access resources such as health care. Studying how immigrants form trust relationships that produce greater self-efficacy related to managing their health care might be an important area for future research. Such research might have implications for further understanding of Hispanic women's health maintenance behaviors, [63] and might also prove helpful to health practitioners in developing more effective interventions for this population.

The interaction of perceived benefits and barriers found in this study should be considered when planning interventions to increase cervical cancer screening participation among Hispanic women. In this study, Hispanic women did not weigh the benefits of the screening independently of their perceived barriers to screening. Similar results were found in a previous study [20]. Educational efforts targeting Hispanic women should prioritize and emphasize helping these women find ways to overcome barriers to screening for cervical cancer while at the same time promoting the benefits to screening. Contrary to the findings from previous research, [16, 35] this study found low reported average rates of cervical cancer fatalistic beliefs. It is important to examine more thoroughly the assumption that fatalism is a cultural trait among Latinos [42]. This study also added to the literature regarding acculturation, as it demonstrated that the broad construct of "acculturation" is complex and multidimensional.

The HBM can be used as a framework to design culturally appropriate cervical cancer screening interventions. Further research is needed to determine if this framework applies to other Hispanic women's health behaviors. Health care providers and policy makers working with Hispanic women need to recognize the importance of factors, such as familism, knowledge about cervical cancer and screening, age, marital status, income, and access to a medical home as crucial facilitators or impediments to cervical cancer screening among Hispanic women. Comprehensive approaches that combine access to regular care and screening at a medical home, and provide clear, accurate

and culturally adapted information about cervical cancer, HPV, and screening appear to increase cervical cancer screening compliance among Hispanic women.

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