Extension of the Behavioral Model of Healthcare Utilization with Ethnically Diverse, Low-Income Women

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Objective: Psychosocial vulnerabilities were added to a model of healthcare utilization. This extension was tested among low-income women with ethnicity addressed as a moderator.

Design: Structured interviews were conducted at 2 points in time, approximately 1 year apart. The constructs of psychosocial vulnerability, demographic predisposing, barriers, and illness were measured by muluple indicators to allow use of Structural Equation Modeling to analyze results. The models were tested separately for each ethnic group.

Setting: Community office.

Participants: African-American (N = 266), Euro-American (N = 200), and Mexican-American (N = 210) women were recruited from the Dallas Metropolitan area to participate in Project HOW: Health Outcomes of Women, a multi-year, multi-wave study. Face-to-face interviews were conducted with this sample. Participants had been in heterosexual relationships for at least 1 year, were between 20 and 49 years of age, and had incomes less than 200% of the national poverty level.

Main Outcome Measures: Healthcare utilization, defined as physician visits and general healthcare visits.

Results: Illness mediated the effect of psychosocial vulnerability on healthcare utilization for African Americans and Euro-Americans. The model for Mexican Americans was the most complex. Psychosocial vulnerability on illness was partially mediated by barriers, which also directly affected utilization.

Conclusions: Psychosocial vulnerabilities were significant utilization predictors for healthcare use for all low-income women in this study. The final models for the 2 minority groups, African Americans and Mexican Americans, were quite different. Hence, women of color should not be considered a homogeneous group in comparison to Euro-Americans. (*Ethn Dis.* 2002; 12:111–123)

Key Words: Abused Women, Ethnic Groups, Health Services Research, Health Status Indicators

Introduction

The purpose of this study was to investigate outpatient healthcare services among low-income, urban women. To do so, we extended the Behavioral Model for Vulnerable Populations[1] by adding the construct psychosocial vulnerability, consisting of stress and abuse by partners. Research has shown that some life situations may affect healthcare utilization. Consequently, ethnicity was addressed as a variable that moderates the inter-relationships of constructs in Gelberg, Andersen, and Leake's behavioral model.[1]

To address the problem of inequitable access to health care, Andersen and Newman[2,3] developed a theoretical framework. They demonstrated that illness, education, and ethnicity influence the use of healthcare services. However, a major criticism of this model was its inability to account for specific social structure characteristics that would influence utilization for different groups. Therefore, Gelberg, Andersen, and Leake[1] incorporated a vulnerable domain. The goal of this revision was to more accurately assess factors that may be pertinent for specific groups. The revised model was developed with the implication that some of the constructs would need tailoring to specific vulnerable populations.

Ethnicity has received attention as a predictor of healthcare utilization and access. Minorities, when compared to Euro-Americans, have lower rates of utilization, despite increased risks for particular health conditions and other differences in health status.[4] According to Freiman,[5] there are substantial differences between the 3 most frequently studied populations (African Americans, Euro-Americans, and Hispanics) on healthcare insurance, education, and utilization.

Traditional group comparison procedures have been used to identify ethnic differences in health that are likely to affect patterns of utilization. Despite improvements in health care, African Americans are more likely to be in fair or poor health, and they continue to have shorter life expectancies than do Euro-Americans.[4] The incidence and risk for specific disorders and mortality rates are higher among African Americans[6] and Mexican Americans compared to Euro-Americans.[7] In general, minorities are more likely to require medical care, but less likely to receive health services than Euro-Americans. Mexican Americans have been reported to be the most disadvantaged, reporting worse health but less contact with health professionals and fewer hos-

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pitalizations than Euro-Americans.[8] Minority groups report a worse primary care experience than do Euro-Americans.[5,9,10] They are less likely to utilize private physicians and establish a regular provider of care and more likely than Euro-Americans to use hospital outpatient clinics and emergency rooms.[4] These findings suggest that ethnicity may function more as a moderator than a predictor variable. Certainly, cultural factors affect how symptoms are perceived. Further, ethnicity affects how individuals are treated by others. These considerations imply that constructs in the Behavioral Model for Vulnerable Populations[1] may relate differently to each other depending on the ethnicity of the individuals.

It is often difficult, however, to account for differences based on ethnicity. One problem is that ethnicity is often confounded with socioeconomic status. Some differences in health care may be more closely related to factors associated with poverty rather than race, ethnicity, or culture. Poor individuals have fewer resources to cover the costs of health care, are generally less educated, and are less likely to have insurance. Poverty has been labeled as a "fundamental" cause of disease, with low socioeconomic status associated with poor health, low life expectancy, high mortality rates, and with each of the 14 major causes of death in the International Classification of Diseases.[11] In Elofsson, Unden, and Krakau's[12] study, those who considered themselves to be poor were 10 times more likely to forego seeking health care than those who were not poor. Thus, poverty may be considered a barrier to healthcare utilization.

The associations among utilization, poverty, and ethnicity are complex. Although low-income Mexican Americans with Medicaid had more access to health care than did those who were not insured,[13] being uninsured decreased the probability of seeking health care more for Euro-Americans than for either African Americans or Mexican Americans.[5] Individuals without insurance have worse perceived health status, are less likely to be Euro-American, more likely to have a family income below 200% of the federal poverty level, and less likely to have graduated from high school, compared to those with health insurance.[14] The insured visit a physician twice as often as the uninsured.[15] Consequently, we held socioeconomic status constant while using education and insurance as indicators of demographic predisposing and enabling constructs based on Andersen and Newman's model.[2] By recruiting only low-income women, poverty, a primary indicator of socioeconomic status, was controlled. This alleviates the confound of ethnicity and socioeconomic status.

A psychological perspective of the Behavioral Model for Vulnerable Populations[1] suggests an additional construct is needed to more effectively account for healthcare utilization. This view incorporates the large bodies of literature indicating that psychosocial factors may result in a vulnerability that differs from demographic predisposing variables in affecting health and healthcare utilization. Consequently, this study added psychosocial vulnerability as a construct, incorporating generalized stress and abuse by partners as indicators.

Vulnerable, low-income populations are exposed to a great deal of stress in their day-to-day living conditions, which, in turn, affects their health. A great deal of research has shown that stress influences health status and healthcare utilization.[16] For example, stress has been implicated in the onset of illness, an immediate cause for utilization. It increases the probability of utilization in the absence of illness and is more predictive of healthcare use than are physical symptoms[17] due, in part, to its negative effect on perceived health. Farmer and Ferraro[16] found perceived health status was a stronger predictor for healthcare use among African Americans than Euro-Americans. African Americans were also more likely to perceive their health as poor when experiencing psychological distress. Studies such as these suggest the inclusion of perceived health as a measure of illness, and stress as a psychosocial

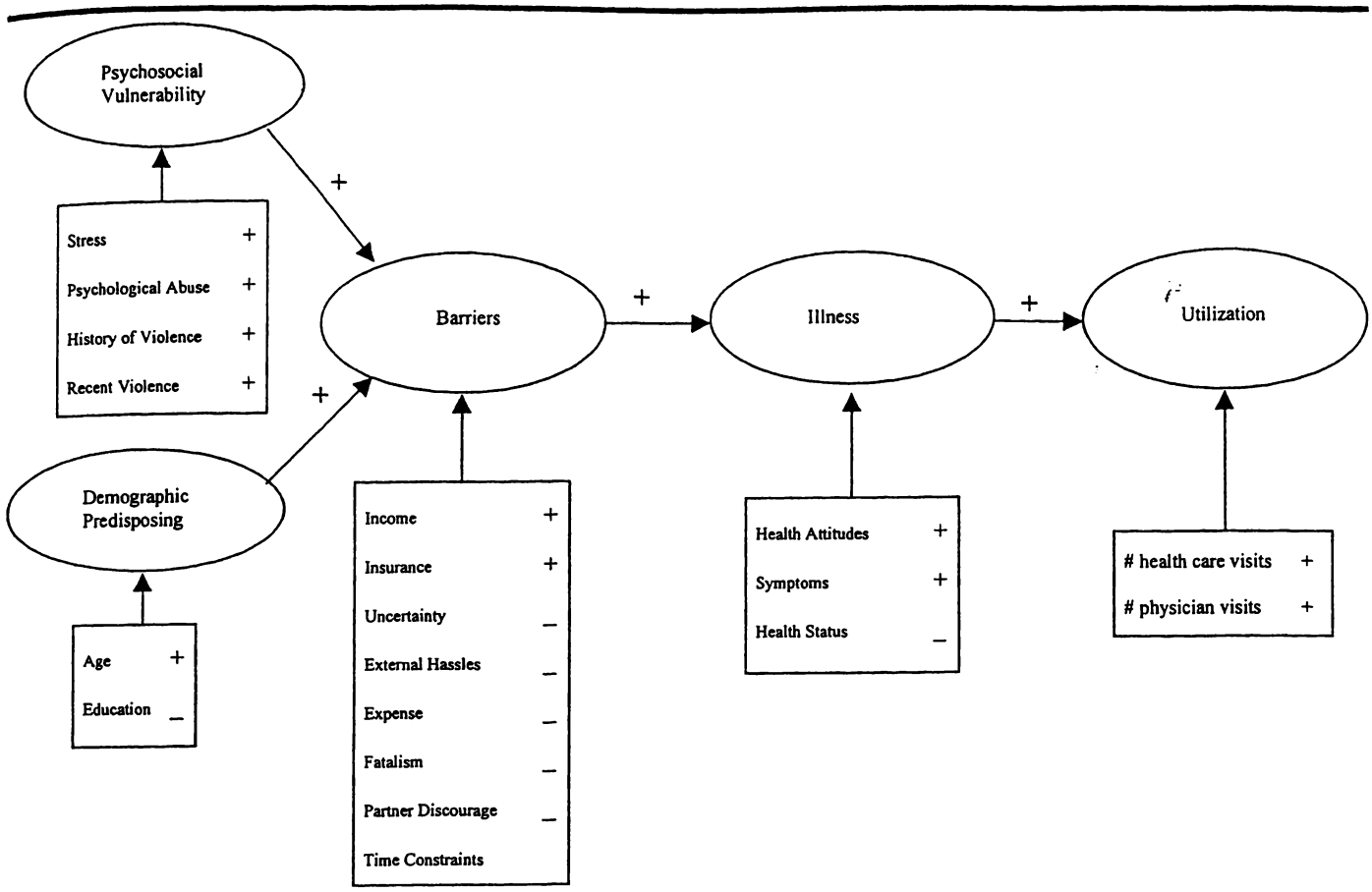

Fig 1. Proposed utilization model

vulnerability variable, in any health service utilization model.

Partner abuse is also important when considering women's utilization of heath care. Abuse has a psychological and physical impact on women's health. Partner violence is more prevalent in low-income populations than among those with higher socioeconomic status.[18] McLeer and Anwar[19] estimated that abuse accounts for 99,800 days of hospitalization, 28,700 emergency room visits, and 39,900 physician visits annually. Abused women report more medical symptoms, pain, functional disability, and physician visits than do non-abused women.[20] Battered women have more hospital admissions in all age groups compared to women with nonviolent partners,[21] utilizing health services 1 to 20 times in a 6-month period[22] for symptoms such as headaches, gastrointestinal disturbances, respiratory problems, and menstrual abnormalities.[23]

The type of abuse women sustain may have an effect. Violence, as well as verbal and nonverbal behavior purposely intended to hurt or control a woman, contribute to physician utilization rates.[24] A broader definition of psychological abuse includes subtle and overt acts that function to harm a woman, undermining her sense of self, mental health, and overall well being.[25,26] It is evident that both physical and psychological abuse are psychosocial vulnerabilities, particularly for low-income women.

In summary, we tested the extension of the Vulnerable Population Model[1] shown in Figure 1. Specifically, we examined healthcare utilization predictors among low-income, ethnically diverse women without the confound of socioeconomic status. The predisposing construct of psychosocial vulnerability consisted of psychological abuse and physical violence by women's partners, as well as overall stress. Demographic predisposing indicators were age and education, because ethnicity was addressed as a moderator. Barriers (enabling indicators) were objective (income, insurance) and subjective (perceptions of barriers).

Illness was health status, attitudes about health, and symptoms. Both predisposing constructs (psychosocial vulnerability and demographic) were hypothesized to influence utilization through effects on barriers and illness based on Andersen and Newman's earlier work.[2] Ethnicity was expected to moderate the strength of relationships between constructs and affect how well indicators defined the constructs. Overall, the final models for the two minority groups were expected to be generally similar to each other and different from the final model for Euro-Americans.

METHOD

Participants

The data were from Waves 1 and 2 of Project HOW: Health Outcomes of Women. This low-income sample of women was recruited through personal contact, mass mailings, referrals from participants, and flyers distributed through churches, schools, and in public places. The requirements for participation were ethnicity (African American, Euro-American, and Mexican American), age (between 20 and 49), presence of a long-term heterosexual relationship (at least 1 year), and poverty (household income below 200% of federal poverty level or receipt of public aid). The mean level of poverty based on household size and income from work was 92% (ie, 8% below the poverty threshold). Nineteen women with incomes below poverty level were receiving public assistance from a program designed to alleviate the effects of poverty. Mexican-American women who were not born in the United States had completed at least 10 years of school in the United States. Qualified women were told the study required a commitment to 4 interviews, each lasting approximately 3 hours. For Wave 1, women received a t-shirt, totebag, bus pass, and $15. For Wave 2, they received $35. More information on screening and procedures can be found elsewhere.[26–28]

The final sample of 836 women was, on average, 33.3 years old. Women self-identified as African-American (N = 303, 36.2%), Euro-American (N = 273, 32.7%), and Mexican-American (N = 260, 31.1%). Slightly more than a third reported having a high school diploma or GED equivalent (N = 321, 38.4 %). Less than one third of participants had not completed high school (N = 238, 28.5%). Women were dating (N = 201, 24%), cohabiting (N = 107, 12.8%), common-law married (N = 181, 21.7%), or married (N = 347, 41.5%) for 7.7 years on average. At Wave 2, more African Americans (N = 273, 39.2%), than Euro-Americans (N = 208, 29.8%), or Mexican Americans (N = 216, 31.0%) remained in the study, χ^2 = 20.64, $P<.001$, N = 697. Thus, 83.4% of the original sample was retained in Wave 2.

Measures

Age and years of education, the 2 demographic predisposing indicators, were reported at Wave 1. Both a high school diploma and GED were considered 12 years of education. Insurance status, a barrier indicator, was assessed at Wave 2. Women were classified as having no coverage (44.1%) or some form of health insurance (55.9%). Utilization was measured at Wave 2 with 2 indicators. Women reported the number of times they had seen a physician during the preceding year, and the total number of times they used any health resource (eg, emergency room, hospital outpatient clinic, regular health clinic) since their first interview.

Psychosocial Vulnerability

Four indicators were used to assess the latent variable, psychosocial vulnerability. Stress was measured with the Perceived Stress Scale.[29] Coefficient alpha for college samples and participants in a smoking cessation program was .85 to .86, and strong correlations with symptomology (.52 to .76) were found. The 14 items were rated on a 7-point scale anchored by never (1) and always (7). At Wave 2, participants reported stress since their previous interview.

Psychological abuse by women's partners was reported at Wave 2. Marshall's[26] Subtle and Overt Psychological Abuse Scale was utilized. Many psychologically abusive acts may be perpetrated lovingly, in a playful manner, or in a more overt or aggressive manner.[30] These acts or comments can be obvious and overt (eg, name calling) or subtle (manipulation). Higher means for 65 items rated on a scale anchored by never (0) and almost daily (9) indicated abuse.

The Severity of Violence Against Women Scale (SVAWS)[31] was utilized. This measure was developed with college and community samples of women. Only the 21 violence items were used. The subjective frequency of violence during partici-

pants' entire relationship (history of violence) was assessed at Wave 1 using a scale anchored by never (0) and a great many times (5). At Wave 2, women reported their partners' recent violence (between the interviews) on a response scale ranging from never (0) to almost daily (9). More severe violence cannot be assumed from higher means.

Barriers

In addition to income and insurance, the remaining indicators consisted of barriers perceived to interfere with health care. At Wave 1, participants described reasons women have for not taking care of their health and seeking health care. These responses were used to develop 29 items for Wave 2, which were rated on a 7-point scale (not at all to extremely much) for how much each potential barrier influenced them. A principal component factor analysis with orthogonal rotation resulted in 6 factors with an eigenvalue greater than 1. In an iterative process, 7 items that loaded high on 2 factors were dropped, as were items with a primary loading less than .45. Six scales corresponded to the factors with higher means indicating more influence by each barrier. Internal consistency was .87 for uncertainty, .79 for external hassles, .82 for expense, .73 for fatalism, .66 for partner discouragement, and .72 for time constraints. The items for each scale are listed in Appendix A.

Illness Level

There were 3 indicators for Illness. First, 3 items used a 7-point response scale. Women rated their physical health and well being (extremely bad to extremely good), their current physical health and well being compared to one year ago (very much worse to very much better), and how happy (extremely unhappy to extremely happy) they had been about their physical health and well being since their first interview. The mean of these 3 items was perceived health status.

The health attitudes indicator was a subscale developed by Ware and Sherbourne,[32] and validated by Wu et al.[33] Eleven items assessed how often women felt ill, discouraged or worried about their health, pleased with their health, susceptible to illness, or healthy. The response scale was anchored by never (1) and almost always (7). A higher mean indicated more negative perceptions about their own health.

Finally, physical symptoms were measured using the 12-item somatization subscale (eg, headaches, faintness, pains in heart or chest, soreness of muscles) of the Hopkins Symptom Checklist.[34] This measure, or variations of it (eg, SCL-90R), has been widely used with normal populations across various socioeconomic strata. In the original sample, internal consistency for somatization was .87. The items were rated on a scale ranging from not at all (0) to a great deal (4), indicating how bothered women were by each type of symptom during the previous month. The mean of these items was used.

ANALYSIS

Structural equation modeling (SEM) is an *a priori* statistical technique used to test a theory depicted as a path model. It is often considered to be confirmatory because the model is provided before analysis and whether or not it is supported by the data is confirmed.[35] SEM, a combination of factor analysis and path analysis, allows for the simultaneous testing of various relationships, and allows testing at a higher level of abstraction by differentiating latent and observed variables, taking measurement error into account.

SEM requires reasonably large samples. Samples of 100–200 are medium sized and samples with more than 200 participants are considered large. The generalized likelihood ratio (G^2) is interpreted as a chi-square (χ^2) statistic with degrees of freedom equal to the difference between the number of observations and parameters.[35] In model testing, a nonsignificant chi-square is desired, indicating the model fits the data well, resulting in predictors of utilization. In a large sample, the χ^2 statistic may be significant, although differences between the observed and model-implied covariances are slight. To reduce this sensitivity to sample size, the χ^2 value is divided by the degrees of freedom, with a value of 3 or less considered acceptable.[35]

There are 3 important preliminary steps. First, the indicators must be examined for normality. Scores were considered outliers if the value exceeded 4 standard deviations from the mean. Participants were dropped as a result of outlying scores, or were reassigned the score that was 4 standard deviations above the mean (ie, the cutoff).

The indicators of violence (recent and historical) and utilization (physician and health service) were critical for the analyses. Extreme scores

on violence and utilization reflect the reality of these women's lives. Therefore, any score determined to be an outlier on these indicators was transformed to the 4 standard deviation cutoff. Outliers on other measures were dropped. Five African Americans, 6 Euro-Americans, and 4 Mexican Americans were excluded due to extreme scores. All remaining outliers were dropped for the least important indicators (ie, education, income, perceived stress, and partner discouragement).

Second, the possibility of multicollinearity must be addressed. Multivariate normality meets the assumptions that all univariate distributions are normal, the joint distribution of any combination of variables is normal, and all bivariate scatterplots are linear and homoscedastic. Multicollinearity occurs when inter-correlation among variables is high. In SEM, multicollinearity is a problem if indicators of the same construct correlate at .85, or indicators of different constructs correlate at .90.[35] Correlation matrices indicated multicollinearity was not a problem for the sample or any of the ethnic groups.

After these steps, measurement models for each construct are developed. Confirmatory Factor Analyses (CFA) were used. The indicators for each latent variable (psychosocial vulnerability, illness level, demographic predisposing, enabling) were submitted to factor analyses to ensure that only one construct is addressed by the indicators. Indicators were dropped if loadings were less than .45, or if error was higher than .80.

Model goodness of fit was tested by the Bentler Comparative Fit Index (CFI).[36] The value of the CFI indicates the proportion of improvement for the overall fit of the proposed model relative to the null model. Values of .90 on the CFI are considered good, and a value of 1, though rare, would be excellent. For example, if the CFI value equals .90, then the fit of the proposed model is 90% better than the null model. Second, the Root Mean Square Residual (RMSR) increases as the average discrepancy between the observed and predicted covariances increase. A value of 0 would indicate a perfect fit between the data and the model. An acceptable fit is a RMSR value below .10. EQS software[36] was utilized to analyze the data using the maximum likelihood estimation method. Ethnicity was modeled as a moderator variable to test for differing models of utilization for the 3 ethnic groups. Hence, 3 separate models were generated and tested for goodness-of-fit to represent each ethnic group.

Experts agree a necessary step is to modify models[35,37–40] until acceptable goodness-of-fit indices are achieved. Although statistical procedures are used to suggest modifications of the proposed model, no changes should be tested unless they are in accord with theory and/or past research. For these purposes, the Lagrange Multiplier (LM) and the Wald statistic were utilized to allow for model trimming and building within theoretical constraints. LM suggests paths to be added. This index approximates the amount by which the model's overall χ^2 would decrease with the additional path (ie, if a parameter were freely estimated). The Wald statistic estimates the amount the model's overall χ^2 would decrease if a path was dropped from the model (ie, if a particular free parameter were fixed to 0). The simplest form of the models was tested first. If they had a poor fit, suggested modifications were considered.

RESULTS

First, the data were examined by comparing the groups. Multivariate analyses of variance (MANOVAs) were conducted to examine ethnic differences on the 4 constructs. The means are listed in Table 1. African Americans, Euro-Americans, and Mexican Americans did not significantly differ on any indicator of psychosocial vulnerability, $F(8, 1382) = 1.07$. The groups differed on demographic predisposing, $F(4, 1352) = 16.67$, $P<.001$, with a univariate difference on education, $F(2, 676) = 27.58$, $P<.001$. The third construct, barriers, was significant, $F(12, 1380) = 3.14$, $P<.001$, with univariate differences on poverty status, $F(2,676) = 4.36$, $P<.02$; expense, $F(2, 694) = 9.23$, $P<.001$; and time constraints, $F(2, 694) = 7.23$, $P<.001$. The proportion of women with health insurance did not differ in the 3 groups, $\chi^2(2) = 3.95$. There were also differences on illness, $F(6, 1386) = 3.07$, $P<.005$, with univariate differences on health attitudes, $F(2, 694) = 8.86$, $P<.001$, and physical health status, $F(2, 694) = 6.96$, $P<.001$. Finally, there were no differences in healthcare utilization for the 3 ethnic groups, $F(4, 1378) = 2.07$, $P=.08$.

Confirmatory Factor Analysis (CFA) was used for measurement modeling. Requirements for fit in-

Table 1. Descriptive statistics for African Americans, Euro-Americans, and Mexican Americans

	African Americans		Euro-Americans		Mexican Americans	
	M	(SD)	M	(SD)	M	(SD)
Psychological vulnerabilities						
Perceived stress	4.19	(.83)	4.24	(.62)	4.10	(.84)
Psychological abuse	2.33	(2.33)	2.33	(2.27)	2.09	(2.33)
History of violence	7.89	(2.39)	7.73	(2.11)	6.11	(10.08)
Recent violence	.38	(.59)	.37	(.58)	.29	(.48)
Demographic predisposing¶						
Age	33.63	(7.40)	33.85	(7.64)	31.94	(7.87)
Education	12.56*†‡	(1.70)	12.11*†‡	(2.11)	11.31*†‡	(1.99)
Barriers¶						
Income, % of poverty	97.90†	(62.88)	113.48†	(58.71)	109.36†	(48.57)
Insurance	3.62	(2.17)	4.19	(1.99)	3.79	(2.07)
Uncertainty	2.49	(1.64)	2.68	(1.56)	2.74	(1.71)
External hassles	2.46	(1.59)	2.70	(1.53)	2.52	(1.51)
Expense	3.30†	(2.02)	4.09†	(2.20)	3.46†	(2.02)
Fatalism	2.22	(1.28)	2.19	(.96)	2.45	(1.19)
Partner discouragement	1.43	(.95)	1.39	(.91)	1.58	(1.08)
Time constraints	3.92*	(2.04)	4.56*	(1.73)	4.39*	(1.77)
Illness‖						
Health status	4.82*	(1.42)	4.32*	(1.31)	4.58	(1.39)
Health attitude	3.70*	(.91)	3.60*	(.71)	3.64*	(.89)
Symptoms	.92	(.86)	1.05	(.76)	.97	(.81)
Utilization						
Physician visits	5.72	(7.60)	7.61	(14.29)	5.57	(8.49)
Health care visits	4.60	(6.56)	5.43	(8.13)	3.80	(5.69)

§ Significant difference at $P<.05$.
‖ $P<.01$.
¶ $P<.001$.
† Means sharing a symbol (*, †, ‡) were significantly different.

dices are outlined in detail in Kline.[35] CFA was calculated on the 4 indicators for psychosocial vulnerability, illness, demographic predisposing, and barrier constructs separately for each of the 3 ethnic groups. Measurement modeling was first conducted for African Americans. These analyses indicated the models fit the data poorly for the psychosocial vulnerability, χ^2 (8) = 34.51, P=.001, barriers, χ^2 (34) = 786.07, P=.001, and illness χ^2 (4) = 14.89, P=.005, measurement models. The demographic predisposing model was a good fit, χ^2 (1) = .84, P=.36. However, this construct was dropped due to a low loading (.25) and high error (.97) for education. Comparative fit indices were greater than .90, for all measurement models except barriers, which was dropped due to a poor fit with the data (CFI = .00). For psychosocial vulnerability, perceived stress was dropped as an indicator due to a low loading (.33) and high error term (.95). Illness was retained due to good fit indices (CFI = .97). Thus, utilization among African Americans was tested using psychosocial vulnerability and illness constructs. With these revisions, the model in Figure 1 was tested with this group.

The initial model was significantly different from the data, χ^2 (11) = 24, P=.01; however, when adjusted for sample size (χ^2/df), the model fit was acceptable at 2.18. The Comparative Fit Index suggested a match (CFI = .98). Multivariate kurtosis indicated by the Mardia's Kappa coefficient was 69.81. The robust analyses resulted in an improvement in fit, χ^2 (11) = 13.57, P=.26 (CFI = .99, RMSR = .86). There were no recommended modifications for this model. Illness fully mediated the effect of psychosocial vulnerability on utilization. The final model shown in Figure 2 accounted for 19% of variance in utilization among African-American women.

Measurement modeling for Euro-Americans was performed

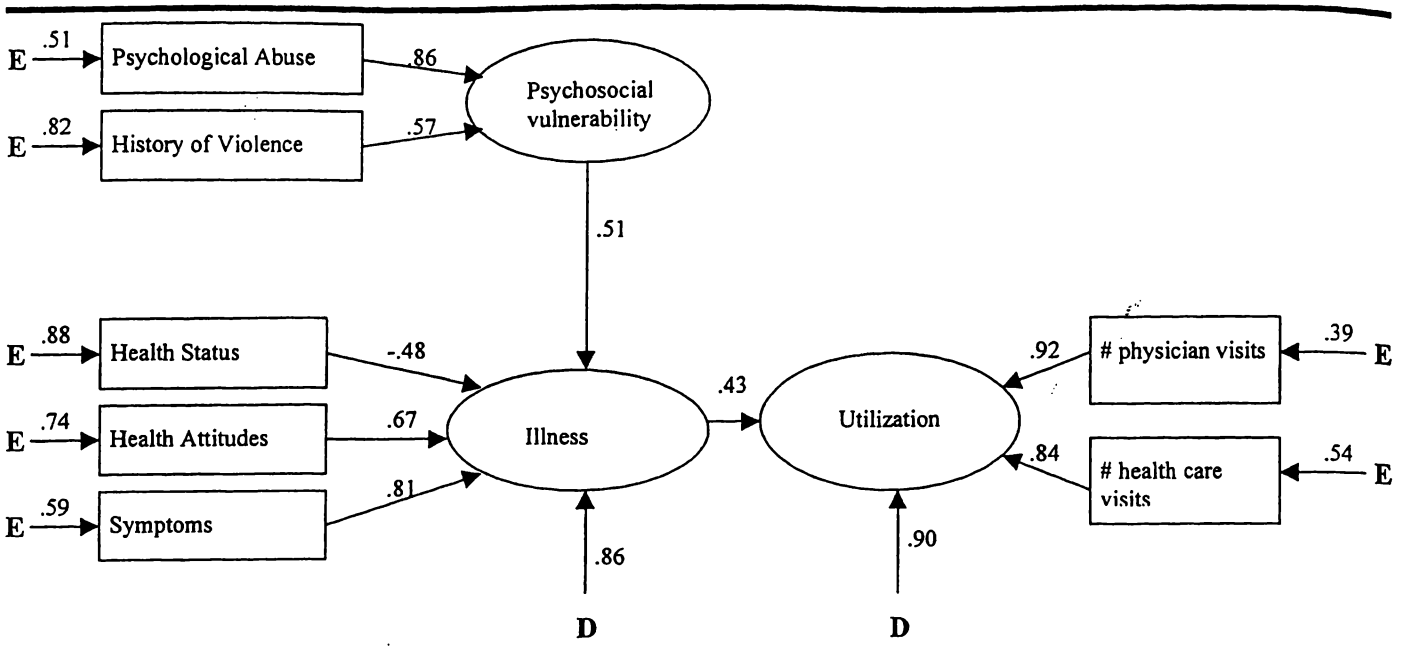

Fig 2. Final utilization model for African Americans

next. The psychosocial vulnerability, χ^2 (8) = 8.10, P=.42, and illness, χ^2 (4) = 4.88, P=.30, measurement models fit the data well. The demographic predisposing, χ^2 (1) = 12.98, P=.001, and barriers, χ^2 (18) = 58.22, P=.001, measurement models did not fit the data. All CFI scores were greater than .90 except that for barriers (.89). Demographic predisposing indicators had loadings of 0 and high error (1.00). All barrier indicators also had low loadings (<.48) and high error (>.81). Thus, only psychosocial vulnerability and illness could be retained for Euro-Americans.

The initial model had a good fit (CFI = .96), despite significantly differing from the data, χ^2 (25) = 40.82, P=.02. The model was acceptable when adjusted for sample size (χ^2/df = 1.63). Multivariate kurtosis was high (Mardia's Kappa = 132.33). The robust analyses resulted in an improvement in fit, χ^2 (25) = 34.13, P=.11 (CFI = .97, RMSR = 4.02). No modifications to the model were suggested. Illness fully mediated psychosocial vulnerability, but only 4% of the variance in utilization was accounted for by the final model shown in Figure 3.

Finally, measurement modeling was conducted for Mexican Americans. The psychosocial vulnerability measurement model significantly differed from the data, χ^2 (8) = 25.52, P=.001, but had a good fit with the data (CFI = .93). The barriers, χ^2 (18) = 14.56, P=.69, measurement model indicated a good fit following removal of income and insurance due to low loadings (<.20) and high error (>.98). The illness, χ^2 (4) = 6.36, P=.17, measurement model fit the data well. The demographic predisposing indices of age and education differed significantly from the data, χ^2 (1) = 4.26, P=.04, and had low loadings (.22, −.38) with high error terms (.98, .92) despite a good fit with the data (CFI = .97). Therefore, this construct was dropped. The remaining constructs (psychosocial vulnerability, barriers, and illness) had CFI scores greater than .90 for the measurement models.

The results were quite different for Mexican-American women, χ^2 (59) = 162.78, P=.001, (CFI = .89). The LM test indicated that a path from psychosocial predisposing to enabling should be added. When incorporated into the model, the χ^2 remained significant, χ^2 (59) = 135.38, P=.001. However, when adjusted for sample size, the model fit was acceptable (χ^2/df = 2.29; CFI ≐ .92). A robust estimation technique, used due to high multivariate kurtosis (Mardia's Kappa = 97.25), resulted in a minimal improvement in fit, χ^2 (59) = 91.24, P = .004 when adjusted for sample size (χ^2/df = 1.55; CFI = .95, RMSR = .96). The model in Figure 4 accounted for 27% of the variance in utilization. The effects of psychosocial vulnerability on utilization

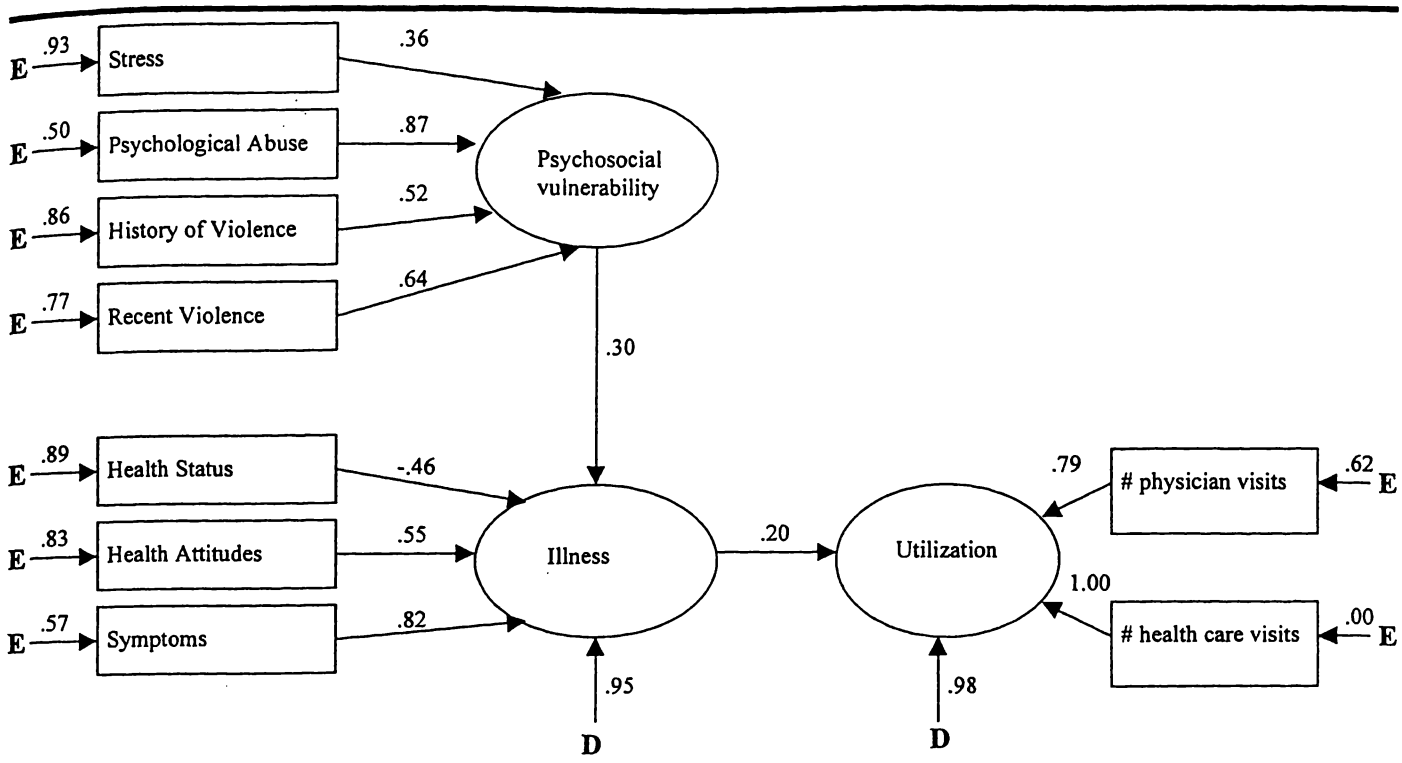

Fig 3. Final utilization model for Euro-Americans

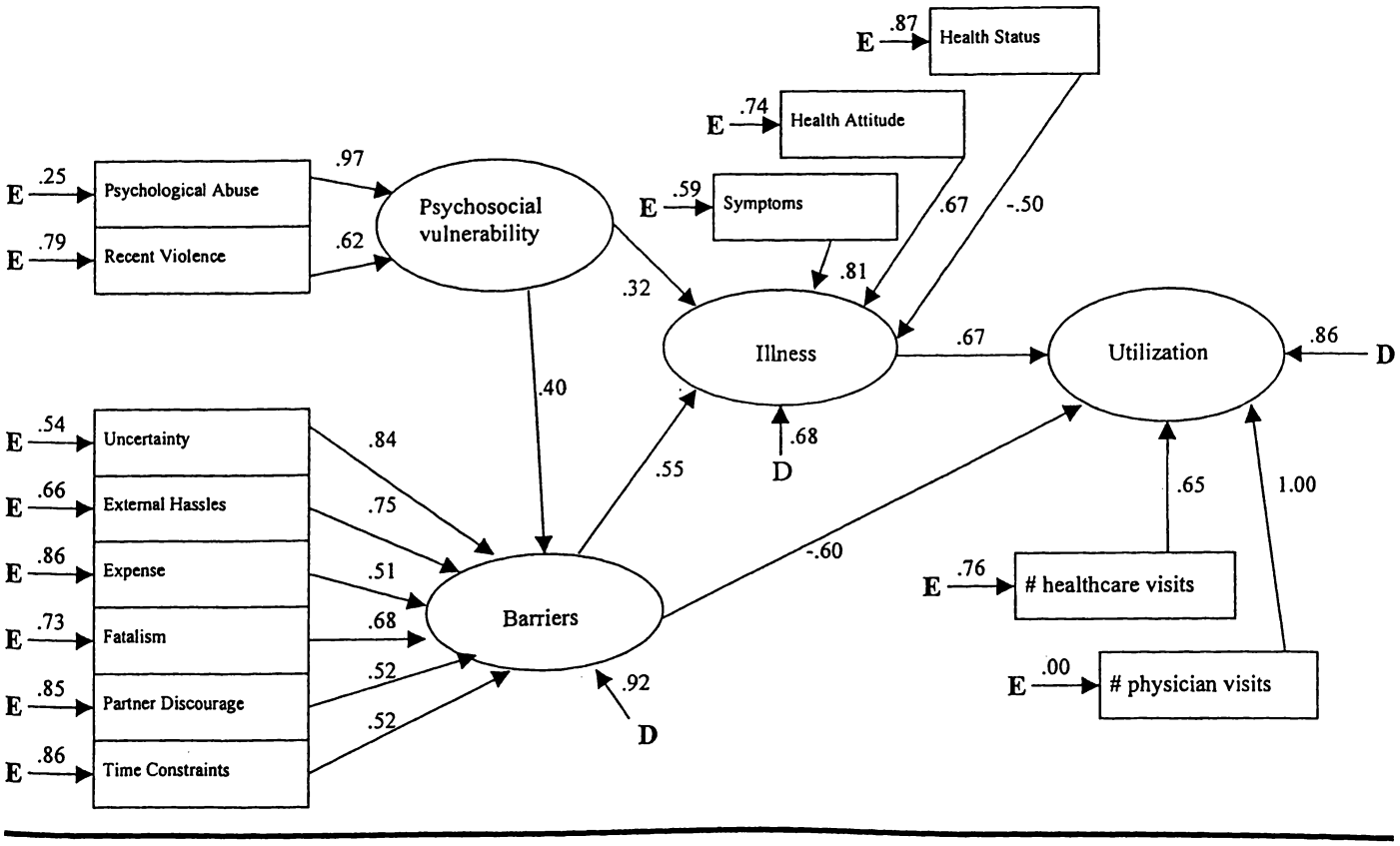

Fig 4. Final utilization model for Mexican Americans

This study extended previous research by showing the importance of psychosocial vulnerabilities in the behavioral model for healthcare utilization for vulnerable populations.[1]

were completely mediated by illness and barriers with both illness and barriers directly affecting utilization.

DISCUSSION

This study extended previous research by showing the importance of psychosocial vulnerabilities in the behavioral model for healthcare utilization for vulnerable populations.[1] Support for the inclusion of psychosocial vulnerability in the model was evident when this construct was important in all 3 final models. By including only low-income women in this sample, the typical confound of socioeconomic status and ethnicity was eliminated to obtain a more accurate view of the role of ethnicity in moderating healthcare utilization.

The size of this sample allowed the proposed model to be tested with each ethnic group. Testing one robust model across groups would not have adequately represented any ethnic group. Further, the resulting composite would not have allowed for recognition of the similarities between the models for African Americans and Euro-Americans, nor would the very different model for Mexican Americans have been evident.

For African-American and Euro-American women, illness fully mediated effects of psychosocial vulnerability. Neither demographic predisposing, nor barrier constructs were of importance to predict their use of health services. For African Americans, partners' psychological abuse and history of violence were important. These indicators were also important for Euro-Americans but so were perceived stress and recent violence. Other than this difference, the indicators related similarly to the constructs in these groups. However, the final model accounted for much less of Euro-American's utilization. Thus, this extension of Gelberg, Andersen, and Leake's[1] model was least effective in predicting healthcare utilization for Euro-American, low-income women.

For Mexican Americans, the final model was quite different. Both illness and barriers mediated psychosocial vulnerability with direct effects on utilization. Barriers were partially mediated by illness. In this group, the psychosocial vulnerability construct was comprised of psychological abuse and recent rather than a history of physical violence. The final model for this group was superior to the others, accounting for 27% of the variance in utilization.

It should be noted that all but 10 Mexican-American participants were native to the United States. The 10 who were not native were educated in the United States; therefore, the differences between Mexican Americans and the other groups are not likely to be due to acculturation. Other cultural differences between the 3 ethnic groups likely create varying predispositions for healthcare utilization. The final models in this study suggest that it should not be assumed that minorities are a homogeneous group.

Surprisingly, barriers were only important in the model for Mexican Americans, although they had been developed through the entire sample. It could be that African Americans and Euro-Americans simply do not allow these factors to interfere with needed healthcare visits. It must also be noted that the items were initially meant to measure the extent to which women take care of their health, not only their healthcare utilization. However, examination of the items in the appendix show that the final scales were weighted toward utilization of services. Finding that these barriers were relevant only for Mexican-American women corresponds with previous research comparing Mexican Americans, African Americans, and Euro-Americans. For example, one study showed that twice as many Mexican Americans (32%) were dissatisfied with the time they had to wait to get an appointment as the population as a whole (16%).[10] The final models imply that policies should be instituted to remove these types of barriers to improve the likelihood of Mexican-American women seeking health care; however, this type of attention is unnecessary for African Americans and Euro-Americans.

Research often compares minority groups with Euro-Americans, assuming similarities across different minority groups as we did with the

MANOVAs. There were relatively few differences between the 3 ethnic groups on the indicators. There were no differences in either rates of utilization for the 3 groups or insurance status. There were differences on education, with African Americans reporting the most education and Mexican Americans reporting the least. Interestingly, there were also differences on health attitudes and perceived health status. African Americans reported their health status to be worse than both Mexican Americans and Euro-Americans, respectively. This implies that, although all 3 groups use healthcare services at approximately the same rate, they do not perceive their health to be the same. Clearly these few ethnic differences cannot account for the differences in the final models. Other cultural differences may be involved.

Illness indicators made similar contributions to the construct in all groups. However, the impact of illness on utilization ranged from relatively minor (.20) for Euro-Americans to very important for Mexican Americans (.67). Thus, illness (symptoms, perceived health status) has a greater impact on whether or not Mexican Americans seek health care. This pattern was somewhat at odds with research based primarily on Euro-Americans, which has shown a strong relationship between symptoms and utilization.[41] This relationship was significant, but weak for Euro-Americans, leaving a large proportion of the variance unaccounted for. Clearly, there are unexamined factors, one of which may be use of alternatives to traditional health services utilization by Euro-Americans.

Illness mediated the effect of psychosocial vulnerability on utilization, which is in accordance with research showing that partner violence increases symptoms.[19,20] This study supported previous findings, with the association between psychosocial vulnerability and illness, but psychological abuse was the only psychosocial vulnerability indicator consistent in all 3 models. Thus, aspects of the previous findings could be due to psychological abuse rather than the violence to which it has been attributed. The importance of subtle and overt psychological abuse was also evidenced by this indicator, which had the strongest loading in all 3 groups, thus, supporting Marshall's[25,30] contention that emotional abuse does not have to be overt, obvious, and controlling to be harmful to women. This does not discount the importance of partner violence, which was important in all 3 models. What differed was that a history of violence was important for African Americans, but only recent acts were relevant for Mexican Americans. Both indicators were important for Euro-Americans. Again, women of varying ethnic backgrounds were differentially affected.

Despite these differences, there is one clear implication for health care from all 3 models. Healthcare providers should routinely screen for the presence of partner abuse. Although abuse may not have a direct effect on women's decisions to seek health care, due to its prevalence, it may exacerbate symptoms in many patients. If physicians and other healthcare providers would routinely address abuse with women, and provide information on resources to alleviate the abuse, women's health would likely improve.

This study had several limitations. Both demographic predisposing indicators had restriction of range. Had this study included older women, age may have been a significant indicator. Most women were within 2 standard deviations from the mean on education. Including more women with advanced education may have demonstrated the association found in other studies.[42] Although socioeconomic status was also restricted, this allowed ethnicity to be addressed without the confound of income that is often evident in the literature. Including individuals in higher socioeconomic strata across all 3 ethnic groups may produce interesting findings for income as a predictor of utilization.

The results of this study should be generalized only with caution. On the one hand, the sample was representative. Honeycutt, Weston, and Marshall[27] compared the sample to data from the US Census Bureau for this metropolitan area. With a few exceptions (eg, higher education, less likely to work) that would be expected from volunteers for a longitudinal study, the sample was similar to the 1990 US Census and the 1995 American Household Survey. On the other hand, extreme scores were omitted to meet the statistical normality requirements. Yet, to analyze healthcare utilization in a manner that is truly representative of the population, extreme rates need to be considered. This study compromised competing requirements for normality and generalization by reducing outlying scores. This procedure allowed the inclusion of individuals reporting higher levels of

violence and medical use, while decreasing the impact of their extreme scores.

Another limitation related to generalizability is that this study included primarily young women who were all in heterosexual relationships. Findings may differ for older women. Patterns for healthcare utilization and strength of healthcare indicators may also differ for women who are either not in a long-term relationship or are in a homosexual relationship.

One problem with this study was the overlap between the 2 indicators of utilization, which were highly correlated, although this is less problematic with SEM than with other methods. Women may have included one visit when answering both questions. An important improvement would be the incorporation of screening and preventative care which could result in a path from utilization to illness as conditions or symptoms are diagnosed, or by creating a change in health attitudes. Both types of visits also included inpatient and outpatient utilization. Further studies should include separate measures for inpatient and outpatient utilization to address issues of lack of care (ie, emergency room services) vs poor access to care (ie, outpatient visits and preventative care). Due to the nature of the utilization outcome variables in this study, it cannot be concluded whether policy should specifically emphasize access or lack of care for any of the 3 ethnic groups.

Several other implications for healthcare interventions can be extrapolated from these findings. First, policies need to address the importance of the assessment of not only domestic violence, but of psychological abuse as well. Psychological abuse, which can often be subtle, was an important predictor for all 3 ethnic groups. Healthcare professionals need to be trained to recognize this abuse and to be aware of resources to assist these women. Second, healthcare policy needs to recognize not only the ethnic disparities in illness and healthcare utilization, but also the need for interventions tailored to the specific needs of a group. Too often minorities are assumed to be similar in needs. The results demonstrated that this is not the case. Low-income, African-American women present with different patterns for healthcare utilization than do Mexican-American women.

As noted, barriers to utilization need to be addressed for Mexican-American women to assist them in accessing healthcare resources. In particular, uncertainty, external hassles, and expense should be addressed. Uncertainty entails not knowing what symptoms to be aware of, not knowing what prevention and screening programs are available, and not knowing how to communicate health concerns to healthcare professionals. Public health programs and community clinics are often excellent resources for health education to the community. Based on the findings in this study, these programs should target low-income Mexican-American women. External hassles and expense can also be alleviated by the development of healthcare clinics that are sensitive to the needs of low-income women, who often lack insurance, child care, and transportation.

In conclusion, this study successfully extended the Vulnerability Model[1] describing utilization for low-income African-American, Euro-American, and Mexican-American women. Future studies are needed to build on these findings to continue to define healthcare patterns in order to develop ethnically appropriate, effective interventions. These interventions will then need to be examined to determine whether or not they improve access to health care and improve healthcare outcomes.

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APPENDIX A

Perceived Barriers

The following are reasons women have for not taking caring of their health. How much does each reason affect your ability to take care of yourself?

1	2	3	4	5	6	7
Not at all						Extremely much

How much is it because . . .

Uncertainty
____ you're afraid of the results
____ you don't know how to talk about your concerns
____ you don't know what the problem is
____ you don't know what you should do
____ you don't know whether the problem is serious or not

External hassles
____ you don't like the way you're treated
____ it takes too much time
____ the hassle of getting treated, like the waiting time or rules
____ places you could afford don't treat you right

Expense
____ it costs too much to go to a doctor
____ no insurance
____ you couldn't afford it if you needed more treatment or medicine

Fatalism
____ it won't matter anyway
____ you're just too lazy
____ your health is okay, you don't need to do anything
____ never think about it
____ you don't care about yourself enough
____ you just don't get around to it

Partner discouragement
____ your partner won't let you
____ your partner discourages you

Time constraints
____ you put others first
____ you're too busy, have no time