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# Inadequate Health Numeracy Affects Cancer Screening Practices in Vulnerable Populations

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## Abstract:

### Introduction:

The relationship of health numeracy (HN), an element of health literacy, to cancer screening practices remains unclear. In response, this study aims to answer two questions: 1) Is HN associated with colorectal cancer screening (CRCS) and Cervical Cancer Screening (CVCS)? 2) Do these associations vary across joint categories of race/ethnicity, gender, and educational level?

### Methods:

This study used the Health Information National Trends Survey (HINTS 2007), a nationally representative survey of American adults (n= 7264). CRCS and CVCS were dichotomous variables (1 = adherence to age-specific guidelines; 2 = non-adherence). HN was also dichotomous (1= very easy/easy to understand medical statistics; 2= difficult/very difficult). Contingency table methods using PASW 18.0, generated odds ratios (OR) with 95% confidence intervals (95% CI). Unweighted analyses are reported.

### Results:

Inadequate HN (or IHN; HN code =1) was associated with CRCS non-adherence (OR=1.13; 95% CI [1.01,1.27]). In subgroup analysis, this association persisted only among Hispanic males with less than a high-school (HS) education (OR=3.10; 95% CI [1.01,9.48]). IHN was globally associated with CVCS (OR=1.39 95% CI [1.20,1.60]); this association persisted only among Whites (females) with less than a HS education (OR=1.48; 95% CI[1.14,1.92]).

### Conclusion:

Preliminary analyses suggest that IHN influences cancer screening non-adherence, particularly among certain population subgroups. Ideally, these subgroups would receive interventions designed to raise HN, ultimately leading to earlier cancer detection.

## Introduction:

- The relationship of health numeracy (HN), an element of health literacy, to cancer screening practices remains unclear.
- The influences of race/ethnicity and educational level on cancer screening practices, however, are well established.
- Examining the joint influence of HN, race/ethnicity, and education could add valuable insight.

### Research Question #1:

- Does the association between inadequate health numeracy (IHN) and colorectal cancer (CRC) screening non-adherence vary across joint categories of race/ethnicity and education?

### Research Question #2:

- Does the association between IHN and cervical cancer (CVC) screening non-adherence vary across joint categories of race/ethnicity and education?

## Methods:

- Data source: Health Information National Trends Survey (HINTS 2007)
- Eligible population: Those without history of cancer (n=3442)
- Dependent variables:
  - CRC adherence to guidelines (1=yes, 2=no).
  - CVC adherence to guidelines (1=yes, 2=no).
- Independent variable: IHN
  - Comfort with medical statistics (1=yes, 2=no).
- Effect modifiers:
  - Race/ethnicity (1=White, 2=Black, 3=Hispanic)
  - Education level (1=Less than or equal to HS, 2=More than HS)
- Statistical analysis:
  - Analyses of valid cases included stratified crude and age-adjusted odds ratios (OR) with 95% confidence intervals (95% CI).
  - Analyses were unweighted and executed using SPSS 15.0 and PASW 18.0 (SPSS, Inc, Chicago, IL).

## Results:

Table 1. Overall and Subgroup Age-Adjusted Odds Ratios of CRC Screening Non-Adherence, HINTS 2007.

Non-Adherence to Colorectal Cancer Screening	N	Age-Adjusted Odds Ratio (95% Confidence Interval)	
		Overall	Subgroup
<b>Hispanics</b>			
≤HS Education			
IHN	89	2.62 [1.65,4.18]*	3.28 [1.54,6.99]*
AHN	44	0.77 [0.41,1.47]	1.00
>HS Education			
IHN	37	1.45 [0.74,2.84]	1.67 [0.70,3.91]
AHN	64	0.97 [0.58,1.61]	1.00
<b>Blacks</b>			
≤HS Education			
IHN	78	2.68 [1.64,4.39]*	1.27 [0.68,2.39]
AHN	92	2.00 [1.29,3.12]*	1.00
>HS Education			
IHN	69	1.11 [0.67,1.81]	0.95 [0.11,1.78]
AHN	143	1.07 [0.75,1.52]	1.00
<b>Whites</b>			
≤HS Education			
IHN	522	1.65 [1.33,2.04]*	1.11 [0.86,1.44]
AHN	501	1.45 [1.17,1.80]*	1.00
>HS Education			
IHN	655	1.06 [0.87,1.28]	1.06 [0.87,1.28]
AHN	1393	1.00	1.00

\* Significantly different from 1.0

Figure 1. Age-Adjusted Odds Ratios of Inadequate Health Numeracy on CRC Screening Non Adherence, Subgroup Comparisons (HINTS 2007)

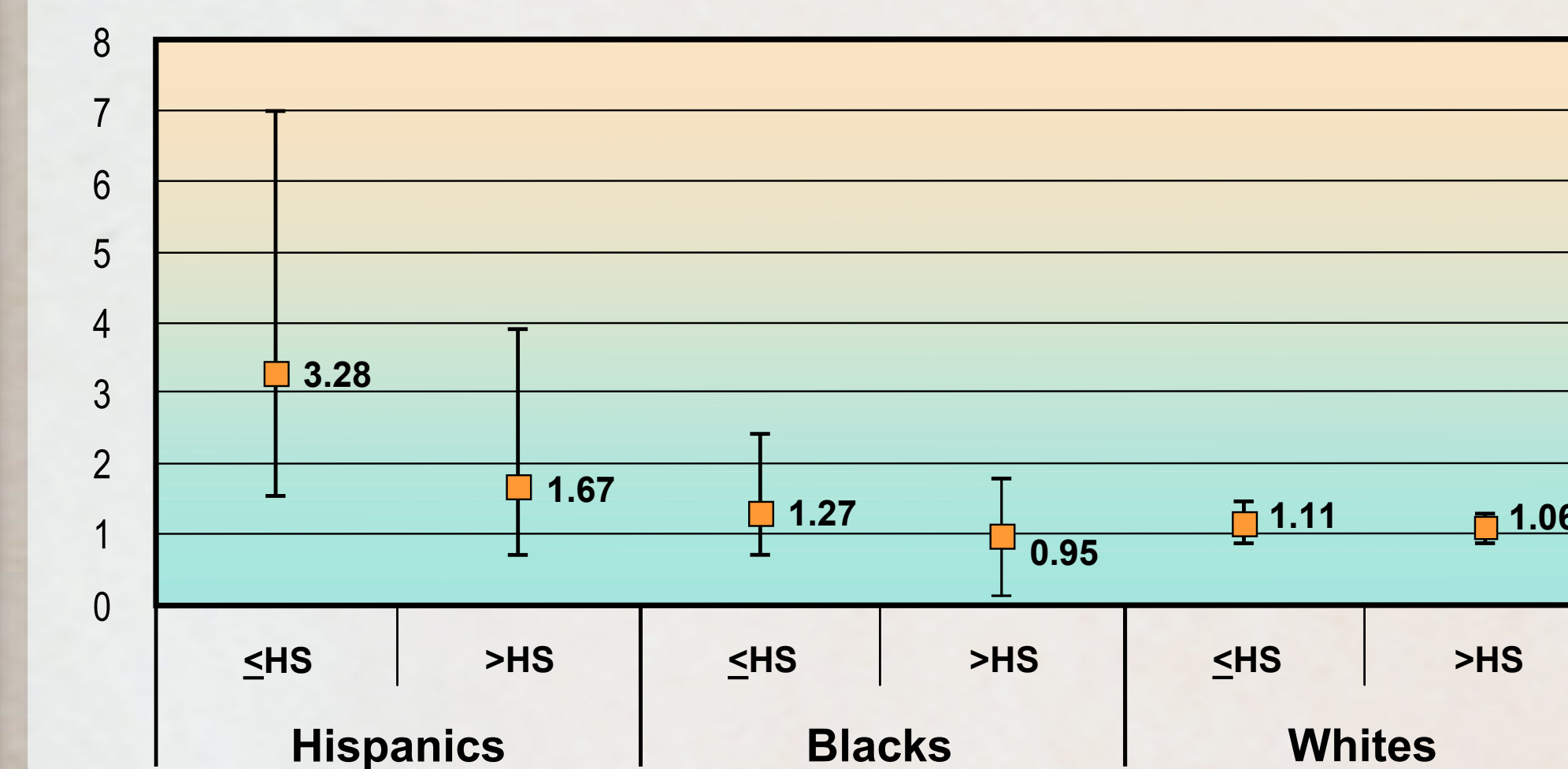
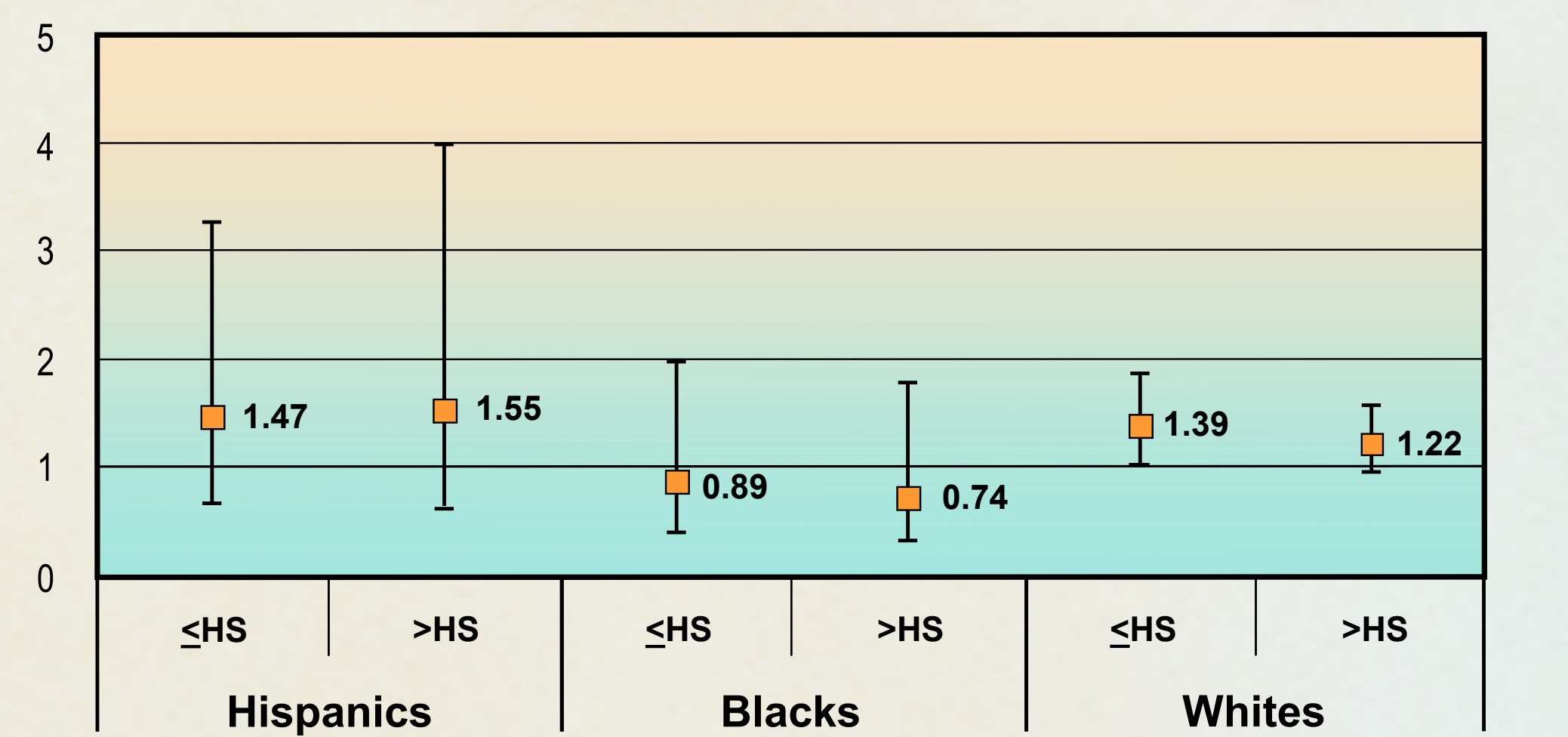


Table 2. Overall and Subgroup Age-Adjusted Odds Ratios of CVC Screening Non-Adherence, HINTS 2007.

Non-Adherence to Cervical Cancer Screening	N	Age-Adjusted Odds Ratio (95% Confidence Interval)	
		Overall	Subgroup
<b>Hispanics</b>			
≤HS Education			
IHN	98	1.30 [0.77,2.20]	1.47 [0.66,3.28]
AHN	82	1.07 [0.56,2.03]	1.00
>HS Education			
IHN	52	1.38 [0.65,2.91]	1.55 [0.61,3.97]
AHN	64	0.92 [0.49,1.73]	1.00
<b>Blacks</b>			
≤HS Education			
IHN	77	1.04 [0.57,1.88]	0.89 [0.40,1.98]
AHN	88	1.14 [0.65,2.00]	1.00
>HS Education			
IHN	70	0.70 [0.33,1.50]	0.74 [0.31,1.76]
AHN	172	0.95 [0.60,1.49]	1.00
<b>Whites</b>			
≤HS Education			
IHN	424	2.06 [1.59,2.67]*	1.39 [1.03,1.86]*
AHN	433	1.51 [1.16,1.97]*	1.00
>HS Education			
IHN	587	1.22 [0.95,1.58]	1.22 [0.95,1.58]
AHN	1258	1.00	1.00

\* Significantly different from 1.0

Figure 2. Age-Adjusted Odds Ratios of Inadequate Health Numeracy on CVC Screening Non-Adherence, Subgroup Comparisons (HINTS 2007)



## Conclusions:

- Preliminarily, IHN influences cancer screening non-adherence within certain population sub-groups.
- If current findings hold true, new pathways linking these variables have been discovered.

## Recommendation:

- Confirmatory analyses are needed, using other measures of HN available in HINTS, weighted data, and adjustment for other background variables besides age.