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Title: Effects of Acculturation on the Reporting of Depressive Symptoms among Hispanic Pregnant Women

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**Objectives:** To determine whether acculturation influences the responses to symptom items and the total scale scores by comparing those who completed the Center for Epidemiologic Studies Depression Scale (CES-D) in Spanish compared to those who completed it in English.

**Method:** The CES-D was administered to 395 Hispanic women during their 22-24 weeks pregnancy clinic visit. For the analysis, the sample was divided into two groups based on a subject's language preference of English or Spanish when completing the CES-D. Differential item functioning analysis was conducted to examine differences between the two groups in item responses on the 20 items on the CES-D.

**Results:** Reliability of the CES-D total score was .86 and .88 for the Spanish-speaking and English-speaking groups. None of the items of the Depressed Affect subscale showed differential item functioning. However,



July 21, 2006

Dear Dr. Dougherty:

I am submitting a manuscript “Effects of Acculturation on the Reporting of Depressive Symptoms among Hispanic Pregnant Women” to be reviewed for possible publication in your journal *Nursing Research*. This manuscript reports differences in item responses to depression symptoms among Hispanic pregnant women. In particular we examined how acculturation effect responses to the items on the Center for Epidemiological Study – Depression Scale. The results found that there is an acculturation bias on the CES-D scale which may lead to lower total depressive symptoms score for the non-acculturated Hispanic group.

This manuscript is not being reviewed by any other journal and this study had UTMB’s intuitional review board’s approval. All authors have made significant contribution to the manuscript.

If I can be of any assistance to you in answering any questions or concerns about this manuscript please feel free to contact me.

Sincerely,

Hoang T. Nguyen, Ph.D.

Assistant Professor  
UTMB School of Nursing

RUNNING HEAD: Effects of Acculturation

## **Effects of Acculturation on the Reporting of Depressive Symptoms among Hispanic Pregnant Women**

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**Keywords:** Acculturation, Depression, Hispanic, pregnancy, CES-D

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## Abstract

**Background:** Studies reporting a higher prevalence of depression in Mexican-Americans compared to Mexicans living in Mexico have noted difficulties in interpreting the results due to the inherent problem of bringing a translated instrument into a different culture from which it was originally designed.

**Objectives:** To determine whether acculturation influences the responses to symptom items and the total scale scores by comparing those who completed the Center for Epidemiologic Studies Depression Scale (CES-D) in Spanish compared to those who completed it in English.

**Method:** The CES-D was administered to 395 Hispanic women during their 22-24 weeks pregnancy clinic visit. For the analysis, the sample was divided into two groups based on a subject's language preference of English or Spanish when completing the CES-D. Differential item functioning analysis was conducted to examine differences between the two groups in item responses on the 20 items on the CES-D.

**Results:** Reliability of the CES-D total score was .86 and .88 for the Spanish-speaking and English-speaking groups. None of the items of the Depressed Affect subscale showed differential item functioning. However, differential item functioning was found in four out of the seven items in the Somatic Activity Subscale and in three out of the four items in the Positive Affect Subscale.

**Discussion:** The results suggest that even within a fairly homogenous Hispanic group of mostly Mexican-Americans, responses to the CES-D differed by acculturation. Respondents whose primary language preference was Spanish were less likely to endorse somatic symptoms but more likely to endorse the positive items than respondents whose primary language preference

- 1 was English. Depression screening in this population needs to account for acculturation
- 2 differences within the Hispanic group.

1  
2 Many studies have reported a higher prevalence of depression in Mexican-Americans  
3 when compared to Mexicans living in Mexico. The Center for Epidemiologic Studies Depression  
4 Scale (CES-D) in Spanish is a frequently used screening scale for depression with the Hispanic  
5 population. However, researchers and clinicians have noted difficulties in interpreting the results  
6 due to the inherent problem of bringing a translated instrument into a different culture from  
7 which it was originally designed. Therefore, the purpose of this study is to determine whether  
8 language as a proxy for acculturation influences the responses to symptom items and the total  
9 scale scores by comparing those who completed the CES-D in Spanish compared to those who  
10 completed it in English.

## 11 **Background**

12 The Mexican-American population is one of the largest ethnic groups in the United States  
13 (Heilemann, Frutos, Lee & Kury 2004), and more investigation is needed about this group's  
14 general mental health, in particular depression (Vega, et al. 1998). Nonetheless, the recent work  
15 of Escobar and colleagues (2000) has confirmed that place of birth is strongly associated with a  
16 life time diagnosis of major depression. Persons of Mexican descent born in the United States  
17 (US) demonstrate the highest prevalence rates while Mexican-born immigrants show the lowest.

18 Mental health studies have found differences in the prevalence of depression across  
19 ethnic groups within the Hispanic population. Recent studies by Vega et al (1998) found the  
20 prevalence of major depressive episode in U.S. born Mexican-Americans to be twice that of  
21 Mexican immigrants using the Composite International Diagnostic Interviews (CIDI). Lifetime  
22 prevalence for U.S. born Mexican-American women compared to female Mexican immigrants  
23 was 17.5% vs. 8.4%. Another study found that depression rates were similar between U.S.-born,

1 non-Hispanic, and Hispanic populations (Robins & Regler, 1991). Whether these prevalence  
2 rates represent real differences in population morbidity or the results of cultural differences in the  
3 conceptualization and expression of depressive symptoms are not known.

4         The prevalence of depression in Mexican Americans has caused health care providers to  
5 question the influence of depression on the morbidity of this ethnic group (Livingston, Seeman,  
6 Merrill, & Blazer, 1994; Vega et al., 1998). Regrettably, recent studies on depression in Latino  
7 groups and Mexican immigrants has been inconclusive on whether immigrant status is  
8 protective, especially for those from Mexico (Lara, Gamboa, Kahramanian, Morales, Bautisita,  
9 2005).

10         Of particular interest to health care providers is how maternal depression influences  
11 preterm birth (Orr & Miller, 1995; Orr, James & Prince, 2002). Despite country of origin,  
12 maternal depression has been shown to lower the mother's health-related quality of life and to  
13 have a negative impact on birth outcomes and the developmental stages of the child (Hart, Jones,  
14 Field, Lundy, 1999). It is for these reasons that screening for depression in pregnant women is  
15 important and widely advocated. However, the interpretation of the results for a Spanish version  
16 of an English screening instrument may need to be interpreted differently between those mothers  
17 who have been born in the US from those born in Mexico.

18         The Center for Epidemiological Study Depression Scale

19         The CES-D (Radloff, 1977) has frequently been used to screen for depression in the  
20 perinatal and postpartum period (Martinez-Schallmoser, Telleen, & MacMullen, 2003; Walker,  
21 Cooney, Riggs, 1999). The instrument consists of 20 items that asks about depressed affect,  
22 somatic activity, interpersonal interaction, and lack of positive affect. The instrument has been  
23 shown to have good reliability in a number of communities and across racial and ethnic groups

1 (Orr, James & Casper, 1992). However, the major challenge in using a translated, standardized  
2 instrument is its validity. The instrument may be biased for several reasons. The translated  
3 instrument may fail to capture the conceptualization of depression or fail to capture the entire  
4 domain of contents in the translated group. The *emic* or meaning behind the translated word may  
5 not be the same between the two groups. Social desirability or stigma may also play a role in  
6 how people respond.

7         The goal of this study is to examine whether acculturation (measured by a proxy of  
8 language preference) has an impact on responses to the CES-D items in a sample of pregnant  
9 Hispanic women. Item response theory provides a basis for identifying social or cultural bias on  
10 a test item. Differential item functioning (DIF) analysis is developed from item response theory  
11 and has been used extensively in the educational field to examine test bias on gender or minority  
12 status (Hambleton, Swaminathan, & Rogers, 1991). It is based on the assumption that a subject's  
13 performance on a test can be explained from a continuum of variation of a latent factor (such as  
14 depression), and that there exists an item characteristic curve linking the item performance to the  
15 continuum of variation. In education testing, the item characteristic curve shows the difficulty of  
16 the item in relationship to a person's knowledge of that topic. In mental health assessment, the  
17 item characteristic curve could represent the amount of depression a subject is experiencing in  
18 relationship to a person's conceptualization or knowledge of depression. Differential item  
19 functioning analysis presents a new way of testing whether a particular item is culturally biased  
20 and needs to be evaluated further.

## 21 **Methods**

22         Hispanic women who presented at their 22-24 weeks pregnancy clinic visits were  
23 recruited from community and university-based clinics in Texas using a study protocol approved

1 by the Institutional Review Board for Protection of Human Subjects. Table 1 shows the  
2 demographic characteristics of the sample. The mean age of the subjects was 24.3 (SD = 4.98).  
3 The youngest was 14-years-old and the oldest was 40.

4 Language preference in completing the CES-D is used as an indicator of acculturation.  
5 Language of preference has been shown to be a good proxy for acculturation (Burnam, 1987).  
6 Hispanic women who preferred Spanish were considered non-acculturated. Of the 395 Hispanic  
7 women who completed the CES-D, 176 women were identified as acculturated and 219 women  
8 as non-acculturated. The non-acculturated group was slightly older than the acculturated group  
9 ( $x = 25.9$ ,  $SD = 4.4$ ; vs.  $22.2$ ,  $SD = 4.8$ ,  $t = 8.03$ ,  $p < 0.001$ ). The mean length of time lived in the  
10 United States for the acculturated group and non-acculturated group was 21 years ( $SD = 6.2$ ) and  
11 5 years ( $SD = 3.4$ ), respectively, and for the entire sample was 12.1 years ( $SD = 9.3$ ).

12 All statistical analyses were conducted using Statistical Analysis Software version 9.1  
13 (SAS). Initial analysis examined the endorsement of CES-D items between acculturated  
14 respondents and non-acculturated respondents. The four-level response was recoded into a binary  
15 variable with zero as not endorsing an item and 1, 2, or 3 indicating positive endorsement.  
16 Descriptive statistics was used to generate the percent endorsement for an item, and significant  
17 differences ( $p < .05$ ) between the acculturated and non-acculturated groups were tested using  
18 Chi-square statistics.

19 Item means, standard deviation, and Cronbach alpha for the four subscales and the total  
20 score were generated to examine the reliability and construct validity of the measure in the study  
21 sample. These statistics were generated separately for the non-acculturated group and the  
22 acculturated group.

1 Differential item functioning analysis was conducted to evaluate acculturation bias in  
2 CES-D items. Zumbo (1999) recommended using logistic regression modeling as a method to  
3 examine differential item functioning. A detailed discussion of the theory and methods had been  
4 previously described (Zumbo). Briefly, the analysis strategy consisted of running three logistic  
5 regression models using a hierarchical sequential modeling strategy. A CES-D item was chosen  
6 as the dependent variable for all three models. The first model contained only the CES-D total  
7 score as the independent variable and served to define the effect of those with similar depression  
8 scores on the particular CES-D item. In DIF analysis terminology, the CES-D total score would  
9 be considered the conditioning variable. The second model examined the group differences in  
10 item response for those with similar depression score by adding the group variable to the first  
11 model. In essence, the second model tested for uniform differential item functioning. In the third  
12 model, the interaction term for total score by group was added, which tested simultaneously  
13 uniform and non-uniform differential item functioning. Differences in likelihood ratio chi-square  
14 between the first and second models provided a 1-degree of freedom chi-square test of  
15 significance for uniform DIF. Differences in chi-square values between the first and third models  
16 resulted in a 2-degree of freedom chi-square test of both uniform and non-uniform DIF  
17 simultaneously. The effect size was calculated by taking the difference in  $R^2$  between the first  
18 and second models and between the first and third models.

19

## 20 **Findings**

21 Table 2 shows the percentage of endorsement for all 20 CES-D items by the acculturated  
22 group and the non-acculturated group. Nine of the 20 items showed significant differences in  
23 endorsement between the two groups. Of the nine items with significant differences in

1 endorsement between the two groups, only one item (“20. I could not get going”) was endorsed  
2 more by the non-acculturated group than the acculturated group. The remaining eight items  
3 showed greater endorsement by the acculturated group than the non-acculturated group,  
4 suggesting that there may be group bias in these items. However, these item differences between  
5 the groups did not control for total CES-D score.

6 Differential item functioning analysis evaluates group differences in item response after  
7 controlling for the total score. Table 3 presents the uniform differential item functioning statistics  
8 for each item and the mean, SD, and reliability statistics. The items composing the Depressed  
9 Affect subscale and the Interpersonal subscale showed no differential item functioning between  
10 the acculturated group and the non-acculturated group. However, four of the seven items of the  
11 Somatic Activity Subscale showed significant uniform DIF, especially item 7 “I felt that  
12 everything I did was an effort.”

13 Table 4 presents the correlations between the items and the CES-D total scores. Items  
14 composing the Depressed Affect had the highest correlations to the total scores and were similar  
15 in both groups. Lowest correlations were found for items in the Positive Affect Subscale.  
16 Correlations between Somatic Activity Subscale items and the total CES-D scores in the non-  
17 acculturated group ranged from .43 to .50 compared to the acculturated group from .25 to .62.

## 18 **Discussion and Implications**

19 The primary goal of this study was to examine whether acculturation (defined as  
20 language preference) effects item responses to the CES-D. Item response patterns between the  
21 acculturated group and the non-acculturated group were examined using differential item  
22 functioning (DIF) analysis. The results showed most items in the Somatic Activity Subscale and  
23 the Positive Affect Subscale had uniform differential item functioning between these groups. The

1 non-acculturated Spanish-speaking group endorsed less Somatic Activity items but more Positive  
2 Affect items than the English-speaking acculturated group. No significant differential item  
3 functioning was found for items in the Negative Affect subscale or the Interpersonal Subscale,  
4 suggesting no group bias exists for these items.

5         Seven items showed differences between the acculturated group and the non-acculturated  
6 groups within this Hispanic sample. The items were “bothered,” “effort,” “sleep,” “get going,”  
7 “good,” “happy,” and “enjoyed.” The item with largest language effect was item 7 “I felt that  
8 everything I did was an effort,” suggesting that the acculturated group interpreted this item  
9 differently than the non-acculturated group. Other items in the Somatic Activity Subscale in  
10 which health care providers need to be aware of the acculturated effects are item 11 “my sleep  
11 was restless” and item 20 “I could not get going.” The non-acculturated Spanish-speaking  
12 Hispanic does not associate these symptoms with depressed mood in the same magnitude as the  
13 acculturated English-speaking Hispanic. In the Positive Affect subscale, all items showed  
14 differential responses between the two groups, except for item 8 “I feel hopeful about the  
15 future.” For those with the same CES-D scores, non-acculturated Hispanics tended to rate  
16 feeling good, happy, and enjoying life higher than their acculturated English-speaking  
17 counterparts. These results indicate acculturation has a differential effects on the item responses  
18 to the CES-D within the Hispanic group.

19         Several limitations in this study are worth mentioning. First, the CES-D is not a  
20 diagnostic instrument and therefore no diagnosis of depression can be made. Prevalence of major  
21 depression cannot be determined using only the CES-D. A diagnostic instrument or a clinical  
22 interview would have been required to determine the prevalence of depression in this sample.  
23         Second, the study’s cross-sectional design prevents any inference about changes due to

1 acculturation over time. Although the results showed an association between acculturation and  
2 response patterns, no causal link could be established from this study design. Third, this study  
3 uses a respondent's primary language preference as a proxy measure of acculturation. Certainly,  
4 acculturation is more than language use and includes social relationships, observance of  
5 traditional holidays, diet and health practices, and a multidimensional definition of acculturation  
6 would be a better approach. The multidimensional approach would be more complicated to  
7 implement in a clinical setting; hence, we have taken the simplified approach of primary  
8 language preference in this study to define acculturation. Even with the simple definition for  
9 acculturation, significant differences in item responses were found between the two groups.

10       The results of this study confirm that acculturation influences Hispanic responses to the  
11 Somatic Activity and Positive Affect Subscales of the CES-D. How these differences affect the  
12 clinician's understanding of the acculturated and non-acculturated Hispanic experience of  
13 depression is yet to be determined. However, the use of the CES-D to evaluate depressive  
14 symptoms with Hispanics must be done with care. Physical complaints might be a more  
15 significant indicator of mood for the non-acculturated Hispanic respondents than the acculturated  
16 respondents. Items on the Positive Affect Subscale are reversed and may be interpreted  
17 differently by the non-acculturated group. The Negative Affect and Interpersonal Subscales show  
18 no difference between the two groups. The importance of the findings from this study is that the  
19 effects of acculturation on item responses may lead to an underestimated of depressive mood in  
20 the non-acculturated Spanish-speaking Hispanic pregnant women. Further study needs to be  
21 conducted using clinical interviews to validate the CES-D screening instrument in this minority  
22 population, since depression can negatively influence pregnancy outcomes.

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Table 1. Demographic Description of Sample, Mean (standard deviation) or Percent				
Demographic of	Non-	Acculturated	Total	Significance
Sample	Acculturated			
Sample size	219	176	395	
Age	25.9 (4.5)	22.2 (4.8)	24.3 (5.0)	t-value = 8.0, p<0.001
Years in U.S.	5.0 (3.4)	20.9 (6.2)	12.1 (9.3)	t-value = 32.6, p<0.001
Marital status				
Single	38.4%	62.6%	49.4%	
Married	50.7%	28.2%	40.5%	
S/W/D	10.9%	9.2%	10.1%	Chi-square = 23.6, p<0.001
Education				
Not a H.S. grad	79.5%	44.8%	64.1%	
High school grad	18.6%	50.0%	32.6%	
College grad	1.9%	5.2%	3.4%	Chi-square = 50.2, p<0.001

Note: S/W/D is separated, widowed, or divorced

Table 2. Item Endorsement (%) by Acculturation Status in a Sample of Hispanic Pregnant Women

CES-D Item	Non-	Acculturated	p-value
	Acculturated (n = 219)	(n = 176)	
1. I was bothered by things that usually don't bother me.	44.8	60.2	.002
2. I did not feel like eating. My appetite was poor.	42.5	43.8	NS
3. I felt that I could not shake off the blues even with help from my family or friends.	24.7	34.7	.03
4. I felt that I was just as good as other people.	68.5	61.9	NS
5. I had trouble keeping my mind on what I was doing.	40.2	52.8	.01
6. I felt depressed.	49.8	54.6	NS
7. I felt that everything I did was an effort.	32.9	71.0	.0001
8. I felt hopeful about the future.	54.8	56.8	NS
9. I thought my life had been a failure.	17.4	25.0	NS
10. I felt fearful.	29.2	36.4	NS
11. My sleep was restless.	50.7	69.3	.0002
12. I was happy.	53.0	54.6	NS
13. I talk less than usual.	32.9	43.8	.03
14. I felt lonely	40.2	44.3	NS
15. People were unfriendly.	30.6	29.6	NS
16. I enjoy life.	51.6	42.0	NS
17. I had crying spells.	41.6	57.4	.002

18. I felt sad.	51.1	61.4	.04
19. I felt people dislikeded me.	26.5	28.4	NS
20. I could not get “going.”	61.2	45.5	.002

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Table 3. Items, means (SD), Cronbach  $\alpha$ , and Differential Item Functioning (DIF)

Scale/Item (item#)	Non-Acculturated		Acculturated		Uniform DIF	
	Mean (SD)	$\alpha$	Mean (SD)	$\alpha$	LR $\chi^2$	R <sup>2</sup>
Depressed affect	3.58 (4.10)	.88	4.77 (0.54)	.86		
Blues (3)	0.37 (0.75)		0.54 (0.84)		0.4	.06 %
Depressed (6)	0.69 (0.83)		0.82 (0.92)		0.2	.03
Failure (9)	0.22 (0.51)		0.40 (0.78)		2.1	.39
Fearful (10)	0.36 (0.61)		0.50 (0.77)		0.3	.05
Lonely (14)	0.63 (0.89)		0.74 (0.98)		1.1	.13
Crying (17)	0.61 (0.85)		0.86 (0.91)		5.1	.79
Sad (18)	0.70 (0.84)		0.89 (0.88)		0.7	.08
Somatic Activity	4.16 (3.26)	.70	5.90 (3.66)	.69		
Bothered (1)	0.51 (0.62)		0.84 (0.84)		12.2*	2.40
Appetite (2)	0.60 (0.82)		0.61 (0.80)		0.8	.16
Mind (5)	0.56 (0.80)		0.77 (0.88)		2.5	.46
Effort (7)	0.45 (0.74)		1.28 (1.07)		62.0*	12.16
Sleep (11)	0.73 (0.86)		1.14 (0.98)		13.8*	2.50
Talked (13)	0.49 (0.80)		0.63 (0.84)		0.5	.10
Get going (20)	0.83 (0.81)		0.63 (0.80)		21.8*	3.94
Positive Affect <sup>1</sup>	4.36 (3.26)	.74	3.64 (2.92)	.72		
Good (4)	1.54 (1.22)		1.21 (1.15)		11.5*	2.59
Hopeful (8)	1.05 (1.12)		1.01 (1.08)		2.0	.45
Happy (12)	0.84 (0.95)		0.78 (0.86)		6.7*	1.18

Enjoyed (16)	0.93 (1.06)		0.64 (0.87)		24.3*	4.07
Interpersonal	0.82 (1.18)	.42	0.73 (1.05)	.54		
Unfriendly (15)	0.48 (0.84)		0.40 (0.71)		2.7	.57
Disliked (19)	0.34 (0.65)		0.33 (0.56)		2.6	.48
Total CES-D Score	12.9 (8.55)	.86	15.0 (9.53)	.88		

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<sup>1</sup>For Positive Affect, subscale items were reversed prior to scoring.

SD = standard deviation;  $\alpha$  = Cronbach Alpha; LR  $\chi^2$  = Likelihood Ratio Chi-square with one degree of freedom;  $R^2$  is a measure of the magnitude of the effect and is expressed in percent. \*

p<.01

Table 4. Items Correlation with Total CES-D Score

Scale/Item (item#)	Non-Acculturated	Acculturated
	r	r
Depressed affect	.86	.90
Blues (3)	.65	.69
Depressed (6)	.72	.75
Failure (9)	.48	.57
Fearful (10)	.53	.52
Lonely (14)	.74	.73
Crying (17)	.68	.61
Sad (18)	.77	.77
Somatic Activity	.77	.83
Bothered (1)	.43	.47
Appetite (2)	.42	.47
Mind (5)	.46	.55
Effort (7)	.50	.25
Sleep (11)	.43	.62
Talked (13)	.50	.49
Get going (20)	.49	.62
Positive Affect <sup>1</sup>	.59	.61
Good (4)	.31	.40

Hopeful (8)	.32	.31
Happy (12)	.56	.55
Enjoyed (16)	.61	.58
Interpersonal	.49	.63
Unfriendly (15)	.31	.45
Disliked (19)	.49	.60

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