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Excessive Daytime Sleepiness as an Indicator of Depression in Hispanic Americans

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Abstract

Introduction: Excessive daytime sleepiness (EDS) has been shown to be associated with depression; however, this relationship has not been confirmed among Hispanic Americans. **Method:** This study examined the link between EDS and depression among Hispanic Americans ($N = 411$) and explored the potential moderating roles of age, gender, income, education, health status, and acculturation. The Epworth Sleepiness Scale and Patient Health Questionnaire–9 measured EDS and depression, respectively. **Results:** Hierarchical linear regression demonstrated that EDS was significantly related to depression. Receiver operating characteristic curve analysis suggested that the Epworth Sleepiness Scale discriminated with adequate sensitivity and specificity between participants with moderately severe depression and those with less severe symptoms. No sociodemographic variables moderated the EDS–depression relationship. **Conclusion:** These findings suggest that depression should be considered when Hispanic Americans present with EDS.

Keywords

depression, Hispanic Americans, sleep, methodology and measurement

Resumen

Introducción: Somnolencia diurna excesiva (EDS) se ha demostrado que se asocia con la depresión; sin embargo, esta relación no ha sido confirmado entre los hispanos. **Métodos:** En este estudio se examinaron la relación entre EDS y la depresión entre los hispanos ($N = 411$), y exploraron las funciones moderadores potenciales de la edad, sexo, ingresos, educación, estado de salud, y la aculturación. La escala de Epworth y el Cuestionario de Salud del Paciente-9 midieron EDS y la depresión, respectivamente. **Resultados:** Regresión lineal jerárquica demostraron que EDS fue significativamente relacionados con la depresión. Análisis de la curva ROC sugiere que la escala de Epworth distinguió con una adecuada sensibilidad y especificidad entre los participantes con depresión moderadamente severa y aquellos con síntomas menos graves. Ninguna variable sociodemográfica moderó la relación EDS-depresión. **Conclusión:** Estos resultados sugieren que la depresión debe ser considerada cuando los hispanoamericanos presentan con EDS.

Palabras clave

depression, hispanosamericanos, el sueño, la metodología y medida

Excessive daytime sleepiness (EDS) is defined as the tendency to fall asleep during the daytime despite attempts to remain alert (Chellappa, Schroder, & Cajochen, 2008). As insightful diagnosticians, nurses will encounter this chief concern of EDS, because EDS occurs in up to 8.7% of the general population (Bixler et al., 2005). Unfortunately, EDS has negative consequences on both societal and personal levels. EDS has been linked to increased motor vehicle crashes, falls among the elderly, work-related injuries, worse academic performance, increased health care utilization, and medical errors (National Research Council, 2006b). EDS has also been linked to a wide variety of physical and mental health comorbidities, including angina pectoris, cardiac arrhythmias, type 2 diabetes mellitus,

dementia, and affective disorders (National Research Council, 2006a). Given the negative consequences of EDS, nurses will

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logically seek to explore possible causes, negative consequences, and interventions for patients reporting this complaint.

There is a growing body of evidence-based recommendations to guide this exploration. The scientific literature suggests that the most clinically significant mental health comorbidity of EDS is depression; prior research has found that the two are strongly associated within a medical framework (Ando & Kawakami, 2012; Bixler et al., 2005; Chellappa & Araujo, 2006; Chellappa et al., 2008; Fava, 2004; Shen et al., 2011). While the causative direction between EDS and depression has yet to be elucidated, EDS has been established as a medical symptom of depression, with relief of EDS frequently demonstrated on treatment with antidepressant medications (Shen et al., 2011). Additionally, EDS has been implicated as a risk factor for future depressive episodes (Fava, 2004) and has been shown to be correlated with suicidal ideation (Chellappa & Araujo, 2006). Depression has also been shown to be a predictor of EDS among patients with obstructive sleep apnea (Pamidi, Knutson, Ghods, & Mokhlesi, 2011). Neurobiological dysrhythmia involving disordered serotonergic activity of circadian cycles is tentatively suggested to explain the EDS–depression link (Chellappa et al., 2008).

While the epidemiological prevalence of EDS among Hispanic Americans remains to be examined, EDS is not uncommon among various studied Hispanic American samples, with estimates ranging from 9.2% to 45% (Baron et al., 2010; Grzywacz et al., 2011; Sandberg et al., 2012; Shafazand et al., 2012). With EDS as a potential window into comorbidities such as depression, understanding of the Hispanic experience of EDS and its relationship with depression is critical. Hispanic Americans have been shown to frequently report the somatic rather than the affective symptoms of depression (Lewis-Fernandez, Das, Alfonso, Weissman, & Olfson, 2005). EDS may act as a clinical "chief complaint" indicating depression, with patients primarily reporting pathology to health care providers as "daytime sleepiness" rather than as "depression" (Ando & Kawakami, 2012; Fava, 2004; Grzywacz et al., 2011). Thus, EDS may potentially offer a key culturally specific indication of depression among Hispanic Americans.

Unfortunately, examination of the EDS–depression relationship among Hispanic Americans is sparse (Loredo et al., 2010). This lack of investigation is likely due to a number of factors, such as language and cultural barriers, as well as disparities in research and treatment access (Loredo et al., 2010). Only recently has the EDS–depression link been examined specifically among Hispanic Americans, with two studies from the same research team demonstrating that EDS and depression are positively associated in Hispanic American farmworkers in eastern North Carolina (Grzywacz et al., 2011; Sandberg et al., 2012). However, the EDS–depression association has yet to be explored among the general Hispanic American population (Ishikawa, Cardemil, & Falmagne, 2010; Loredo et al., 2010).

However, while this relationship has been suggested in the past, the sensitivity and specificity with which EDS indicates depression among Hispanic Americans has not been assessed. Understanding the specifics of how EDS can indicate depression among Hispanic Americans would enhance nurses' understanding of patients who present with a primary complaint of EDS and may further inform strategies for determining which patients should be further assessed for depression.

Research on the sociodemographic variables that might moderate the EDS–depression relationship has also been scarce and conflicted. Bixler et al. (2005) affirmed that age moderates the EDS–depression relationship in a general population sample. They found that depressed subjects who were younger (age ≤ 35) were more likely than their nondepressed peers to report EDS; these differences were not found for older subjects. No known studies have examined this finding in a Hispanic American community sample. Existing literature has shown that female gender (Piccinelli & Wilkinson, 2000), lower income (Zimmerman & Katon, 2005), less education (World Health Organization International Consortium in Psychiatric Epidemiology, 2000), worse health status (Nakao & Yano, 2006), and lower levels of acculturation (Torres & Rollock, 2007) are independent predictors of depression. However, the impact of these sociodemographic variables as potential moderators of the relationship between EDS and depression has received minimal attention. Any potential moderators of the EDS–depression link could have specific clinical implications that may aid frontline primary care providers in evaluating Hispanic Americans.

The aim of the present study was to examine EDS as an indicator of depression among the general population of Hispanic American adults. Age, gender, income, education, health status, and acculturation were examined as potential moderators of the EDS–depression relationship among Hispanic Americans.

Method

Participants

Participants ($N = 411$) were self-identified Hispanic American adults residing in Southern California, with 91% of Mexican descent. Subjects were recruited from throughout San Diego County, which includes a mix of urban, suburban, and rural areas. Individuals were eligible to participate if they were at least 21 years of age, resided in the United States, and possessed sufficient literacy skills to be able to complete the written study packet in their preferred language of either English or Spanish. Approval for human subjects research was obtained from the sponsoring universities' institutional review boards prior to recruitment. All participants provided written informed consent prior to enrolling in the study.

Measures

Sociodemographic variables. Information on sociodemographic variables, including age, gender, income, and education, was provided by self-report.

Epworth Sleepiness Scale (Johns, 1991). The Epworth Sleepiness Scale is an eight-item self-report survey in which respondents rate their likelihood of falling asleep during typical daytime activities. Responses are summed to produce a total score ranging from 0 to 24, with higher scores indicating more daytime sleepiness. The optimal cutoff score for diagnosing EDS is ≥10 (Johns, 1993). The Epworth Sleepiness Scale has been validated in both English (Johns, 1991, 1992) and Spanish (Chica-Urzola, Escobar-Cordoba, & Eslava-Schmalbach, 2007), as well as within a multiethnic study that included a sizable Hispanic American population (Baron et al., 2010). Cronbach's alpha for the total score in the present sample was .80, demonstrating good internal consistency reliability and comparable to other studies featuring similar samples; Chica-Urzola et al.'s (2007) study featured a Cronbach's alpha of .85.

Patient Health Questionnaire–9 (PHQ-9; Spitzer, Kroenke, & Williams, 1999; Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000). This nine-item questionnaire was used to evaluate participants' depressive symptoms. The PHQ-9 was originally developed based on the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision* (American Psychiatric Association, 2000), diagnostic criteria for depressive disorders to help primary care health practitioners make tentative diagnoses of depression. Respondents rank the frequency with which they have experienced nine symptoms of clinical depression during the prior 2 weeks using a continuum of four response options: $0 = never$, $1 = several days$, $2 = more than half the days$, and $3 = nearly every day$. Responses are summed to produce a total score ranging from 0 to 27, with higher scores indicating greater severity of depressive symptoms. Four clinical cutoffs have been identified at 5, 10, 15, and 20 to indicate mild, moderate, moderately severe, and severe depression, respectively. A score of less than 5 indicates minimal or no depression. The PHQ-9 has previously been used to evaluate depressive disorders in numerous populations, has strong psychometric properties, and is highly correlated with mental health professional diagnoses (Kroenke, Spitzer, Williams, & Löwe, 2010). It has been validated in Spanish (Diez-Quevedo, Rangil, Sanchez-Planell, Kroenke, & Spitzer, 2001) and for use with Hispanic American adults (Merz, Malcarne, Roesch, Riley, & Sadler, 2011). Additionally, Merz et al. (2011) reported high internal consistency for the PHQ-9 in Hispanic Americans ($\alpha = .84$ for the English version, $\alpha = .85$ for the Spanish version), and a study examining the application of Spanish version of PHQ-9 among Mexican women also found high internal consistency ($\alpha = .89$; Familiar et al., 2015). Cronbach's alpha for the total score in the present sample was .90, demonstrating high internal consistency reliability.

Health-Related Quality of Life (HRQOL-4; Centers for Disease Control and Prevention [CDC], 1997, 2000). Health status was measured using the first question of the HRQOL-4 survey, which evaluates self-reported overall health. The HRQOL-4 is part of the Behavioral Risk Factor Surveillance System questionnaire (CDC, 1997, 2000). The first question of the HRQOL-4 ("Would you say that in general your health is (A) excellent (B) very good (C) good (D) fair or (E) poor?") is a reliable and valid indicator of health status (Andresen, Catlin, Wyrwich, & Jackson-Thompson, 2001; Newschaffer, 1998). For the present investigation, higher scores indicated better overall self-reported health. The HRQOL-4 has been validated both in English among the general American public (CDC, 2000) and in Spanish with a sample of Hispanic Americans (CDC, 2002).

Brief Acculturation Scale for Hispanics (BASH; Norris, Ford, & Bova, 1996). Acculturation was assessed using the BASH, a four-item language-based questionnaire adapted from the Short Acculturation Scale for Hispanics (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). Participants rank the degree to which their thinking, reading, and speaking habits are primarily in English or Spanish using a scale from $1 = Only$ $Spanish$ to $5 = Only$ $English$. Participants' responses to each of the four items were averaged; higher scores represented increased use of English as opposed to Spanish (Davis & Engel, 2011). Reliability and validity of the measure have been demonstrated in both English- and Spanish-speaking Hispanic Americans (Norris et al., 1996), and the BASH's psychometric properties have been shown to be equivalent to longer measures of acculturation (Mills, Malcarne, Fox, & Sadler, 2014; Norris et al., 1996). Cronbach's alpha for the total score in the present sample was .94, demonstrating high internal consistency reliability, and comparable to the alpha of .92 reported by Wilkinson et al. (2012) in their sample of Mexican American youth.

Procedure

As part of a larger cross-sectional survey study, participants completed self-report questionnaires in their preferred language of English or Spanish. Language preference was self-reported by participants at the time of study enrollment. A multifaceted recruitment strategy, including word-of-mouth, community outreach, and flyer distribution, was employed. Interested individuals called the research team to receive more detailed information and be prescreened for eligibility, and subsequent face-to-face meetings were organized at a mutually convenient location. After obtaining written informed consent and determining the participants' preferred language, the researcher administered the questionnaires to each individual. Researchers provided assistance with the questionnaires according to participants' need. Participants spent on average approximately 2 hours completing all study questionnaires and received $75 for their participation.

Analytic Plan

Preliminary investigation demonstrated that the assumption of normality of the error distribution was violated. Therefore, a natural log transformation was performed on the outcome variable, PHQ-9 total scores, for use in all regression analyses. Because zero was a possible nontransformed total PHQ-9

score, a constant was added to each value prior to transformation. Due to the logarithmic transformation of depression, exponentiated regression coefficients were examined in addition to transformed regression coefficients to facilitate interpretation (Vittinghoff, Glidden, Shiboski, & McCulloch, 2005).

Descriptive statistics were determined for all variables of interest. A Spearman's rank correlation coefficient was first calculated to explore the bivariate relationship between EDS and depression. Hierarchical linear regression analysis was then used to examine the relationship between EDS and depression after controlling for age, gender, income, education, health status, and acculturation.

To examine the ability of the Epworth Sleepiness Scale to indicate depression among Hispanic Americans, a receiver operating characteristic (ROC) curve analysis was conducted. The area under the curve (AUC) was evaluated to determine the Epworth Sleepiness Scale's ability to categorize participants as likely depressed or likely not depressed according to their score on the PHQ-9. AUCs were computed based on a plot of the sensitivity (true positives) versus one minus the specificity (false positives) at multiple theoretical cutoff values of the Epworth Sleepiness Scale (DeLong, DeLong, & Clarke-Pearson, 1988). The AUCs represented the likelihood that a positive score on the Epworth Sleepiness Scale would be found in individuals who also had a positive score on the PHQ-9. The cutoff value used to define a positive score on the PHQ-9 was determined a priori, while the optimal cutoff value of the Epworth Sleepiness Scale was determined based on the results of the ROC curve analysis. ROC curve analyses were conducted at the four clinical PHQ-9 cutoff values: 5 (mild), 10 (moderate), 15 (moderately severe), and 20 (severe; Kroenke et al., 2010). An AUC greater than .50 would demonstrate that the Epworth Sleepiness Scale was better than chance at identifying participants who endorsed items on the PHQ-9 in a way consistent with clinical depression.

Last, moderators were examined using six distinct hierarchical linear regression models, each with depression as the outcome. In each model, EDS, one sociodemographic variable (age, gender, income, education, health status, or acculturation), and the interaction between EDS and that variable were included as predictors. All continuous variables were centered prior to inclusion in the regression equations to reduce multicollinearity between predictors and their respective interaction terms. All statistical analyses were performed using SPSS, Version 19.0 (IBM Corp., 2010).

Results

Table 1 presents sample characteristics and descriptive statistics of the study's primary variables of interest. Twenty-one percent ($n = 87$) experienced EDS, defined as an Epworth Sleepiness Scale score ≥ 10 (Johns, 1993). Levels of depression were as follows: subthreshold 62.8% ($n = 258$), mild 22.1% ($n = 91$), moderate 7.8% ($n = 32$), moderately severe 5.1% ($n = 21$), and severe 2.2% ($n = 9$).

Table 1. Demographic Characteristics ($N = 411$).

Variable	n	Summary value
Age, M (SD), observed range	410	42.0 (13.8), 21-81
Gender, %	411	
Female		49.4
Education, %	399	
Less than high school		26.5
High school or vocational school graduate		20.0
Some college but no degree		17.3
Associate's or bachelor's degree		27.2
Graduate degree		6.1
Don't know/missing		2.9
Income, %	379	
Less than $20,000		32.4
$20,000 to less than $50,000		37.2
$50,000 or more		22.6
Don't know/missing		7.8
Self-reported health status, M (SD), observed range	409	3.3 (1.0), 1-5
Acculturation, M (SD), observed range	399	2.8 (1.2), 1-5
EDS, M (SD), observed range	411	6.2 (4.5), 0-24
Depression, M (SD), observed range	411	4.6 (5.2), 0-26

Note. M = mean; SD = standard deviation; EDS = excessive daytime sleepiness.

The results from the Spearman's rank correlation analysis demonstrated a statistically significant bivariate association between EDS and depression ($\rho = .32$, $p < .01$). Hierarchical linear regression demonstrated a significant main effect of EDS on depression after controlling for age, gender, income, education, health status, and acculturation (see Table 2). The model as a whole was statistically significant and accounted for 25% of the variance in depression, Adjusted $R^2 = .25$, $F(7, 349) = 17.75$, $p < .01$; $\Delta R^2 = .09$, $\Delta F(1, 349) = 41.70$, $\Delta p < .01$.

Of the six sociodemographic variables examined, none significantly moderated the relationship between EDS and depression (see Table 3). Significant main effects were found for age, income, and health status. Each of the six main effect models as a whole was statistically significant ($p < .01$). According to the adjusted R^2 statistics, the models examining age, gender, income, education, or acculturation as predictors accounted for 11% to 13% of the variance in depression, while the model examining health status accounted for 19% of the variance.

Finally, the ROC curve analyses demonstrated that the Epworth Sleepiness Scale was best able to discriminate between individuals with moderately severe depression and those with less than moderately severe depression, based on a PHQ-9 cutoff value of 15 (see Figure 1 and Table 4). The classification table of probability cut-points demonstrated that a score of 7 on the Epworth Sleepiness Scale was the optimal cutoff value to distinguish between individuals scoring above or below 15 on the PHQ-9 (sensitivity = .77, specificity = .62). Lowering the cutoff to 6 resulted in notably higher sensitivity (= .87); however, specificity was reduced to no better than chance (= .50). Additionally, using the widely accepted cutoff

Table 2. Hierarchical Linear Regression Analysis Demonstrating Main Effect of EDS on PHQ-9 Scores After Controlling for Sociodemographic Variables.

Predictor	b	e^b	SE	p
Gender	.20	1.22	.09	.03
Age	−.01	0.99	<.01	<.01
Income	−.05	0.95	.02	.02
Education	−.00	1.00	.02	.87
Acculturation	.08	1.08	.04	.04
Health status	−.30	0.74	.05	<.01
Epworth	.07	1.07	.01	<.01

Note. SE = standard error; EDS = excessive daytime sleepiness; PHQ-9 = Patient Health Questionnaire-9.

Table 3. Hierarchical Linear Regression Analyses Demonstrating Main and Interactive Effects of Sociodemographic Variables and EDS on PHQ-9 Scores.

Predictor	n	b	e^b	SE	p
Model 1. Age and EDS					
Age	410	−.01	0.99	<.01	<.01
EDS	410	.07	1.07	.01	<.01
Age * EDS	410	<.01	1.00	<.01	.80
Model 2. Gender and EDS					
Gender	411	.12	1.12	.09	.20
EDS	411	.07	1.07	.01	<.01
Gender * EDS	411	<−.01	1.00	.02	.86
Model 3. Income and EDS					
Income	379	−.06	0.94	.02	<.01
EDS	379	.07	1.07	.01	<.01
Income * EDS	379	.01	1.01	.01	.32
Model 4. Acculturation and EDS					
Acculturation	399	.04	1.04	.04	.33
EDS	399	.07	1.07	.01	<.01
Acculturation * EDS	399	<.01	1.01	.01	.67
Model 5. Education and EDS					
Education	399	−.03	0.97	.02	.15
EDS	399	.07	1.07	.01	<.01
Education * EDS	399	.01	1.01	<.01	.08
Model 6. Health status and EDS					
Health status	409	−.28	0.76	.04	<.01
EDS	409	.06	1.06	.01	<.01
Health status * EDS	409	.02	1.02	.01	.06

Note. EDS = excessive daytime sleepiness; PHQ-9 = Patient Health Questionnaire-9; SE = standard error. Main effect statistics presented for each analysis are based on results of simultaneous linear regression models, as no interactions were statistically significant at α = .05.

of 10 did increase specificity (= .81); however, this caused sensitivity to be reduced to no better than chance (= .50; see Table 5).

Discussion

The primary aim of the present study was to explore if EDS can serve as an indicator of depression among a sample of Hispanic American adults. The rates of EDS and depression in this sample were within the relatively broad ranges of past reported
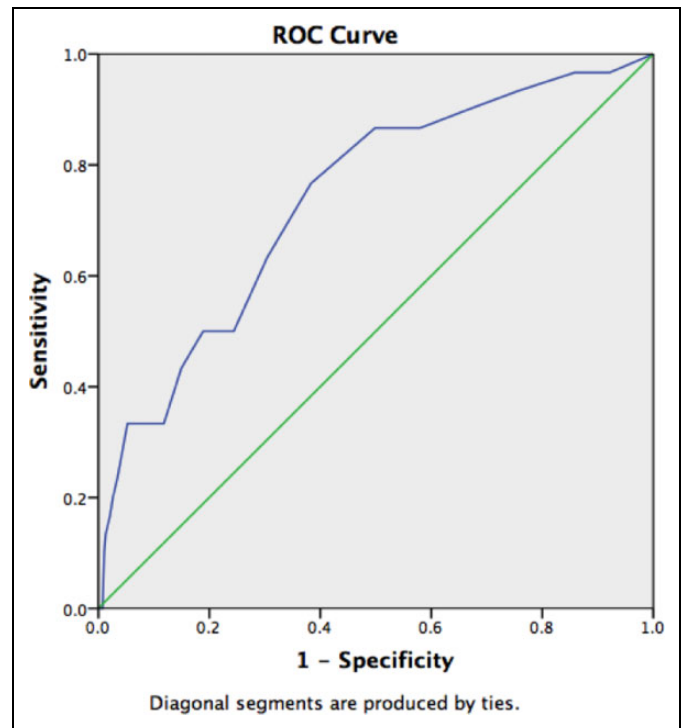
Figure 1. Area under the curve for the Epworth Sleepiness Scale's ability to predict depression based on PHQ9 ≥15.

Table 4. Area Under the Curve for the Epworth Sleepiness Scale's Ability to Predict Depression Based on Four Potential PHQ-9 Cutoffs.

PHQ-9 cutoff	AUC	95% CI	SE	p
5, Mild depression	.65	.59, .71	.03	<.01
10, Moderate depression	.69	.61, .76	.04	<.01
15, Moderately severe depression	.74	.64, .83	.05	<.01
20, Severe depression	.68	.48, .87	.10	.07

Note. PHQ-9 = Patient Health Questionnaire-9; AUC = area under the curve; CI = confidence interval; SE = standard error.

rates of EDS (Shafazand et al., 2012) and depression (Baron et al., 2010; Sandberg et al., 2012) measured in Hispanic American cohorts. It is important to note that while the subjects of the aforementioned studies share the general label of "Hispanic," this current nonclinical sample of Southern Californian Hispanic Americans of mostly Mexican descent may likely differ significantly from Shafazand et al.'s (2012) and Sandberg et al.'s (2012) samples. Shafazand et al.'s (2012) clinical sample featured South Florida Hispanic American patients of mostly Cuban and Puerto Rican descent recruited from primary care, pulmonary, and sleep clinics. In contrast, Sandberg et al.'s (2012) sample included Southeastern U.S. agricultural Latino farmworkers. Consistent with prior literature employing non–Hispanic American samples (Bixler et al., 2005; Chellappa & Araujo, 2006; Chellappa et al., 2008; Fava, 2004; Shen et al., 2011), EDS and depression were significantly, moderately associated in the present sample. This association was also consistent with the two available studies that have examined Hispanic

Table 5. Sensitivity, Specificity, and FPR for the Classification of Individuals as Moderately Severely Depressed (PHQ-9 ≥ 15) Versus Less (PHQ-9 < 15) at Each Given Cutoff Value of the Epworth Sleepiness Scale.

Epworth cutoff value	Sensitivity	Specificity	FPR
1	.97	.08	.92
2	.97	.14	.86
3	.93	.24	.76
4	.90	.33	.67
5	.87	.42	.58
6	.87	.50	.50
7	.77	.62	.38
8	.63	.70	.30
9	.50	.76	.24
10	.50	.81	.19
11	.43	.85	.15
12	.33	.88	.12
13	.33	.91	.09
14	.33	.95	.05
15	.23	.97	.03
16	.20	.98	.03
17	.17	.98	.02
18	.13	.99	.01
19	.10	.99	.01
20	.01	.99	.01
22	.00	1.00	.00
25	.00	1.00	.00

Note. Epworth = Epworth Sleepiness Scale; FPR = false positive rate, or (1 − specificity); PHQ-9 = Patient Health Questionnaire-9.

American farmworkers (Grzywacz et al., 2011; Sandberg et al., 2012). The moderate association between EDS and depression remained significant even after controlling for age, gender, income, education, health status, and acculturation.

ROC curve analysis suggest that EDS, as measured by the Epworth Sleepiness Scale, may indicate whether a Hispanic American person is likely to have moderately severe depression versus less severe levels. The severity at which this distinction was made is notable, as prior studies have demonstrated that Hispanic American patients often present with somatic rather than affective symptoms to describe mental health distress (Lewis-Fernandez et al., 2005). Awareness of this EDS–depression link can help nurses recognize and explore the potential for the presence of depression, and especially of depression of heightened severity, among Hispanic American patients who are complaining of the more somatically expressed problem of daytime sleepiness.

The results do suggest, however, that Hispanic Americans complaining of daytime sleepiness, even at relatively low levels, should be considered to be at elevated risk for potential depressive symptoms. The sensitivity and specificity of the Epworth Sleepiness Scale for distinguishing moderately severe depression from less depression, even at the optimal cutoff value of seven, are modest (sensitivity = .77, specificity = .62). Of comparative note, Ando and Kawakami (2012) found that a positive answer to a single-item question regarding daytime sleepiness in the past 12 months indicated major depressive disorder with a sensitivity of .53 and specificity of .78 in their community-based Japanese sample. As the Epworth Sleepiness Scale was not originally developed to distinguish between individuals with and without depression, but rather to document levels of daytime sleepiness, it follows that the predictive parameters found in the present study are not perfect. Regardless, EDS and depression are indeed correlated such that the gold standard instrument measuring EDS (i.e., the Epworth Sleepiness Scale) can actually capture with adequate sensitivity and specificity clinical depression within this Hispanic American sample. The use of the Epworth Sleepiness Scale as an actual measurement of depression is not advocated; rather, the results underscore the potential importance that reports of EDS, however solicited, can serve as a sign that the presence of depression should be considered. Nurses as frontline providers may encounter Hispanic American patients with a chief concern of EDS, and especially in light of Hispanic American's cultural expression of depression as somatic concerns (Lewis-Fernandez et al., 2005), these results indicate that such patients with even relatively low levels of EDS may be at risk for depression and deserve further screening via validated instruments such as the PHQ-9.

In accordance with U.S. Preventive Services Task Force (USPSTF) guidelines, many primary care clinics already screen patients for symptoms of depression (USPSTF, 2009). However, there are no particular recommendations regarding which measures should be used to complete these screenings. Given that some measures commonly used to screen for depression in primary care settings exclusively evaluate affective symptoms (e.g., PHQ-2; Kroenke, Spitzer, & Williams, 2003), it is unlikely that these measures would identify Hispanic American patients who may be less likely to endorse such symptoms despite experiencing depression. Moreover, the USPSTF specifically recommends against screening for depression in settings that do not have staff-assisted depression care supports in place. Thus, in settings such as these, recognizing the potential for daytime sleepiness to indicate depression among Hispanic American patients may help nurses identify those who are at sufficiently heightened risk of depressive symptoms to necessitate more comprehensive evaluation.

In the present study, age, gender, income, education, health status, and acculturation did not moderate the relationship between EDS and depression. Besides age, these variables had generally not previously been examined as moderators of the EDS–depression link. With regard to age, Bixler et al. (2005) found a stronger EDS–depression association in younger as opposed to older adults, but their study also differed in several ways from the current study. Bixler et al. examined a large epidemiological sample (N = 16,583) from central Pennsylvania, while the present study evaluated a smaller sample from Southern California. Additionally, they did not consider race/ethnicity; it is thus not clear if age moderated the association between EDS and depression specifically in Hispanic Americans. Last, EDS was assessed with two questions rather than a well-validated measure such as the Epworth Sleepiness Scale.

Therefore, whether age moderates the EDS–depression relationship in Hispanic Americans merits further study.

The present findings must be interpreted within the context of relevant limitations. First, this study was cross-sectional in nature; therefore, no causal inferences can be drawn. All measures were also evaluated by self-report. Additionally, participants were predominantly of Mexican descent; results may not be generalizable to other Hispanic American subgroups. Future research would benefit from exploring if the present results can be replicated in broader samples of Hispanic Americans.

This study yielded important results that contribute to the understanding of EDS and depression in Hispanic Americans. Specifically, results supported the link between EDS and depression in Hispanic Americans, and they suggested that EDS may be a helpful indicator of moderately severe depression in this population. These findings can help nurses identify patients who may also be at risk for, or experiencing, clinically relevant depression, and in turn, refine diagnostic assessment and subsequent therapeutic interventions.

Authors' Note

Authors Brian A. Nuyen and Rina S. Fox contributed equally to this study.

Declaration of Conflicting Interests

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