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Comparing the Influence of Childhood and Adult Economic Status on Midlife Obesity in Mexican American, White, and African American Women

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Abstract

Objective—This research addresses the following 2 questions. What is the effect of childhood and adult economic status on midlife obesity in Mexican American women? How do these economic patterns in Mexican American women compare with patterns seen in White women and in African American women?

Method—Data were drawn from the U.S. National Longitudinal Survey of Youths 1979–2002 waves. The sample consisted of 422 Mexican Americans, 2,090 Whites, and 1,195 African Americans. The economic indicator used for childhood economic status was parent education; for adult economic status, the participant's own education and adult per capita income were used. Unadjusted and adjusted odds ratios were estimated for the relationship between midlife obesity and economic indicator, stratified by race/ethnic group.

Results—There was an increased risk for midlife obesity with disadvantaged economic status measured during childhood and at midlife in Mexican American women. The economic effects on midlife obesity in Mexican American women were similar to those found for White, but not African American women. Few economic influences on obesity at midlife were found for African American women.

Conclusions—Strategies that broadly improve the economic conditions of Mexican American women may be one important way to address the obesity epidemic in this population.

Keywords

obesity; socioeconomic status; race differencers; Mexican American

The prevalence of obesity continues to increase for women in the United States, particularly among African American and Mexican American women. Recent prevalence estimates using the NHANES data from 1999 through 2004 suggest that African American women are at the greatest risk for developing obesity by midlife, with Mexican American women following (Ogden et al., 2006). Using the 2003–2004 NHANES, Ogden et al. (2006) estimated that 23.8% of White women, 50.3% of African American women, and 35.7% of Mexican American women aged 20–39 years were obese. According to the U.S. Census Bureau (2008), there were 22.1 million women between the ages of 35 and 44 years living in the United States in 2006. Of these 62.6% were White, 12.3% were African American, and 7.3% were Mexican

American. Together, these data suggest that in the 35–44 age bracket, there were approximately 3.3 million White women, 1.4 million African American women, and 575,000 Mexican American women who were obese.

Socioeconomic status has been a recognized risk factor for obesity in women. In their seminal 1989 review, Sobal and Stunkard (1989) concluded that there was a strong inverse relation between economic status and obesity in women. Their results were based on a large number of U.S. and European studies. While most of the studies in the Sobal and Stunkard review had only one measure of economic status, a few reported measures at multiple life points (Braddon, Rodgers, Wadsworth, & Davies, 1986; Power & Moynihan, 1988). Those with multiple measures found that child economic status was an independent risk for adult obesity, with the strength of the association similar to that of adult economic status. The 1989 review led to an increased interest in how economic status over the life course may influence obesity development. For example, Ball and Mishra (2006) found lasting effects of childhood economic status on the weight status of adult women, independent of adult economic status. Childhood economic status may be a particularly important risk factor for adult obesity since disadvantage in childhood has been linked to adolescent obesity (Freedman et al., 2007) that then tracks into adulthood (Thompson et al., 2007).

Measures of economic status over the life course generally include at least one indicator from childhood and one from adulthood. Childhood measures have included father's occupation or education (Baltrus, Lynch, Everson-Rose, Raghunathan, & Kaplan, 2005; James, Fowler-Brown, Raghunathan, & Van Hoewyk, 2006), family size (Wamala, Lynch, & Kaplan, 2001), and social class (used in European studies, e.g., Lawlor, Ebrahim, & Davey Smith, 2002). Adult economic status has primarily been determined using education or income at various points in adult life (Baltrus et al., 2005; Chor, Faerstein, Kaplan, Lynch, & Lopes, 2004; Lewis et al., 2005).

Since publication of the Sobal and Stunkard review, a growing body of evidence also suggests that the measured effects of economic status, that is, the inverse relationship between advantage and obesity, may not hold for minorities. In particular, there have been several studies that have documented little association between usual economic measures and obesity in African American women (James, Fowler-Brown et al., 2006; Zhang & Wang, 2004). In a series of papers using economic measures from multiple time points, James and colleagues (Bennett, Wolin, & James, 2007; James, Fowler-Brown et al., 2006; James, Van Hoewyk et al., 2006) found that low economic status during childhood predicted early onset of obesity for African Americans, but it was less predictive of changes in body mass index (BMI). In the Study of Women's Health Across the Nation (Lewis et al., 2005), rates of obesity were found to decrease with increasing levels of education in White women, but not in African American women. At all levels of education, African American women were at similar weights. Furthermore, a study using the Alameda County cohort found that African American women were heavier at the start and gained more weight over the time period (Baltrus et al., 2005). Studies with multiple measures of economic status provide a distinct advantage over studies with only adult measures of economic status because they account for disadvantage during the critical childhood period and provide a more thorough picture of the risk associated with low economic status (Baltrus et al., 2005; Lawlor et al., 2002; Novak, Ahlgren, & Hammarstrom, 2006; Wamala et al., 2001). As a result of this body of work, it is now accepted that economic influences on obesity development are different in White as compared with African American women (Kaplan, Baltrus, & Raghunathan, 2007).

These findings have important implications for intervention programs targeting women. Effective interventions require an understanding of the complex processes that lead to obesity. While there is a clear inverse relationship between economic status and obesity in White

women, that is not so for African American women. This suggests that different interventions may be needed. In White women, obesity development is sensitive to both childhood and adult economic status, suggesting that obesity may be a byproduct of a lack of resources across the life course, that is, high-quality foods, places, and time to exercise. For African American women, the picture is more complex and will require greater understanding of the developmental processes before successful interventions are found. Nurses who are interested in assisting communities in preventive and treatment programs must take these differences into account.

While there has been research comparing the effects of life course economic indicators on obesity between White and African American women, other minorities have not been studied. Even though there are over 11 million Mexican American females currently living in the United States, there has been no comparable life course study of obesity among Mexican American women. To address the gap in the literature, this research addresses the following two questions. What is the effect of childhood and adult economic status on midlife obesity in Mexican American women? How do these economic patterns in Mexican American women compare with patterns seen in White women and in African American women?

Methods

Sample

Data from the National Longitudinal Survey of Youth 1979 (NLSY79) were used in this study. This survey began in 1979 with young women aged 14–21 years. These women were followed annually until 1994 and biennially thereafter. It originally consisted of three subsamples: (1) a cross-sectional sample designed to be representative of the U.S. population who were aged 14–21 years when the survey began in 1979; (2) a supplemental sample designed to oversample civilian Hispanic, African American, and economically disadvantaged White youth of the same birth cohort; and (3) a sample designed to represent the population aged 17–21 years as of January 1, 1979, who were enlisted in the four branches of the military as of September 20, 1978. The military sample was dropped in 1985. The economically disadvantaged White oversample was dropped in 1991. This study used the women in the cross-sectional sample and in the minority oversample through the 2002 wave. Hispanics who were not Mexican American were dropped.

As in any ongoing longitudinal survey, there are missed interviews and sample attrition. Yearly retention rates in the NLSY79 are quite high. In each year between 1980 and 1984, over 95% of respondents were interviewed. This dropped to 90% by 1987, where it remained roughly constant until 1996. By 2000 it had fallen to 81%. Missing a single interview does not mean that the respondent will not be recontacted in a subsequent interview. Only death or concerns about interviewer safety prevented recontact in the event of a missed interview. These numbers are quite small. By 2002, 303 of the original respondents were deceased and 105 respondents were difficult cases who were no longer contacted.

The original sample in 1979 consisted of 4,487 women in the three race/ethnic groups (White, African American, and Mexican American). The final sample number for this study was 3,707. There were 396 women who were not included because they were not interviewed during midlife (sometime between ages 35 and 45 years). An additional 158 were lost due to missing data on measures of child or adult economic status and 236 observations were dropped because of missing data on BMI. The analysis was based on 3,707 women or 83% of the potential sample. To determine whether the demographic profile of the study sample differed from the “lost” group, several analyses were conducted. Chi-square tests for differences in the proportions in the two groups on race/ethnicity, parent education, own education, and income tertiles were conducted. The included group was statistically different from the lost group on

each of the demographic measures. The study sample had fewer minorities, was better educated with higher incomes, and had better educated parents than the lost group.

Measures

Race/ethnicity identification—The NLSY79 provides a “sample identification code” that indicates whether the respondent was White, African American, or Hispanic based on self-report during the screening interview. During the 1979 interview, members of the Hispanic sample self-reported their primary race/ethnicity. Hispanics who self-identified as Chicana, Mexican, or Mexican American were included in the Mexican American sample.

BMI measures—Data on self-reported height were collected in 1981, 1982, 1983, and 1985. The last reported height measure was used in these analyses. The average age of the women at the time of the collection of their last reported height was 23.6 years, with a minimum of 17 years and a maximum of 28 years. Data on self-reported weight were collected at each interview starting in 1981. Midlife BMI was determined using the last reported height and weight reported from the last interview during which the respondent was between the ages of 35 and 44. An indicator for obesity was calculated with obesity defined as BMI ≥ 30 .

Child economic indicator—An indicator for childhood economic status was based on the years of schooling completed by the parents. If neither parent completed the 12th grade, the low parental education variable was coded 1. If at least one parent had completed 12 or more years of schooling, low parental education was coded 0. This cutoff for parental education was chosen because between 1957 and 1964, the birth years of the women in our sample, 55% of the population over the age of 25 had not graduated from high school.

Adult economic indicators—Measures of adult economic status were based on income and education. Education was based on highest grade completed in the last midlife interview and was categorized into three groups: <12 years, 12 years, and more than 12 years. A different measure of educational status for the adult children was used from that used for their parents because the fraction of the population over the age of 25 who were high school dropouts declined to 26% by 1985 when the youngest of the women in the sample turned 20. Average per capita income was constructed using all available data from the time the woman was 26 through the midlife interview. Using these data, a per capita income was calculated using the total family income divided by the number of family members. To determine the denominator, the number of family members was summed, with each member aged 14 years or more counted as 1 and each child under the age of 14 was counted as 0.5 (Deaton, 1997). A mean per capita income was determined by averaging per capita income from each wave, adjusted to constant 1990 dollars. A categorical income variable was then created by breaking the sample income into thirds. Indicators were created for women whose average per capita income was (i) below the 33.3 percentile of the sample (US\$8,766); (ii) between the 33.3 percentile and the 66.7 percentile (US\$8,766 and US\$15,503); and (iii) above the 66.7 percentile (>US\$15,503).

Other covariates—Age in years at the midlife interview (measured between the ages of 35 and 44 years) was included in the multivariate analyses because increasing age is associated with increased weight at least through midlife in women (Flegal, 2006).

Analysis

To test for differences in sample characteristics by race/ethnicity, chi-square analyses were conducted for midlife obesity and categories of parental education, own education, and income. Unadjusted odds ratios were computed between obesity and each economic indicator for each race/ethnic group. Next, adjusted multivariate logistic regressions were estimated, stratified by race/ethnicity, to obtain odds ratios for the conditional effect of each of the economic factors

on midlife obesity. Because the NLSY sample contains siblings, the error terms were not independent within family groups. To account for this the robust option in STATA was used to obtain heteroskedasticity robust standard errors. All statistical procedures were undertaken using STATA 9.0.

Results

Table 1 describes the sample by race/ethnic groups. The overall sample consisted of 12% Mexican American, 56% White, and 32% African American women. Thirty-four percent of Mexican American women were obese at midlife, as compared with 42% African American women and 23% White women. Mexican American women were disadvantaged relative to Whites in terms of parental education, own education, and adult per capita income. Furthermore, Mexican American women were disadvantaged relative to African American women in terms of low parental education (68% vs. 46% had parents who did not complete high school) and own education (19% vs. 10% had not completed high school). Mexican American women were comparable to African American women in terms of adult income (49% vs. 51% in the bottom tertile).

The unadjusted odds ratios are presented in Table 2. Mexican American women whose parents had less than a high school education were more likely to be obese than those whose parents had at least a high school education [2.18, 95% CI = 1.37, 3.48]. There was no statistically significant effect between the two adult economic indicators, own education and income, and midlife obesity for Mexican American women. In White women, both child and adult economic measures were associated with obesity. The odds of obesity associated with low parental education was 1.92 [95% CI = 1.51, 2.45] while the odds associated with own education less than high school was 2.33 [95% CI = 1.55, 3.50] and high school graduate was 1.32 [95% CI = 1.07, 1.64] compared with the omitted category of at least some college. The middle-income group, compared with the top-income group, had odds of 1.52 [95% CI = 1.21, 1.92]. For African American women, the only significant association between economic indicators and midlife obesity was within the own education category, where those with less than a high school education were 1.64 [95% CI = 1.09, 2.45] times more likely to be obese than those with at least some college.

Table 3 shows the adjusted odds ratios for obesity at midlife. Within the Mexican American group, low parental education remained a significant risk for midlife obesity [1.89, 95% CI = 1.16, 3.09]. Those with less than a high school education were at reduced risk of midlife obesity [0.36, 95% CI = 0.18, 0.70] and Mexican American women in the bottom third of the income distribution were more likely to be obese [3.87, 95% CI = 1.93, 7.73]. For White women, parental education remained significant [1.57, 95% CI = 1.21, 2.04] but there were no significant education effects in the adjusted model. Income in the adjusted model was significantly associated with obesity. In the bottom third, the risk was 1.74 [95% CI = 1.29, 2.34] and the mid-third 1.42 [95% CI = 1.11, 1.82] times greater than those in the top third of the income distribution. For African American women, there were no statistically significant effects between either the child or the adult economic indicators and midlife obesity.

Discussion

This is the first study, to our knowledge, to examine the association between child and adult economic indicators on midlife obesity in Mexican American women. These results suggest that there was an increased risk for midlife obesity with disadvantaged economic status measured during childhood and at midlife in Mexican American women. The economic effects on midlife obesity in Mexican American women were similar to those found for White, but not African American women. With respect to African American women, this study found

results that parallel results reported by James and colleagues, in that there were few economic influences on obesity at midlife in this sample of African American women. The percentage of women who were obese by race/ethnic group matched the percents reported in Ogden et al.'s (2006) analysis of the NHANES data. A greater percentage of African American women were obese when compared with Mexican American women, and a greater percentage of Mexican American women were obese when compared with White women.

Parental education was used as the measure of economic status in childhood; own education and mean adult per capita income were used as measures of economic status in adulthood. Education was thought to be salient to health because better educated individuals have greater access to health information and were better able to process information (Grossman, 1972). This leads better educated individuals to adopt healthier behaviors (Deaton, 2002). Evidence in favor of this hypothesis includes changes in the U.S. education/smoking profile after the 1964 Surgeon General's report (Chaloupka, 1995) and changes in the Ugandan education/HIV profile after introduction of the government's information campaign (De Waulk, 2004). This has implications for the effects of education on obesity in that better educated women are better positioned to access and utilize information on nutrition, exercise, and the consequences of obesity in terms of increased risks of Type-2 diabetes and cardiovascular disease. Income is thought to be salient to obesity because diets healthy in fruits, vegetables, and low-fat proteins cost more in the United States today than high-fat, high-caloric-density foods (Cutler, Glaeser, & Shapiro, 2003). Access to safe venues for exercise is also associated with a higher income. Those with a higher income can afford to purchase gym memberships and to live in safe neighborhoods with recreational areas (Burdette, Wadden, & Whitaker, 2006).

In Whites, the education effect seen in the unadjusted model was lost when adjusted for income and parent education, but both income and parent education were significant. This may reflect the overlap in these measures of economic status. While the correlations between the education and income categories were below .3, they were significant. Another possible explanation is that there is reverse causality, between obesity and income. Pagán and Dávila (1997) reported a negative association between wages and obesity in cross-sectional data. Crawley (2004) looked at wage growth and found an effect of obesity only for White women. To test for reverse causality, average adult household earnings was regressed on early adulthood BMI/obesity, education, marital status, and age. No evidence was found that early adult BMI or early adult obesity was associated with subsequent household income. This evidence lends credence to the interpretation that there was no relation between own education and midlife obesity conditional on the other variables used in the analysis.

The finding that, among Mexican American women, high school dropouts were less likely to be obese than those with higher education was surprising. There was heterogeneity within the Mexican American population due to the presence of immigrants and children of immigrants who, compared with children born to U.S.-born parents, have different patterns of obesity as well as different patterns of life course economic status. Thirty-nine percent of the high school dropouts were immigrants, while only 6% of Mexican American with at least a high school diploma were immigrants. To further explore the impact of nativity status in Mexican American women on economic status and obesity patterns, these variables were examined by immigration status. Of the 422 Mexican American women in this sample, 68% were at least second generation whose parents were born in the United States ($N = 288$), while 13% were first-generation U.S.-born children of immigrants ($N = 54$) and 19% were immigrants ($N = 80$, born outside of the United States, both parents born outside the United States). A pattern similar to other studies regarding obesity and nativity was found (Goel, McCarthy, Phillips, & Wee, 2004). Individuals whose parents were born in the United States were more likely to be obese at both points in time than first-generation women, who in turn were more likely to be obese than immigrants. This was likely due, at least in part, to dietary changes with acculturation

(Winkleby, Albright, Howard-Pitney, Lin, & Fortmann, 1994). The fraction of parents of immigrants and first-generation women who had <12 years of schooling was over 80%, compared with 60% for those whose parents were born in the United States.

Implications for public health nurses

These results have both direct and indirect implications for public health nursing practice. They reinforce a general public health prevention model that conceptualizes health and disease as endpoints of a lifetime of exposures and opportunities. It also provides further evidence of the importance of public health efforts to reduce child and adolescent obesity in disadvantaged populations as a long-term strategy for health promotion of adult populations. The differences in the economic effects by race/ethnicity found in this study suggest that intervention programs must be tailored to the audience. Messages and programs developed based on relationships found for White women may not always address the ways in which economic status influences obesity development in minority populations. For Mexican American women, understanding the process of acculturation will be important in understanding how economic status may pose a risk for obesity development. These results also suggest that childhood economic disadvantage poses a risk for adult obesity in Mexican American and White women. In addition to these individually focused implications, there are broader societal policies suggested by these findings. For Mexican American and White women, economic status clearly played a role in obesity development. Programs aimed at poverty reduction, including educational reforms and funding, should be pursued as a broad-based population-based intervention for the promotion of health for Mexican American and White women.

Limitations and strengths of this study

Limitations of this study included a loss of 17% of the original cohort, the reliance on self-report weight measures, and the relatively smaller sample size of Mexican American women as compared with White and African American women. The strength of this study is that it includes a national longitudinal sample with a rich set of economic variables.

Conclusion

This study was designed to answer two questions. The first was: What is the effect of childhood and adult economic status on midlife obesity in Mexican American women? These results suggest that a low economic status in childhood increased the odds of midlife obesity, even with controls for adult economic status. Furthermore, adult economic status was shown to have an independent effect on the risk for midlife obesity, with those in the lowest income tertile at highest risk for obesity. The second was: How do these patterns in Mexican American women compare with patterns seen in White women and in African American women? The influence of economic status on obesity at midlife for Mexican American women paralleled the findings in the literature and in this study for White women, but not for African American women. This suggests that strategies that broadly improve the economic conditions of Mexican American women may be one important way to address the obesity epidemic in this population. Studies that can delve deeper into the possible underlying mechanisms to explain these observed associations are the next steps to fully understanding and then intervening in this problem area.

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TABLE 1

Sample Characteristics by Race/Ethnicity (N = 3,707)

	Mexican American (N = 422)	White (N = 2,090)	African American (N = 1,195)	p-value
Adult obesity (measured last interview age 35–44 years)				< .001
% BMI ≥ 30	34	23	42	
% BMI < 30	66	77	58	
Child economic indicator (measured age 14 years)				< .001
% Parent education < 12 years of schooling	68	19	46	
% Parent education ≥ 12 years of schooling	32	81	54	
Adult economic indicator: own education				< .001
% < 12 years	19	6	10	
% = 12 years	38	41	42	
% > 12 years	43	53	48	
Adult economic indicator: per capita income averaged across ages 25–44 years				< .001
% Bottom third	49	19	51	
% Mid-third	31	35	29	
% Top third	20	45	19	

Note. BMI = body mass index.

p-value for Pearson's chi-square test for differences between race/ethnic groups.

TABLE 2

Unadjusted Logistic Regression on Obesity, Odds Ratios [95% CI]

	Mexican American (N = 442)	White (N = 2,090)	African American (N = 1,195)
Parental education < 12	2.18 [1.37,3.48]	1.92 [1.51,2.45]	1.18 [0.94,1.49]
Own education			
< 12	0.80 [0.44,1.43]	2.33 [1.55,3.50]	1.64 [1.09,2.45]
= 12	1.51 [0.97,2.36]	1.32 [1.07,1.64]	0.99 [0.78,1.26]
> 12	1.00	1.00	1.00
Adult PC income			
Bottom third	0.97 [0.57,1.66]	1.20 [0.91,1.58]	1.08 [0.81,1.45]
Mid-third	0.98 [0.55,1.73]	1.52 [1.21,1.92]	1.14 [0.83,1.57]
Top third	1.00	1.00	1.00

TABLE 3

Multivariate Logistic Regressions of Obesity, Odds Ratios [95% CI]

	Mexican American (N = 442)	White (N = 2,090)	African American (N = 1,195)
Parental education < 12	1.89 [1.16,3.09]	1.57 [1.21,2.04]	1.12 [0.87,1.41]
Own education			
< 12	0.36 [0.18,0.70]	1.43 [0.91,2.24]	1.42 [0.93,2.21]
= 12	0.84 [0.51,1.39]	1.04 [0.83,1.32]	0.92 [0.70,1.19]
> 12	1.00	1.00	1.00
Adult PC income			
Bottom third	3.87 [1.93,7.73]	1.74 [1.29,2.34]	1.31 [0.92,1.82]
Mid-third	1.66 [0.84,3.28]	1.42 [1.11,1.82]	1.26 [0.89,1.78]
Top third	1.00	1.00	1.00

Note. Age also included.