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Prospective association between body mass index and receipt of preventive services: Results from the Central Pennsylvania Women's Health Study (CePAWHS)

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Abstract

Objective—We examine whether overweight and obesity are associated with disparities in clinical preventive services receipt in a unique, prospective, population-based cohort of reproductive-age women.

Method—We used data from the Central Pennsylvania Women's Health Study (CePAWHS) longitudinal survey of women ages 18–45. The baseline random-digit-dial telephone survey was conducted in 2004–2005 and a second telephone interview two years later; 1342 participants comprised the analytic sample. Dependent variables were seven preventive services identified at follow-up. In addition to baseline body mass index (BMI) category, independent variables were selected based on the behavioral model of health services utilization.

Results—Forty-six percent of the sample was classified as normal weight, 28% as overweight, and 26% as obese. In adjusted analyses, women who were overweight and obese, compared to women with normal weight, were more likely to receive preventive counseling for diet/nutrition, physical activity, and weight management ($p < 0.01$). Overweight and obese women received more cholesterol and diabetes screening ($p < 0.05$ and $p < 0.01$, respectively). However, there were no differences by BMI category in receipt of Pap testing or reproductive counseling.

Conclusion—Overall, we found that women with overweight and obesity were more likely to receive preventive services, especially services relevant for overweight and obese populations.

Introduction

Optimizing receipt of preventive services is recommended by multiple professional groups and is critical for providing high-quality, comprehensive primary care for women (US Preventive Services Task Force, 2011; Centers for Disease Control and Prevention (CDC) (Johnson et al., 2006); American College of Preventive Medicine (Nawaz and Katz, 2001)). Women who are overweight have heightened need for preventive healthcare, given

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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increased cervical cancer mortality (Flegal et al., 2007), co-morbid cardiovascular risk factors (Flegal et al., 2007), and adverse pregnancy outcomes (Viswanathan et al., 2008).

Studies have not conclusively shown whether overweight/obesity is associated with preventive healthcare service receipt. Some studies suggest underutilization of services in women who are overweight and obese (Wee et al., 2000, Ostbye et al., 2005) due to limited visit duration, competing medical priorities, or physician bias (Wee et al., 2000, Ostbye et al., 2005). Other studies show that overweight and obese women receive equal or even more preventive services -- possibly due to greater need for services associated with obesity-related comorbidities or to greater screening opportunities due to frequent medical appointments (Chang et al., 2010, Littman et al., 2011, Yancy et al., 2010). However, no studies have focused specifically on reproductive-age women, a population with unique preventive service needs.

This study examines disparities in receipt of clinical preventive services by body weight in a prospective, population-based cohort of reproductive-age women. We examine the association between body mass index (BMI) and preventive service receipt, controlling for relevant factors. We hypothesize that overweight/obese women are less likely than normal weight women to receive preventive services.

Methods

Study Design and Sample

We used data from the Central Pennsylvania Women's Health Study (CePAWHS) longitudinal survey of women ages 18–45 (Weisman et al., 2006). The Penn State College of Medicine Institutional Review Board approved the study. The baseline random-digit-dial telephone survey was conducted in 2004–2005 and was representative of the target population of reproductive-age women in the region (Weisman et al., 2006). A follow-up survey was conducted two years later with a 79% response rate (Weisman et al., 2011). For this analysis we excluded women who were either pregnant ($n=54$) or underweight at baseline ($BMI<18.5$; $n=23$), resulting in an analytic sample of 1,343.

Dependent Variables

Seven preventive services were identified as dependent variables: preventive counseling for (1) diet/nutrition, (2) physical activity, (3) weight management, and (4) reproductive counseling (defined as counseling for pregnancy planning, birth control or preconception care); (5) cervical cancer screening; (6) cholesterol screening; and (7) diabetes screening. All selected preventive services were based on clinical guidelines for either all women or women classified as overweight/obese (Nawaz and Katz, 2001; Johnson et al., 2006; US Preventive Services Task Force, 2011; NCEP, 2002; ADA, 2010).

Receipt of preventive services was measured in the follow-up survey by asking, 'In the past 2 years, have you received any of the following health services?' followed by "Pap smear or test," "blood cholesterol or lipids test," and "test for diabetes" (yes/no). Receipt of counseling services was based on the question, 'In the past 2 years, has a doctor or other health professional asked you or talked to you about any of the following things?' followed by "birth control," "planning for pregnancy," "preconception care," (defined as reproductive counseling), "diet and nutrition," "weight management," and "physical activity" (yes/no).

Independent Variables

All independent variables were measured at baseline. BMI was calculated using self-reported height and weight, classified using World Health Organization categories: normal

weight [BMI 18.5–24.9], overweight [BMI 25–29.9], and obese [BMI ≥30]. Additional independent variables were selected based on the behavioral model of health services utilization (Andersen, 1995): (i) *predisposing* - age, race/ethnicity, urban residence, and education; (ii) *enabling* - having a usual healthcare provider, use of an obstetrician-gynecologist (Henderson et al., 2002), non-poverty status, and continuous health insurance coverage; and (iii) *need* variables - overall health status [a single item from the Short Form 12 (Ware et al., 1996)] and any metabolic comorbidity (hypertension, high cholesterol and/or diabetes mellitus).

Statistical Analyses

Chi-square tests were used for bivariate comparisons of study variables by BMI category. Seven multiple logistic regression models assessed the independent contribution of BMI category to receipt of preventive services, controlling for predisposing, enabling, and need variables. All statistical analyses were conducted using SAS Version 9.2 (Cary, NC).

Results

Baseline characteristics of women by BMI category are shown in Table 1. Forty-six percent of the analytic sample was classified as normal weight, 28% as overweight, and 26% as obese. Women who were obese were older, had lower educational attainment, were more likely to be in or near-poverty status, were less likely to see an obstetrician-gynecologist, and had lower overall self-rated health status and higher rates of metabolic co-morbidities.

Both in bivariate analysis (Table 1) and in multivariable analyses controlling for predisposing, enabling, and need variables (Table 2), women who were overweight or obese were more likely than normal weight women to receive preventive counseling for diet or nutrition (respective AOR (95% CI): 2.5 (1.9–3.3); 4.6 (3.4–6.3)), physical activity (respective AOR (95% CI): 1.8 (1.4–2.3); 2.8 (2.1–3.8)), weight management (respective AOR (95% CI): 4.6 (3.3–6.4); 13.0 (9.1–18.8)), and screening for cholesterol (respective AOR (95% CI): 1.3 (1.0–1.7); 2.1 (1.5–2.8)) and diabetes (respective AOR (95% CI): 1.4 (1.0–1.8); 2.1 (1.5–2.8)). BMI category had no independent effect on receipt of Pap tests or reproductive counseling in multivariable analyses.

Discussion

Overall, we found that overweight and obese women were more likely than normal weight women to receive several preventive services, including services relevant to their weight category. However, most preventive services were provided to less than half of the women. The findings do not support the hypothesis that overweight and obese women are less likely to receive recommended preventive services. Consistent with prior report (Littman et al., 2011, Yancy et al., 2010) and in concordance with clinical guidelines (US Preventive Services Task Force, 2011), these findings suggest that providers are appropriately targeting preventive services to overweight and obese patients. Alternatively, women who are overweight and obese may be more likely to seek these services. For example, having a metabolic co-morbidity was an independent predictor of weight management counseling receipt.

For preventive screenings, women classified as overweight and obese received similar rates of Pap testing to normal weight women. Our finding contrasts with studies reporting that overweight and obese women were less likely to be screened for cervical cancer (Wee et al., 2000, Ostbye et al., 2005), a significant finding given that we evaluated reproductive-age women, instead of all adult women. This difference may be explained, in part, by lower rates

of cervical cancer screening in general among older women (Ostbye et al., 2005, Wee et al., 2000).

Of potential concern is the low rate of reproductive counseling provided to reproductive-aged overweight and obese women, given the elevated risk of pregnancy-related morbidity and adverse pregnancy outcomes (Viswanathan et al., 2008). Although rates of reproductive counseling did not differ by BMI category, less than one-third of overweight and obese women received this service. As 88% of U.S. women of reproductive age are sexually active, preconception care is an essential component of preventive care for this population (Duberstein Lindberg and Singh, 2008). Women who did not see an obstetrician-gynecologist were significantly less likely to receive reproductive counseling, and women with a higher BMI were less likely to see an obstetrician-gynecologist.

Study Limitations and Strengths

Self-reported data may be inaccurate due to subject recall. Despite this limitation, self-report remains a common methodological approach for assessing receipt of preventive counseling (Littman et al., 2011, Wee et al., 2000). Further, self-reported height and weight accurately represent BMI in reproductive-age women (Brunner Huber, 2007). As our population was predominantly white (92%), results may not be generalizable. Additionally, misclassification may have occurred as BMI was assessed at baseline and not at the time of service receipt. We did not correct for multiple comparisons.

This study has important strengths. In contrast to cross-sectional studies, we prospectively investigate the association between BMI and preventive services. Further, we adjust for covariates that might explain differences in preventive services receipt, based on the behavioral model of health services utilization. We are aware of no other study evaluating the association of reproductive counseling with BMI.

Conclusion

Overweight and obese women were more likely to receive several preventive services than normal weight women, but there is a need to improve the delivery of preventive services to all women.

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Table 1

Baseline Characteristics and Self-reported Receipt of Preventive Services at 2 year follow-up by Women (n=1317)^a in the Central Pennsylvania Women's Health Study (CePAWHS) conducted 2004–2007, by Body Mass Index (BMI) Category, Percent (n)

Participant Characteristics	Total Sample (n=1317)	Normal: BMI 18.5–24.9 (46%; n=609)	Overweight: 25 BMI <30 (28%; n=371)	Obese: BMI 30 (26%; n=337)	P value
Demographics (Predisposing variables)					
Age (yrs)					
18–24	11.4 (150)	14.8 (90)	10.5 (39)	6.3 (21)	
25–34	34.7 (456)	33.3 (202)	37.5 (139)	34.2 (115)	
35–45	53.9 (708)	51.9 (315)	52.0 (193)	59.5 (200)	0.001
White (not Hispanic)	92.2 (1210)	93.4 (566)	92.5 (343)	89.6 (301)	0.11
Education: High school or less	36.6 (482)	35.3 (215)	31.5 (117)	44.5 (150)	0.001
Geographic location: Urban	61.0 (802)	60.0 (365)	62.3 (230)	61.4 (207)	0.76
Healthcare Access (Enabling variables)					
Has a regular healthcare provider	90.7 (1194)	89.2 (543)	91.6 (340)	92.6 (311)	0.18
Sees an obstetrician-gynecologist	72.1 (950)	74.7 (455)	73.9 (274)	65.6 (221)	0.008
Poverty status					
Poverty	7.1 (93)	6.4 (39)	5.7 (21)	9.8 (33)	
Near poverty	18.1 (238)	15.6 (95)	17.8 (66)	22.9 (77)	
Not poverty	63.8 (840)	65.2 (397)	67.7 (251)	57.0 (192)	
Income data not provided	11.1 (146)	12.8 (78)	8.9 (33)	10.4 (35)	0.006
Health insurance: Gap in coverage in past 12 months	16.6 (218)	16.1 (98)	17.0 (63)	16.9 (57)	0.92
Health behaviors and indicators (Need variables)					
Co-morbidities: Metabolic Diseases (hypertension, high cholesterol or diabetes mellitus)	21.9 (288)	13.3 (81)	18.6 (69)	41.0 (138)	<0.001
Overall self-rated health status: Excellent/very good	64.7 (852)	76.2 (464)	62.8 (233)	46.0 (155)	<0.001

Participant Characteristics	Total Sample (n=1317)	Normal: BMI 18.5-24.9 (46%; n=609)	Overweight: 25 BMI <30 (28%; n=371)	Obese: BMI 30 (26%; n=337)	P value
Preventive Counseling Services Provided					
Diet or Nutrition	44.1 (580)	28.5 (173)	50.3 (186)	65.8 (221)	<0.0001
Physical Activity	43.5 (571)	32.6 (198)	47.0 (174)	59.2 (199)	<0.0001
Weight Management	31.7 (417)	11.5 (70)	37.0 (137)	62.5 (210)	<0.0001
Reproductive care	36.3 (477)	41.3 (251)	35.7 (132)	28.0 (94)	<0.0001
Preventive Screening Services Provided					
Pap smear	85.6 (1125)	86.8 (528)	86.5 (320)	82.4 (277)	0.16
Cholesterol	50.8 (668)	42.3 (257)	51.4 (190)	65.8 (221)	<0.0001
Diabetes	43.7 (574)	35.7 (217)	44.6 (165)	57.1 (192)	<0.0001

^aThe lower base n is due to missing data.

Table 2

Predictors of Receiving Preventive Services for Women (n=1,317) in the Central Pennsylvania Women's Health Study (CePAWHS) conducted 2004–2007.

Predictors ^a	Preventive Services (Adjusted Odds Ratio and 95% Confidence Interval)						
	Counseling			Screening			
	Diet or Nutrition	Physical Activity	Weight Management	Reproductive Counseling	Cervical Cancer	Blood Cholesterol	Diabetes
Body Mass Index Category							
Overweight vs. normal weight	2.5 (1.9–3.3) ^{**}	1.8 (1.4–2.3) ^{**}	4.6 (3.3–6.4) ^{**}	0.8 (0.6–1.1)	0.9 (0.6–1.4)	1.3 (1.0–1.7) [*]	1.4 (1.0–1.8) [*]
Obese vs. normal weight	4.6 (3.4–6.3) ^{**}	2.8 (2.1–3.8) ^{**}	13.0 (9.1–18.8) ^{**}	0.7 (0.5–1.0)	0.8 (0.5–1.3)	2.1 (1.5–2.8) ^{**}	2.1 (1.5–2.8) ^{**}
Demographics (Predisposing)							
Ages 25–34 vs. Ages 18–24	0.7 (0.5–1.0)	0.8 (0.5–1.2)	0.7 (0.5–1.2)	0.4 (0.3–0.7) ^{**}	1.1 (0.7–2.0)	1.4 (0.9–2.2)	1.3 (0.8–2.0)
Ages 35–45 vs. Ages 18–24	0.8 (0.5–1.2)	1.1 (0.7–1.6)	0.8 (0.5–1.4)	0.1 (0.1–0.2) ^{**}	1.0 (0.6–1.8)	2.8 (1.8–4.2) ^{**}	1.9 (1.3–2.9) ^{**}
White, Non-Hispanic vs. other	1.1 (0.7–1.7)	1.2 (0.8–1.9)	1.3 (0.8–2.1)	0.9 (0.6–1.4)	0.5 (0.3–1.1)	0.8 (0.5–1.3)	0.7 (0.5–1.1)
High school graduate or less vs. greater	0.7 (0.6–0.9) ^{**}	0.8 (0.6–1.0) [*]	0.7 (0.5–0.9) ^{**}	0.7 (0.5–0.9) ^{**}	0.7 (0.5–1.0) [*]	0.7 (0.6–1.0) [*]	0.8 (0.6–1.0)
Rural area vs. Urban area	0.8 (0.6–1.1)	0.8 (0.6–1.0)	1.0 (0.8–1.3)	0.9 (0.7–1.2)	0.8 (0.6–1.2)	1.0 (0.8–1.2)	1.0 (0.8–1.3)
Healthcare Access (Enabling)							
Usual source of care vs. none	1.0 (0.6–1.5)	1.2 (0.8–1.7)	1.1 (0.7–1.8)	1.0 (0.7–1.6)	1.2 (0.7–2.0)	1.8 (1.2–2.8) ^{**}	0.9 (0.6–1.3)
No Ob-gyn vs. Ob-gyn	0.8 (0.6–1.0)	0.9 (0.7–1.1)	0.8 (0.6–1.0)	0.6 (0.4–0.8) ^{**}	0.3 (0.2–0.4) ^{**}	1.1 (0.9–1.5)	1.0 (0.8–1.3)
In poverty vs. not in poverty	0.9 (0.6–1.5)	0.7 (0.4–1.1)	0.5 (0.3–1.0) [*]	0.8 (0.5–1.4)	0.8 (0.4–1.5)	0.5 (0.3–0.8) ^{**}	0.7 (0.5–1.2)
Near poverty vs. not in poverty	1.1 (0.8–1.5)	1.1 (0.8–1.5)	0.9 (0.6–1.3)	0.7 (0.5–1.0)	0.7 (0.4–1.0)	1.0 (0.7–1.3)	0.9 (0.6–1.2)
Continuous health insurance coverage vs. gap in past 12 months	1.1 (0.8–1.6)	1.1 (0.8–1.5)00	1.2 (0.8–1.8)	1.1 (0.8–1.6)	1.8 (1.2–2.7) ^{**}	1.3 (0.9–1.8)	1.3 (0.9–1.8)
Health behaviors and indicators (Need)							
Overall self-rated health status of Excellent/very good vs. not	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.8 (0.6–1.1)	1.1 (0.8–1.5)	1.3 (0.9–1.9)	0.8 (0.6–1.0)	0.9 (0.7–1.1)
No metabolic comorbidities vs. metabolic comorbidities	0.6 (0.5–0.9) ^{**}	0.8 (0.6–1.0)	0.6 (0.4–0.8) ^{**}	1.1 (0.8–1.5)	1.0 (0.6–1.5)	0.5 (0.3–0.6) ^{**}	0.6 (0.5–0.8) ^{**}
Model c statistic	0.70	0.65	0.79	0.73	0.74	0.70	0.65

^aThe second listed variable is the reference group.

10.0>1
50.0>1
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