**BHS Manuscript Proposal**

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| **Title of Manuscript** | Childhood Obesity and Risk of Sleep Apnea in Middle-Age: The Bogalusa Heart Study  |
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**Outline of Manuscript:**

1. **Introduction**

Obstructive sleep apnea (OSA) affects 24% of middle-aged men and 9% of middle-aged women the general population, and the prevalence of OSA has increased substantially over the past several decades. Intermittent hypoxemia and sleep disruption are the hallmarks of OSA, which in turn are associated with an increased risk for cardiovascular and neurocognitive morbidity and mortality. Compelling evidence has suggested that obesity in adulthood is an important risk factor for OSA. However, whether childhood obesity has long-term effects on the development of OSA at mid-life or later is uncertain. Currently, 15% of American children are overweight. This increase in pediatric obesity has been associated with the earlier development of insulin resistance, diabetes, hypertension, and dyslipidemia. The appearance of these cardio-metabolic risk factors in youth may present important public health consequences in adulthood. We will prospectively examine the association of obesity patterns, including overweight status, duration and onset age in childhood, with subsequent risk of OSA in middle-age using data from the Bogalusa Heart Study.

1. **Methods**
2. **Study Population**

Individuals who have measures of adiposity at least two times in childhood and who completed examination and responded to the Berlin Questionnaire assessment of OSA risk in 2010.

1. **Data Required**

Childhood overweight: Body weight and height at each examination available in childhood. BMI will be calculated and compared to appropriate norms to establish childhood overweight status.

Sleep-related outcomes: High-risk for OSA by Berlin Questionnaire score in 2010 will be the primary outcome. Secondary outcomes include persistent snoring and persistent daytime sleepiness as reported on the Berlin Questionnaire.

Covariates :Race, gender, eucational level (<high school/≥high school), self-reported current smoking status (yes/no), self-reported regular alcohol drinking (yes/no) and self-reported leisure-time physical activity on a scale of 1 (very inactive) to 5 (very active) obtained at each survey.

1. **General Analysis Plan**

We will examine overweight status, duration and onset age, based on multiple measures of BMI in childhood. Overweight status will be categorized as never overweight, weight cycling (any shift in classification from overweight to normal weight), persistent overweight (overweight at all measures) and incident overweight (normal weight then becoming and remaining overweight through the last examination in childhood). Duration of overweight in childhood will be based on the presence of overweight at each follow-up exam and the preceding examination. For participants in the persistent or incident overweight groups, duration will be calculated as the cumulative number of consecutive years of overweight throughout childhood; for those in the never overweight group, the duration is 0; and the duration will not be calculated for those in the overweight cycling group because the impact of overweight duration is not clear. Onset age of overweight will be determined using individuals' age at the initial overweight classification and categorized as prior to puberty (earlier than 12 years age) or adolescent (13 to 18 years of age) for those in the incident overweight group only.

Descriptive statistics will be employed to define population characteristics and sleep related outcomes in adulthood will be obtained for all study variables by the four overweight patterns. Polytmous logistic regression models will be used, adjusted for age, race, gender, and follow-up time, educational levels, leisure-time physical activity (measured in adulthood), with time-dependent covariates including regular alcohol use and current smoking. Gender and race differences will be tested for interaction. Analyses will be performed using SAS 9.3 for Windows (SAS Institute, Cary, North Carolina).