DIGITAL ACCESS TO SCHOLARSHIP AT HARVARD
DASH.HARVARD.EDU

HARVARD LIBRARY
Office for Scholarly Communication

The Impact of Socioeconomic Status across Early Life on Age at Menarche Among a Racially Diverse Population of Girls

Citation
James-Todd, Tamarra, Parisa Tehranifar, Janet Rich-Edwards, Lina Titievsky, and Mary Beth Terry. 2010. “The Impact of Socioeconomic Status Across Early Life on Age at Menarche Among a Racially Diverse Population of Girls.” Annals of Epidemiology 20 (11) (November): 836–842. doi:10.1016/j.annepidem.2010.08.006.

Published Version
doi:10.1016/j.annepidem.2010.08.006

Permanent link
http://nrs.harvard.edu/urn-3:HUL.InstRepos:23888008

Terms of Use
This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Open Access Policy Articles, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#OAP

Share Your Story

The Harvard community has made this article openly available.
Please share how this access benefits you. Submit a story .

Accessibility

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

NIH Public Access
Author Manuscript
Ann Epidemiol. Author manuscript; available in PMC 2011 November 1.

Published in final edited form as:
Ann Epidemiol. 2010 November ; 20(11): 836–842. doi:10.1016/j.annepidem.2010.08.006.

The impact of socioeconomic status across early life on age at menarche among a racially diverse population of girls

Tamarra James-Todd, PhD[1], **Parisa Tehranifar, DrPH**[2], **Janet Rich-Edwards, DSc**[1,3], **Lina Titievsky, MPH**[2], and **Mary Beth Terry, PhD**[2]

[1] Connors Center for Women's Health and Gender Biology, Brigham and Women's Hospital and Harvard Medical School, Boston, MA

[2] Department of Epidemiology, Columbia University Mailman School of Public Health, New York, NY

[3] Department of Epidemiology, Harvard School of Public Health, Boston, MA

Abstract

Purpose—We evaluated the association between childhood socioeconomic status (SES) at two time points and age at menarche in a multiracial sample of U.S. girls.

Methods—Our study population consisted of a cohort of female participants enrolled at birth in the New York site of the Collaborative Perinatal Project, born 1959–1963 (n=262). SES at birth, at age 7, and change between birth and age 7 were measured prospectively through an index score of family income, paternal occupation, and education. Data on age at menarche were collected retrospectively through adult self-report. We used multivariable linear regression to examine the association between SES and age at menarche after adjusting for childhood body mass index (BMI) and other covariates associated with age at menarche.

Results—After adjustment, SES at age 7 was positively associated with age at menarche (beta: 0.015, CI: 0.003, 0.024 per unit of SES index). Change in SES was significantly associated with age at menarche; a 20 unit decrease in SES was associated with a 4 month decrease in age at menarche.

Conclusions—Our results suggest that lower SES at 7 years and reductions in SES in early childhood are both associated with an earlier age at menarche.

MeSH heading key words

socioeconomic status; menarche; African-American; Hispanic; urban population

Introduction

Earlier age at menarche is associated with an increased risk of breast cancer (1,2). Age at menarche is influenced by higher subcutaneous fat levels and pre-pubertal body size (3–5). Additionally, psychosocial stress during early childhood could disrupt the hypothalamic-

Corresponding author: Tamarra James-Todd, Brigham and Women's Hospital, 1620 Tremont St., 3rd Floor, Boston, MA 02120, Phone: 617.525.8193/ n2tjt@channing.harvard.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

pituitary-adrenal (HPA) axis leading to earlier onset of menarche (6–10). These factors could be influenced by social conditions; in that, lower socioeconomic status (SES) is associated with increased body size (11,12) and psychosocial stress (13–16). Thus, SES could operate through factors such as, body size (3–5) and psychosocial stress (6–10) to alter age at menarche.

Few studies have examined the association between SES and age at menarche in a multiracial population living in the U.S. Results from one U.S. study found that girls from higher SES reached menarche later (17), while a second study found no association between childhood deprivation and age at menarche (18). However, no study to our knowledge has examined a multi-dimensional measure of SES (including income, education, and occupation). Moreover, it is unclear whether change in SES over time is also associated with age at menarche.

In this study, we examined the association between childhood SES across two pre-pubertal time points and age at menarche. We used a multi-dimensional measure of SES consisting of the three major components of SES: income, education, and occupation. We hypothesized that lower SES at birth, at age 7, and a decrease in SES between these two time periods would be associated with earlier age at menarche, independent of race/ethnicity, childhood body size, maternal factors, and living arrangements.

Methods

Study Population

Original Cohort—Study participants were adult women who participated as children in the New York site of the Collaborative Perinatal Project (CPP). Participants' mothers were recruited during pregnancy, and followed through pregnancy, labor and delivery. Children were followed from birth through age 7. Between 1959 and 1963, there were 2,138 births (1,026 females) in the New York City site of CPP, 841 of these female offspring were followed until age 7 years. Information regarding the recruitment of study participants into this project have been described elsewhere (19–22).

Baseline for Adult Follow-up—From 2001–2006, the adult participants who were followed until age 7 were re-contacted to participate in an adult follow-up study. Upon confirming a participant's identity (20), we asked women if they would like to participate in the adult follow-up. After women consented to participate in the adult follow-up to the CPP, we mailed women a questionnaire. Of these, 11 women did not have data on age at menarche and an additional 14 women did not have data on childhood SES, resulting in a total of 237 women included in our final analysis. Of the 841 eligible participants, 375 (45%) were successfully traced. Of this traced population, 262 women (70%) completed a survey used in this study. Of these, 11 women did not have data on age at menarche and 14 women did not have data on childhood SES, resulting in a total of n=237 women included in our final analysis.

Data collection

Variables collected in original CPP—Information on maternal, paternal, and child health was collected. Data included mother's reproductive history, including maternal age at menarche, as well as sociodemographic characteristics, such as father's absence from the home at birth. Children's height and weight were measured prospectively at birth and until age 7. These anthropometric measurements were taken by trained interviewers at clinic visits. Details of this data collection have been described elsewhere (22).

NIH-PA Author Manuscript NIH-PA Author Manuscript NIH-PA Author Manuscript

Childhood SES—Detailed information on SES was collected prospectively during the original CPP. SES information was collected at the time of registration and at age 7. An index for SES was constructed using the 1960 census data (23). This index took into account three components of SES: education, income, and occupation. All index scores used in this analysis were based on family income, father's education and occupation. The index ranged from 0 to 100, with higher SES scores reflecting higher levels of SES. For example, someone who earned between $500 and $999 per year could have a score of 3 on the income component of the index; a high school graduate could have a score of 69 on the education component of the index, whereas a dentist could have a score of 99 on the occupation component of the index. The three scores making up the individual components of SES were combined to create one summary score for overall SES for each time period. In our analysis, we also examined the association between each of the individual components of SES and early age at menarche. We evaluated the change in SES, defined as the difference between SES at birth and age 7.

Adult Questionnaire—The adult questionnaire collected data on the women's personal health, sociodemographic characteristics, and health behavior information. We asked women to report their race/ethnicity, which was correlated with race/ethnicity data in childhood records. Given that the association between SES and age at menarche were similar for adult and childhood measures of race/ethnicity, we used adult self-reported race/ethnicity for this analysis. We also asked place of birth of the participants' parents.

Age at menarche—Participants were asked during this adult follow-up to report their age at menarche. Specifically, the question was "How old were you when you had your first menstrual period?" Values for age at menarche were recorded in years.

Statistical analysis

We used analysis of variance (ANOVA) to evaluate the crude association between SES variables, race/ethnicity, mother's place of birth, father's absence from the home at birth and age at menarche. We used linear regression models to evaluate the independent association between SES and age at menarche. We constructed four main models separately for each time period of SES as well as change in SES: 1) a crude model, 2) a race/ethnicity-adjusted model, 3) a model adjusted for BMI at age 7, and 4) a model adjusted for race/ethnicity, BMI at age 7, mother's age at menarche, mother's place of birth, and father's absence from the home at birth. Each model contained only one of the following SES constructs: SES at birth, age 7, or change in SES. Race/ethnicity, mother's place of birth, mother's age at menarche, and father's absence from the home were considered potential confounders based on a 10% change in the beta coefficient for childhood SES. We also included BMI at age 7 as a covariate in our models, given that it is a strong predictor of age at menarche (3,24,25). Finally, we tested for interactions between the SES constructs and race/ethnicity by including interaction terms of these two variables in our models. Effect modification was indicated if the interaction term had a p-value <0.05. All analyses were conducted in SAS v. 9.1 (Cary, NC).

Results

The mean SES score was 55 (median SES score at birth was 54) (SD: 17.3) and range of 15 to 93 (Table 1). The median score for SES at age 7 was 56 (SD: 20.3) and range of 7 to 97. SES score for both birth and age 7 were more highly correlated with education than income at each of these time points. The correlation coefficients were moderate to high for childhood SES and income, as well as childhood SES and education for both time periods (r ranging from 0.52 to 0.77), but was lower for occupation. Based on 1960 U.S. census data, a

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

median score of 56 at age 7 was typical of a father that was a machine operator, sales worker, or service man. The education status for someone with the median SES score was somewhere between 8th grade and 12th grade. The annual income level for the majority of our study population with the median SES was $6,000–$8,000.

Change in SES ranged from −55 to 53, with a median of 0. The majority (57%) of the study population experienced slight changes of no more than 10 points in their SES index between birth and age 7. However, 22% of the population experienced an increase of greater than 10 points on the SES index. Approximately, 21% of the study population had a decline of more than 10 points on the SES index, with 5% of these experiencing a decrease of almost 30 points on the index.

Age at menarche ranged from 8 to 19 years of age, with a median of 12 years. 50% of girls reached menarche between the ages of 12 and 13 years, with 27% reporting age at menarche <12 years and 24% reporting menarche >=14 years. The median BMI at age 7 for this study population was 15.4.

The study population consisted of African-American (35.9%), White (27.8%), and Hispanic girls (36.3%). A substantial proportion of the mothers were born outside of the United States (38.4%). Almost ten percent of participants' mothers reported that the biological fathers did not live with them at the time of participant's birth.

In table 2, we present the association between childhood SES and age at menarche. After adjusting for race/ethnicity, BMI at age 7, mother's age at menarche, mother's place of birth, and father's absence at birth, we did not find SES at birth to be significantly associated with age at menarche (Table 2a). However, we did find that for each one point increase in childhood SES at age 7 there was a statistically significant delay in age at menarche (adjusted beta: 0.015 (0.003, 0.024)) (Table 2b).

BMI at age 7 was not associated with SES but it was positively associated with age at menarche, and was retained in the final model to determine the independent association between childhood SES and age at menarche. Race/ethnicity did not modify the association between SES and age at menarche.

In Table 3, we present the association between change in SES from birth to age 7 and age at menarche. The change in SES from birth to age 7 was also associated with age at menarche (adjusted beta=0.018 unit change in SES, 95% CI: 0.005, 0.030). This finding suggest that a girl whose SES score decreased by 20 points between birth and age 7 (10% of the population), would experience a 4 month decline in age at menarche. A girl with the greatest decline in our study population—a 55 point decrease on the SES scale—would reach menarche almost a full year earlier.

Discussion

In this study population, lower childhood SES and decreasing SES between birth and age 7 were associated with earlier age at menarche after controlling for race/ethnicity, BMI at age 7 years, mother's age at menarche, mother's place of birth, and father's absence from the home at birth. Our findings are consistent with results from another U.S. study, in which girls of lower SES were found to have greater odds of reaching menarche by age 12 years than reaching menarche at a later age (17). The use of household income and parental education as proxies for SES was consistent with our measures of SES at birth and age 7 years. However, this study, in contrast to ours, did not consider occupation as an additional dimension of SES. Furthermore, this study did not examine change in SES across two time points during the pre-pubertal period on age at menarche. Our study also adds to the

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

literature by examining this research question in a racially diverse population that includes Hispanic girls.

While the results of the current study are similar to Braithwaite et al, Wise et al., did not find an association between childhood economic deprivation and age at menarche. However, the measure of deprivation differed from the multi-dimensional assessment of SES collected prospectively in our study population. Instead, women were asked to recall certain details of their childhood economic situation, including receipt of welfare. Recall of childhood socioeconomic conditions is subject to misclassification and bias. For example, participants may not have known whether their parents had difficulty paying the rent or if they received welfare. In our study, SES was collected prospectively and obtained directly from the parents of the study participants.

Studies conducted in developing and economic transition countries have found girls from lower SES to reach menarche at a later age as compared with girls from higher SES (26,27), a finding that is in contrast to our and Braithwaite et al’s study results. However, these different associations may reflect the differences in the underlying associations between SES and body size and related risk factors (e.g., nutrition, physical activity) in developing and developed countries. Specifically, while lower socioeconomic status and increased body size are inversely associated in the United States and most western countries, they are positively associated in developing countries (28–30). The different association between SES and body size seen in developing countries may predict different associations between SES and age at menarche.

In the current study, BMI at age 7 was not associated with SES. This finding suggests that SES may operate through a different mechanism than increased pre-pubertal BMI in this urban population of U.S. girls. Future research should consider other pathways. An alternative pathway in which SES could operate to alter age at menarche is through the exposure to increased stress associated with lower SES (13–16). A stress hypothesis was proposed by Belsky et al, which suggested that factors, such as father’s absence from the home could result in lower SES, increased stress and more rapid maturation (6). In our study, father’s absence from the home was significantly associated with lower SES, but it was not associated with earlier age at menarche in the final models. However, other unidentified factors, which could also be related to psychosocial stress, may affect the association between SES and age at menarche.

This study has several strengths. First, our measure of childhood SES included three major dimensions of SES collected prospectively. Second, we evaluated childhood SES at two time points, birth and age 7, as well as change in SES during childhood. Third, our study population consisted of a racially and ethnically diverse population of girls born in an urban setting in the U.S., including Hispanic girls. Given that race/ethnicity has been shown to be a strong predictor of age at menarche (31,32) and that race/ethnicity and SES are closely associated with one another (31–33), studies that have variations in both SES and race/ethnicity, are needed. Fourth, we were able to consider the independent role of SES on age at menarche, after adjusting for a number of important factors related to age at menarche including childhood body size.

Limitations of this study include our retrospective assessment of age at menarche. However, several studies suggest that retrospective collection of menarche is both reliable and valid, even up to 40 years later (r=0.60–0.79) (34–40). Furthermore, it is less likely that study participants would report their age at menarche differentially based on their SES status at birth or age 7. Thus, any misclassification would be expected to dilute the true association between childhood SES and age at menarche. Also, more study participants of higher SES

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

than lower SES were traced and participated in the adult follow-up study, which may have affected our study estimates if tracing and participation also differed by age at menarche. We believe this is unlikely as most early life factors did not predict tracing and participation (20). Although we did not have a measure of SES that was closer to the actual onset of puberty for the girls in this study population, we did measure SES at age 7, which closely preceded the early stages of pubertal development and the onset of menarche. Finally, we may not have had the power to evaluate effect modification by race/ethnicity in the current study population.

In conclusion, in this diverse urban birth cohort, girls of lower SES or reduced SES experienced earlier menarche. Although we were able to consider and adjust for a variety of factors, the relations linking these variables are likely complex. Nevertheless, if replicated, our findings suggest that childhood SES may play an important role in the timing of menarche, with potential to impact future breast cancer risk.

Acknowledgments

We would like to thank the following individuals for their contributions to the New York Women's Birth Cohort: Ezra Susser, Julie Flom, Jennifer Ferris, Tara Kalra, Dipal Shah, Shobana Ramachandran, Julia Meurling, Adey Tsega, Sujata Narayanan, Summer Wright, and all of the participants in the New York Women's Birth Cohort. This work was supported by the Department of Defense Breast Cancer Research Program [DAMD170210357]; and the National Cancer Institute [K07CA90685].

List of abbreviations

SES	Socioeconomic Status
CI	Confidence Interval
BMI	Body Mass Index
CPP	Collaborative Perinatal Project
ANOVA	Analysis of Variance

References

1. Apter D, Vihko R. Early menarche, a risk factor for breast cancer, indicates early onset of ovulatory cycles. J Clin Endocrinol Metab 1983;57(1):82–6. [PubMed: 6222061]
2. Zacharias L, Wurtman RJ. Age at menarche. Genetic and environmentalinfluences. N Engl J Med 1969;280(16):868–75. [PubMed: 4887077]
3. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of menarcheal age to obesity in childhood and adulthood: the Bogalusa heart study. BMC Pediatr 2003;3:3. [PubMed: 12723990]
4. Kaplowitz PB. Link between body fat and the timing of puberty. Pediatrics 2008;121 (Suppl 3):S208–17. [PubMed: 18245513]
5. Wattigney WA, Srinivasan SR, Chen W, Greenlund KJ, Berenson GS. Secular trend of earlier onset of menarche with increasing obesity in black and white girls: the Bogalusa Heart Study. Ethn Dis 1999;9(2):181–9. [PubMed: 10421080]
6. Belsky J, Steinberg L, Draper P. Childhood experience, interpersonal development, and reproductive strategy: and evolutionary theory of socialization. Child Dev 1991;62(4):647–70. [PubMed: 1935336]
7. Kim K, Smith PK. Childhood stress, behavioural symptoms and mother-daughter pubertal development. J Adolesc 1998;21(3):231–40. [PubMed: 9657891]
8. Cesario SK, Hughes LA. Precocious puberty: a comprehensive review of literature. J Obstet Gynecol Neonatal Nurs 2007;36(3):263–74.

NIH-PA Author Manuscript NIH-PA Author Manuscript NIH-PA Author Manuscript

9. Comings DE, Muhleman D, Johnson JP, MacMurray JP. Parent-daughter transmission of the androgen receptor gene as an explanation of the effect of father absence on age of menarche. Child Dev 2002;73(4):1046–51. [PubMed: 12146732]
10. Moffitt TE, Caspi A, Belsky J, Silva PA. Childhood experience and the onset of menarche: a test of a sociobiological model. Child Dev 1992;63(1):47–58. [PubMed: 1551329]
11. Baum CL 2nd, Ruhm CJ. Age, socioeconomic status and obesity growth. J Health Econ 2009;28(3):635–48. [PubMed: 19261343]
12. Murasko JE. Socioeconomic status, height, and obesity in children. Econ Hum Biol 2009;7(3): 376–86. [PubMed: 19451039]
13. Baum A, Garofalo JP, Yali AM. Socioeconomic status and chronic stress. Does stress account for SES effects on health? Ann N Y Acad Sci 1999;896:131–44. [PubMed: 10681894]
14. Hajat A, Diez-Roux A, Franklin TG, Seeman T, Shrager S, Ranjit N, et al. Socioeconomic and race/ethnic differences in daily salivary cortisol profiles: The Multi-Ethnic Study of Atherosclerosis. Psychoneuroendocrinology.
15. Steptoe A, Dockray S, Wardle J. Positive affect and psychobiological processes relevant to health. J Pers 2009;77(6):1747–76. [PubMed: 19796062]
16. Taylor SE, Seeman TE. Psychosocial resources and the SES-health relationship. Ann N Y Acad Sci 1999;896:210–25. [PubMed: 10681899]
17. Braithwaite D, Moore DH, Lustig RH, Epel ES, Ong KK, Rehkopf DH, et al. Socioeconomic status in relation to early menarche among black and white girls. Cancer Causes Control 2009;20(5):713–20. [PubMed: 19107561]
18. Wise LA, Krieger N, Zierler S, Harlow BL. Lifetime socioeconomic position in relation to onset of perimenopause. J Epidemiol Community Health 2002;56(11):851–60. [PubMed: 12388578]
19. Terry MB, Ferris JS, Tehranifar P, Wei Y, Flom JD. Birth weight, postnatal growth, and age at menarche. Am J Epidemiol 2009;170(1):72–9. [PubMed: 19439580]
20. Terry MB, Flom J, Tehranifar P, Susser E. The role of birth cohorts in studies of adult health: the New York women's birth cohort. Paediatr Perinat Epidemiol 2009;23(5):431–45. [PubMed: 19689494]
21. Broman, S., editor. The Collaborative Perinatal Project: An Overview. New York: Praeger Pub; 1984.
22. Hardy JB. The Collaborative Perinatal Project: lessons and legacy. Ann Epidemiol 2003;13(5): 303–11. [PubMed: 12821268]
23. Methodology and scores of socioeconomic status. Washington, D.C.: United States Census Bureau; 1960.
24. Frisch RE, Revelle R. Height and weight at menarche and a hypothesis of critical body weights and adolescent events. Science 1970;169(943):397–9. [PubMed: 5450378]
25. Ferris JS, Flom JD, Tehranifar P, Mayne ST, Terry MB. Prenatal and childhood environmental tobacco smoke exposure and age at menarche. Paediatric and Perinatal Epidemiology. Epub 2010 Aug 24.
26. Henneberg M, Louw GJ. Average menarcheal age of higher socioeconomic status urban Cape coloured girls assessed by means of status quo and recall methods. Am J Phys Anthropol 1995;96(1):1–5. [PubMed: 7726292]
27. Qamra SR, Mehta S, Deodhar SD. A mixed-longitudinal study on the pattern of pubertal growth: relationship to socioeconomic status and caloric-intake--IV. Indian Pediatr 1991;28(2):147–56. [PubMed: 2055629]
28. Darmon N, Drewnowski A. Does social class predict diet quality? Am J Clin Nutr 2008;87(5): 1107–17. [PubMed: 18469226]
29. Popkin BM. The nutrition transition: an overview of world patterns of change. Nutr Rev 2004;62(7 Pt 2):S140–3. [PubMed: 15387480]
30. Popkin BM, Gordon-Larsen P. The nutrition transition: worldwide obesity dynamics and their determinants. Int J Obes Relat Metab Disord 2004;28 (Suppl 3):S2–9. [PubMed: 15543214]
31. Herman-Giddens ME, Slora EJ, Wasserman RC, Bourdony CJ, Bhapkar MV, Koch GG, et al. Secondary sexual characteristics and menses in young girls seen in office practice: a study from

NIH-PA Author Manuscript

the Pediatric Research in Office Settings network. Pediatrics 1997;99(4):505–12. [PubMed: 9093289]

32. Sun SS, Schubert CM, Chumlea WC, Roche AF, Kulin HE, Lee PA, et al. National estimates of the timing of sexual maturation and racial differences among US children. Pediatrics 2002;110(5): 911–9. [PubMed: 12415029]
33. LaVeist, TA., editor. Race, Ethnicity and Health. 1. San Francisco, CA: Jossey-Bass; 2002.
34. Casey VA, Dwyer JT, Coleman KA, Krall EA, Gardner J, Valadian I. Accuracy of recall by middle-aged participants in a longitudinal study of their body size and indices of maturation earlier in life. Ann Hum Biol 1991;18(2):155–66. [PubMed: 2024949]
35. Cooper R, Blell M, Hardy R, Black S, Pollard TM, Wadsworth ME, et al. Validity of age at menarche self-reported in adulthood. J Epidemiol Community Health 2006;60(11):993–7. [PubMed: 17053289]
36. Damon A, Bajema CJ. Age at menarche: Accuracy of recall after thirty-nine years. Hum Biol 1974;46(3):381–4. [PubMed: 4426599]
37. Damon A, Damon ST, Reed RB, Valadian I. Age at menarche of mothers and daughters, with a note on accuracy of recall. Hum Biol 1969;41(2):160–75. [PubMed: 5808780]
38. Ko KP, Park SK, Kim Y, Bae J, Jun JK, Gwack J, et al. Reliability of a questionnaire for women's reproductive history. J Prev Med Public Health 2008;41(3):181–5. [PubMed: 18515995]
39. Livson N, Mc ND. The accuracy of recalled age of menarche. Hum Biol 1962;34:218–21. [PubMed: 13931081]
40. Must A, Phillips SM, Naumova EN, Blum M, Harris S, Dawson-Hughes B, et al. Recall of early menstrual history and menarcheal body size: after 30 years, how well do women remember? Am J Epidemiol 2002;155(7):672–9. [PubMed: 11914195]

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript
NIH-PA Author Manuscript
NIH-PA Author Manuscript

Table 1

Childhood SES at age 7 by Child and Parental Factors, New York Women's Birth Cohort Adult Follow-up, 2001–2006

CHARACTERISTICS	TOTAL N=237	LOW SES (<54) N=121 (51.0)	HIGH SES (>=55) N=116 (49.0)
	μ (SD)	**μ (SD)**	**μ (SD)**
Age at menarche	12 (1.6)	12 (1.7)	13 (1.6)
Weight at age 7 in kg	22.6 (4.8)	22.6 (4.6)	22.7 (5.0)
Height at age 7 in m	1.2 (0.5)	1.2 (0.5)	1.2 (0.6)
Mother's age at menarche	13 (1.6)	13 (1.7)	13 (1.4)
	n (%)	**n (%)**	**n (%)**
Race			
Hispanic	86 (36.3)	50 (41.3)	36 (31.0)
African-American	85 (35.9)	50 (41.3)	35 (30.2)
White	66 (27.8)	21 (17.4)	45 (38.8)
Mother place of birth			
Born in U.S.	147 (62.0)	71 (58.7)	76 (65.5)
Born outside U.S.	90 (38.0)	50 (41.3)	40 (34.5)
Father absent from home at birth			
Yes	22 (9.3)	18 (14.9)	4 (3.5)
No	215 (90.7)	103 (85.1)	112 (96.5)

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 2a

SES at Birth and Age at Menarche, New York Women's Birth Cohort Adult Follow-up, 2001–2006

Variables	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
		β (95% CI)		
SES at birth	0.006 (−0.006, 0.180)	0.002 (−0.011, 0.015)	0.006 (−0.007, 0.018)	0.003 (−0.011, 0.015)
Race/Ethnicity				
Hispanic	---	−0.574 (−1.211, 0.063)	---	−0.303 (−0.902, 0.295)
African-American	---	−0.149 (−0.725, 0.427)	---	−0.227 (−0.763, 0.309)
White	---	Ref.	---	Ref.
BMI at age 7	---	---	−0.097 (−0.184, −0.011)	−0.226 (−0.418, −0.032)
Mother's age at menarche	---	---	---	0.180 (0.043, 0.316)
Mother place of birth				
Born in U.S.	---	---	---	Ref.
Born outside U.S.	---	---	---	−0.283 (−0.830, 0.265)
Father absent from home at birth				
Yes	---	---	---	−0.083 (−0.829, 0.664)
No	---	---	---	Ref.

[a]Crude model

[b]Adjusted for race/ethnicity

[c]Adjusted for BMI at age 7

[d]Adjusted for race/ethnicity, BMI at age 7, mother's age at menarche, mother's place of birth, and father's absence from the home at birth

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 2b

SES at 7 years and Age at Menarche, New York Women's Birth Cohort Adult Follow-up, 2001–2006

Variables	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
		β (95% CI)		
SES at age 7	0.016 (0.006, 0.026)	0.015 (0.005, 0.025)	0.016 (0.006, 0.026)	0.015 (0.003, 0.024)
Race/Ethnicity				
Hispanic	---	−0.344 (−0.879, 0.192)	---	−0.190 (−0.780, 0.400)
African-American	---	−0.025 (−0.556, 0.507)	---	−0.095 (−0.625, 0.435)
White	---	Ref.	---	Ref.
BMI at age 7	---	---	−0.100 (−0.185, −0.015)	−0.232 (−0.421, −0.042)
Mother's age at menarche	---	---	---	0.182 (0.048, 0.316)
Mother place of birth				
Born in U.S.	---	---	---	Ref.
Born outside U.S.	---	---	---	−0.236 (−0.773, 0.302)
Father absent from home at birth				
Yes	---	---	---	0.048 (−0.682, 0.778)
No	---	---	---	Ref.

[a]Crude model

[b]Adjusted for race/ethnicity

[c]Adjusted for BMI at age 7

[d]Adjusted for race/ethnicity, BMI at age 7, mother's age at menarche, mother's place of birth, and father's absence from the home at birth

NIH-PA Author Manuscript NIH-PA Author Manuscript NIH-PA Author Manuscript

Table 3

Association between Change in SES from Birth to Age 7 Years and Age at Menarche, New York Women's Birth Cohort Adult Follow-up, 2001–2006

Variables	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	β (95% CI)			
Δ SES from birth to age 7	0.19 (0.006, 0.032)	0.019 (0.006, 0.031)	0.019 (0.006, 0.032)	0.018 (0.006, 0.031)
Race/Ethnicity				
Hispanic	---	−0.598 (−1.198, 0.003)	---	−0.291 (−0.873, 0.292)
African-American	---	−0.114 (−0.677, 0.449)	---	−0.76 (−0.702, 0.350)
White	---	Ref.	---	Ref.
BMI at age 7	---	---	−0.100 (−0.185, −0.015)	−0.223 (−0.413, −0.033)
Mother's age at menarche	---	---	---	0.175 (0.041, 0.309)
Mother place of birth				
Born in U.S.	---	---	---	Ref.
Born outside U.S.	---	---	---	−0.308 (−0.842, 0.227)
Father absent from home at birth				
Yes	---	---	---	−0.119 (−0.837, 0.598)
No	---	---	---	Ref.

[a] Crude model

[b] Adjusted for race/ethnicity

[c] Adjusted for BMI at age 7

[d] Adjusted for race/ethnicity, BMI at age 7, mother's age at menarche, mother's place of birth, and father's absence from the home at birth