Married, Cohabiting, Single Parent, Extended, and Skipped Generation Families: Family Structure and Children's Health, Medical Care, and Schooling Outcomes in the U.S. *

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ABSTRACT

Objective. We investigate the relationship between detailed family structure and children's health care utilization, barriers to health care access, health and medical conditions, and cognitive and schooling outcomes, and then examine whether socioeconomic status (SES) explains family structure disparities in children's outcomes.

Methods. We use data from the 1997-2011 waves of the National Health Interview Survey (N=173,828) to examine children across nine family structures: (1) nuclear families that include both married parents, (2) cohabiting couple families, (3) single mother families, (4) single father families, (5) extended nuclear families that include married parents and at least one grandparent, (6) extended cohabiting couple families, (7) extended single mother families, (8) extended single father families, and (9) skipped generation families that include children and grandparents, but no parents. Multivariate logistic, ordered logistic, and negative binomial models examine the relationship between family structure and children's outcomes.

Results. Compared to children living in nuclear families, children most cohabiting, single parent, extended, or skipped generation families reported greater barriers to medical care , less optimal health care utilization patterns, poorer health, and worse schooling and cognitive outcomes. Children in single mother and extended single mother families consistently had the poorest outcomes, and the presence of grandparents in extended families did not mitigate the negative experiences among children who live in single parent or cohabiting families. Adjusting for SES partially explained family structure differences in children's wellbeing, and was most important in accounting for the adverse outcomes among children in single father and skipped generation families.

Conclusion. Over the past several decades children are increasingly living in cohabiting,

single parent, extended, or skipped generation families. But children who live non-nuclear families often have worse health and wellbeing than children who live in nuclear families, and socioeconomic status only partially accounts for those differences. Our results suggest that public health and policy interventions that target socioeconomic conditions alone cannot close family structure disparities in their health and wellbeing.

In recent decades, U.S. children are less often living with married parents and are increasingly living in a diverse array of family structures. Between 1970 and 2011 the share of children living with two married parents fell by 24%, whereas the share of children living with single mothers has doubled, the share of children living with single fathers has more than tripled, and the share of children living with grandparents has doubled (1). Children's living arrangements have been linked to their intellectual stimulation, progress through school, access to health care, hospitalizations, and smoking, drinking, and externalizing behaviors (2-8), as well as medical conditions including asthma, migraine, ear infections, allergies, obesity, and global health (9-10). But prior research has not examined the relationship between detailed structures and numerous indicators of children's health, schooling, cognitive, and health care access in a single study.

We advance research in three ways. First, we focus on nine distinct family structures in a single study: (1) nuclear families that include both married parents, (2) cohabiting couple families, (3) single mother families, (4) single father families, (5) extended nuclear families that include married parents and at least one grandparent, (6) extended cohabiting couple families, (7) extended single mother families, (8) extended single father families, and (9) skipped generation families that include children and grandparents, but no parents. Our detailed measures allow insight into family structures that are increasingly common in the U.S. but that are seldom examined in a single study, including single father, cohabiting, extended, and skipped generation families.

Family structure is a key social context that shapes children's wellbeing. Nuclear families average higher socioeconomic status (SES), greater access to health care, and the commitment of two married adults to support the wellbeing of children (11). Single parent families lack a second

parent who can contribute earnings or care for children. As a result, children in single mother families generally have worse cognitive, schooling, behavioral, and health outcomes than children in married parent families (3, 6, 10). Single fathers have fewer socioeconomic resources than married couple families, but more resources than single mother families (12-13). Some studies have found few differences between single mother and single father families, while others have found that children in single father families have equivalent or even superior behavioral and medical outcomes than those living in nuclear families (9, 14). Children in cohabiting families average worse health and educational outcomes than children in nuclear families (6, 15). Parents who are violent, not stably employed, or otherwise disadvantaged are more likely to select into cohabitation rather than marriage, resulting in less supportive and less stable families (16).

The presence of grandparents in nuclear, single parent, or cohabiting families might result in additional adults who can supplement parents' time supervising children or contribute money to the household via work or savings (17). But grandparents that are in poor health or that have few economic resources may draw money, time, and social support away from children (18). Grandparents who are the primary caretakers of their grandchildren because parents are absent (either working or attending school elsewhere, or because they are incarcerated or incapacitated by drugs or alcohol) may be the family caretakers of last resort, and are likely to have few resources and outdated skills for caring for grandchildren (19-22).

Second, we will examine multiple indicators of children's health and wellbeing in four domains: health and medical conditions, health care utilization, barriers to health care, and schooling and cognitive outcomes. Eight indicators of children's health and the presence of medical conditions offer broad insight into children's wellbeing. Four measures of barriers to

health care and two measures of health care utilization illuminate whether children utilize care efficiently and access necessary care. Three measures of schooling and cognitive outcomes are indicative of children's abilities to stay on track with their education. Indicators in these four domains provide a broad overview of the relationship between family structure and children's health and wellbeing.

Third, we examine whether SES accounts for children's health disparities across family structures. Non-nuclear families often have fewer socioeconomic resources than their counterparts that include a married couple (5, 18-19, 23). We examine four measures of SES that might explain the relationship between family structure and child outcomes. Family income indicates the resources available to families to purchase nutritious meals, salubrious forms of recreation, high quality childcare, and freedom from financial stress (24-25). Regular employment offers access to earnings, a pro-social role that integrates families into their communities, and, sometimes, health insurance (25). Education can increase the knowledge, motivation, and social status that parents and grandparents bring to bear on supporting the health and wellbeing of children (26). Finally, home ownership is a key form of wealth for many families. Wealth accumulates across generations, and can be used to put children through school, enable major purchases (including health care), buffer families from economic hardship if earnings should decline, and promote health and long lives (27-28).

DATA AND METHODS

We use data from the 1997-2011 waves of the National Health Interview Survey (NHIS), a large, cross-sectional survey that conducts face-to-face interviews. The NHIS has a response rate of 90% for eligible households. The NHIS collects basic demographic data on all individuals in sampled households, including information about how family members are related, thereby

allowing us to identify detailed family structures. Starting in 1997, the NHIS selects a random child from each household about whom they collect a set of items about health that are measured similarly through 2011. The NHIS data yield 173,828 children aged birth through age 17.

Variables

We include four sets of outcome variables. Four items indicate *barriers to adequate medical care*. The first variable is the sum of five dichotomous items that indicate reasons caregivers could have reported for delaying medical care for the child: unable to get through to the physician's office on the phone, unable to get an appointment soon enough, the wait to see the doctor is too long, unable to get to the doctor's office when they were open, and unable to find transportation to the doctor's office. The final variable ranges from 0 to 5. The other three items are dichotomous and indicate whether the child has a place where he or she usually goes to receive routine medical care, other than the emergency room; whether the child did not receive a prescription medication in the last 12 months because of cost; and whether children aged 2 to 17 did not receive dental care in the past 12 months because of cost.

Two items capture patterns of *health care utilization*. A dichotomous item indicates whether a child has failed to receive a well-child checkup in the last 12 months. An ordinal item indicates the number of times a child has been to the emergency room in the past year, where the categories are none, 1 time, 2 to 3 times, 4 to 9 times, 10 to 12 times, and 13 or more times. Greater reliance on emergency room care suggests an inefficient use of health care dollars.

Eight items capture *health and medical conditions*. Dichotomous items indicate whether the child had frequent or severe headaches, including migraines, in the past year; had a functional limitation that limits the child's ability to play, remember, walk, undertake personal care or to feed his or her self, or that requires special education or early intervention services;

had a cold in the two week interval prior to the interview (only available from 1998 to 2011); had three or more ear infections in the past year; had a condition for which he or she has regularly taken prescription medication for at least three months; or has had anemia in the past year. An ordinal item indicates the presence and severity of asthma, with four categories: never diagnosed with asthma, ever diagnosed with asthma but had no asthma attacks in the past 12 months, ever diagnosed with asthma and had an asthma attack in the past 12 months, and ever diagnosed with asthma and had an asthma attack in the past 12 months that resulted in emergency room care. Although children who have more severe asthma are more likely to have taken prescription medication for the past three months, these items are not perfectly correlated (polychoric correlation = 0.557) and offer different insight into children's health. A final ordinal variable captures the primary caregiver's assessment of the child's global health, and includes the categories of poor, fair, good, very good, or excellent.

Three items capture *schooling and cognitive outcomes* for children aged 6 through 17. The number of school days missed in the past school year ranges from 0 to 240. Two dichotomous outcomes indicate, first, whether a school representative or health professional has ever told the caregiver that the child has a learning disability, and, second, whether a doctor or health professional has ever told the caregiver that the child has attention deficit disorder or attention deficit hyperactivity disorder.

Family structure is the key predictor variable in our models and is measured categorically as: (1) nuclear family, with children and both married parents (the referent); (2) cohabiting parent family; (3) single mother family; (4) single father family; (5) extended married couple family that includes both married parents and at least one grandparent; (6) extended cohabiting family; (7) extended single mother family; (8) extended single father family; and (9) skipped

generation family that includes one or more grandparents but no parents.

Several aspects of the family relationship information in the NHIS warrant particular attention. First, less than 0.002% of children live in families that exclude both parents and grandparents, and typically include other family members (e.g., aunts, uncles) or unrelated adults. The NHIS is best suited to identifying "vertical" relationships among family members, such as grandparents, parents, children, and grandchildren, but collects little information on relationships among cousins, aunts, or uncles, so we exclude children living in families that do not include parents or grandparents. Second, the NHIS identifies families based on social rather than genetic relationships. Thus, the NHIS does not allow us to distinguish adopted or step-children from other children.

All models adjust for children's demographic characteristics. Age is measured in single years and ranges from 0 to 17. We also include age-squared to capture any non-linear relationship between age and each outcome. Sex is dichotomous. Race/ethnicity is categorical and includes non-Hispanic whites (the referent), non-Hispanic blacks, Mexican Americans, other Hispanics, and other non-Hispanics. A dummy variable indicates whether the child was born in the U.S. or elsewhere. Year of survey is measured continuously and ranges from 0 (in 1997) to 15 (in 2011) to capture any annual trends in the outcome. Dummy variables for the calendar quarter of interview capture seasonal variation. Census region is categorical and includes Northeast (referent), South, Midwest, or West. A continuous variable for the number of children in the household captures competition for parent's time, socioeconomic resources, or health care. Dummy variables indicate whether children were born at very low birth weight (<1,500 grams), low birth weight (1,500 to 2,499 grams), or adequate birth weight ($\geq$2500 grams). Caregiver recall of children's birth weight is imperfect, but remains predictive of children's health

outcomes through age 17 (29-30). The models of health and medical outcomes, and diagnosis of learning disabilities or ADD/ADHD also adjust for whether children have had a checkup in the last year because children who have forgone checkups may be less likely to have been diagnosed with these conditions.

Our complete models adjust for family socioeconomic characteristics. Family income was reported in categories that varied across survey years. To approximate a continuous variable, we took the midpoint of each closed-ended interval and estimated a median value for the open-ended interval, converted all values to 2010 dollars, adjusted for the purchasing power of different sized families, and divided the variable by 10,000 and took the log to account for the diminishing returns to health as income increases (25). A continuous variable indicates the average years of education for caregivers (parents, grandparents, or both, depending on who is in the household). We also include an indicator for the proportion of caregivers in the household who are employed. A dichotomous item indicates whether individuals own or are purchasing their house (=1), or are renting.

Analysis

Most variables are missing on less than 3% of the observations, although family income is missing for about 10% of families across waves. Given the large number of outcome and predictor variables in our analyses, even small rates of missing data can result in a substantially reduced sample size when using listwise deletion. Thus, we use multiple imputation methods to deal with missing data. Multiple imputation methods replace each piece of missing data with multiple (in our case, 10) values that are drawn from the posterior distribution of likely values, conditional on the observed covariates (31-32). Multiple imputation methods assume that missing data are missing at random, conditional on the observed data, a weaker (i.e., more

plausible) assumption than is employed by listwise deletion. Indeed, multiple imputation is a standard method for dealing with missing data among the staff of large, national surveys (33-34). We use imputation with chained equations for Stata to create our imputations (35).

We use logistic regression when modeling binary outcomes, ordered logistic regression when modeling ordered outcomes, and negative binomial regression to predict count outcomes. The negative binomial model accounts for the over-dispersion of our count variables (i.e., the variances of our count variables are larger than their means), thereby providing more efficient estimates than Poisson regression. In all cases we report exponentiated coefficients—odds ratios for logistic and ordered logistic models, and rate ratios for negative binomial models. Stata statistical software (36) accounts for the stratified and clustered nature of the NHIS when calculating standard errors for coefficients, and incorporates sample weights to ensure that our results are representative of U.S. children aged birth through 17, between 1997 and 2011.

RESULTS

Table 1 presents the unadjusted means of the count variables, percentages of the dichotomous variables, and percentage distributions of the ordinal variables across the nine family structures. Children in nuclear families typically have the best outcomes, with children in most other family structures lagging.

(Table 1 about here)

Barriers to Health Care and Health Care Utilization

Table 2 presents the exponentiated coefficients for the health care variables. Panel A shows models that adjust for basic demographic and birth weight variables. Compared to children who live in nuclear families, children who live in cohabiting, single parent, or extended families are less likely to have a routine place for care and more likely to forgo prescription

medications and dental care doe to cost. For example, cohabiting parents cite 1.57 times as many reasons married parents for delaying care for their children. Although children in most cohabiting, single parent, and extended families delay care for more reasons than children in nuclear families, children in single father and extended single father families do not delay care for more reasons. Further, children who live in skipped generation families do not differ significantly from children in nuclear parent families for three of the four barriers to health care, although they do have 24% lower odds of having a routine place where they receive care.

The columns for health care utilization show that children in cohabiting, single mother, single father, and extended single father families are significantly more likely to have gone without a well-child checkup in the past year than children in nuclear families. However, children in all cohabiting, single parent, extended, and skipped generation families have increased odds of going to the emergency room more times in the past 12 months than do children in nuclear families.

(Table 2 about here)

Panel B shows the results for the health care outcomes after further adjusting for the four SES indicators. The exponentiated coefficients in Panel B are generally attenuated (i.e., closer to 1) after adjusting for SES, and some fall from significance. Nevertheless, some disparities remain. Children in cohabiting families remain more likely to experience all four barriers to care than children in nuclear families. Children in single mother, extended married couple, and extended cohabiting couple families are no less likely to have a routine place to receive care than children in married parent families, but continue to have delayed care for more reasons and to have higher odds of forgoing prescription medications and dental care due to cost. Children in single father and extended single father families have lower odds of having a routine place for

care than children in nuclear families, and children in extended single mother families delay medical care for more reasons and have higher odds of forgoing prescription medications because of cost.

In some cases, adjusting for socioeconomic differences across families results in a relative advantage for children in some non-nuclear family structures over children in nuclear families. After adjusting for their lower SES, children in single mother families are *more* likely to have a routine place for care than children in nuclear families, and children in skipped generation families are no longer less likely to have a routine place for care and are *less* likely to have forgone prescription medications and dental care due to cost.

Family structure disparities in health care utilization are almost entirely explained by SES. Children in single father families still have higher odds of forgoing a well-child checkup in the last year and of having more emergency room visits, relative to children in married couple families. In contrast, adjusting for SES fully eliminates disadvantages in health care utilization among children in cohabiting, extended nuclear, extended cohabiting, and extended single father families, and children in single mother, extended single mother, and skipped generation families actually have *lower* odds of forgoing a checkup or going to the emergency room more times for care than children in nuclear families..

Health, Medical Conditions, Schooling and Cognitive Outcomes

Table 3 presents the exponentiated coefficients for the health and medical conditions, and the schooling and cognitive outcomes. Panel A shows results from models that adjust for demographic and birth weight variables, and for whether children had a checkup in the last year for all outcomes except days missed in school. Relative to children in nuclear families, children in single mother and extended single mother families have higher odds having each of the eight

health and medical outcomes, and children in cohabiting couple and skipped generation families have higher odds of having seven out of the eight outcomes. Children living in extended nuclear, extended cohabiting, and extended single father families were worse off on than children in nuclear families for only two to five of the health and medical conditions. In contrast, children in single father families have *lower* odds of having the common cold or of having a medical condition that has required prescription medication for three or more months than children in nuclear families, although children of single fathers still have lower odds of having better health on the global health measure.

The models for the schooling and cognitive outcomes show that school-aged children aged six or older who live in cohabiting, single mother, extended nuclear, extended single mother, and skipped generation families miss more days of school per year than children in married couple families. Children in single father, extended single father and extended cohabiting families show no difference in missed school days compared to children in nuclear families. Notably, children in all cohabiting, single parent, extended, and skipped generation family structures exhibit higher odds of having a learning disability or ADD/ADHD than children in nuclear family structures.

(Table 3 about here)

Panel B shows exponentiated coefficients for models of the health and medical conditions, and the schooling and cognitive outcomes, when further adjusting for the four measures of family SES. As with the barriers to healthcare and healthcare utilization outcomes, adjusting for SES attenuated the relationship between many of the family structure variables and the health and medical conditions, and the schooling and cognitive outcomes. After adjusting for SES, children in single mother and extended single mother families have worse outcomes on

seven of the eight health or medical conditions than children in nuclear families. Further, compared to children in nuclear families, children in cohabiting couple families have poorer outcomes on five of the health and medical conditions, children in skipped generation have worse outcomes on four of the health and medical outcomes, and children in extended nuclear families have worse outcomes on two of the health and medical conditions. The disparities across family structure are most persistent to adjustment for SES when focusing on asthma severity and the measure of global health, and are most attenuated when focusing on anemia.

However, after adjusting for SES, children in extended cohabiting families are not different from children in nuclear families for any health or medical condition. And, notably, children in single father families are not disadvantaged on any health or medical condition, and actually advantaged for several health conditions, after adjusting for SES. Compared to children in nuclear families, children in single father families have 24% lower odds of having headaches, 20% lower odds of having the common cold in the past two weeks, 40% lower odds of having required a prescription medication for more than three months, 14% lower odds of having higher asthma severity, and 40% lower odds of anemia. Children in single father families also have 10% higher odds of being in better global health than children from nuclear families.

Panel B also shows attenuated disparities for the schooling and cognitive outcomes. Children in single mother and extended single mother families remain more likely to miss more days of school, have a learning disability, or to have ADD/ADHD than children in nuclear families, after adjusting for SES. But children in cohabiting couple and skipped generation families are more disadvantaged on only two of those outcomes, and children in single father, extended nuclear, and extended single father families are disadvantaged on only one of those outcomes, relative to children in nuclear families. Children in extended cohabiting families are

no more disadvantaged on the schooling and cognitive outcomes than children in nuclear families, after adjusting for SES. Further, children in single father families miss significantly fewer days of school than children in nuclear families.

DISCUSSION

We advance research by examining nine family structures that reflect children's diverse living arrangements at the beginning of the 21st century (1). Our results reveal important family structure differences in four broad domains of wellbeing: barriers to health care, health care utilization, health and medical conditions, and school and cognitive outcomes. As a broad generalization, children in most non-nuclear families have worse outcomes than those who live in nuclear families. Children in none of the non-nuclear family structures were consistently better off than children in nuclear families on all of the outcomes examined.

Upon closer examination, however, children are not equally disadvantaged across all family structures, and the family structure that is associated with the greatest disadvantage varies across the domain of interest. First, consistent with prior research, single mother (3, 6, 10) and extended single mother (22) families have consistently worse outcomes than children who live in nuclear families, for almost all of the outcomes examined. Second, the presence of grandparents in extended families does not consistently mitigate the negative experiences among children who live in single parent or cohabiting families. Grandparents may provide social or economic support to their co-resident grand children, but sickly or penurious grandparents may draw resources from parents and away from grandchildren (2, 18-19, 21-22).

Third, children in single father and, to a lesser extent, extended single father families are often less disadvantaged than children in single mother or extended single mother families, respectively. Children in single father families had lower odds of better global health than

children in nuclear families, were not significantly different from children in nuclear families on five other health and medical outcomes, and had lower odds of having the common cold or of having a condition that required prescription medication for three or more months. Our findings that children in single father families sometimes have better health than children in single mother or even nuclear families is consistent with some prior research (9, 14). Notably, our results might result not from family structure but the different ways that fathers and mothers arrive may arrive at single parenthood. Separate analyses show that 19.6% of single mothers are widowed, 29.6% are never married, and 35.8% are divorced, whereas 23.3% of single fathers are widowed, but only 10.9% are never married and 50.7% are divorced. Never married parents may be less able to rely on the child's other parent or extended family to provide social or economic support, resulting in worse outcomes among children (14).

Finally, children in skipped generation families had worse health and medical outcomes, and schooling and cognitive outcomes, than children in nuclear families. But children in skipped generation families did not have worse outcomes on three of the four barriers to care or on one of the two indicators of health care utilization, and after adjusting for SES, children in skipped generation families appeared advantaged on two of the barriers to care outcomes and both of the health care utilization variables, relative to children in nuclear families. Thus, children in skipped generation families have worse outcomes in part due to their low SES (19, 22).

Our results also demonstrate that SES is an important mechanism that partially explains family structure variation in children's barriers to health care, health care utilization, health and medical conditions, and schooling and cognitive outcomes. For every outcome that we examined, the relationship between family structure and children's wellbeing was weakened, sometimes fully explained, and occasionally reversed once adjusting for family income,

caregivers' education and employment, and home ownership. Children in single father families often have similar or better health and medical outcomes after adjusting for SES. Consistent with prior research, our findings suggest that policies that seek to improve the socioeconomic circumstances of children across all families would weaken the disadvantage associated with living in many non-nuclear family structures (10, 19, 22, 24). But our results also show that SES is not the whole story. Adjusting for SES completely explained the adverse consequences of living in non-nuclear family structures for only one outcome—being diagnosed with anemia in the last year. But many other family structure disparities remain even after adjusting for SES (2, 7). Future research should further explore the mechanisms that might link non-nuclear family structures to children's wellbeing.

Strengths and Limitations

The strengths of these analyses include the use of a large, nationally representative data set of children aged birth through age 17 that live in one of 9 family structures. The NHIS data is of high quality and has a very high response rate and relies on face-to-face interviews. The large sample size, detailed measures of family structures, and wide array of measures of child health and wellbeing all facilitate our extensive analyses. Our study also relies on several measures of SES that capture different resources that might promote children's wellbeing. Separate analyses further tested for differences in the relationship between family structure and child health by gender of the child, age of the child, and calendar year; those interactions were seldom significant, and no patterns emerged when looking across the outcome variables.

Three limitations of our study warrant mention. First, all of our outcome variables were reported by parents or grandparents. Research often finds that caregivers' reports of children's health are valid (29-30, 37). But parents may not be uniformly observant. Men often downplay

their own health problems (38); if single fathers similarly underreport children's health problems, the relative advantage of children in single father families could be exaggerated. But other research finds that mothers and fathers largely agree when reporting on children's behavioral outcomes (39). Second, our data are cross sectional and offer little insight into whether the relationship between family structure and children's outcomes is causal or simply due to other unmeasured factors. Nevertheless, our results describe groups of children who may warrant additional attention in clinical settings and from future, longitudinal research. Finally, our data offer no insight into children's interactions with non-residential parents who may play an important role in children's lives (14).

Conclusion

U.S. children are increasingly growing up in family structures that are associated with barriers to health care, inefficient patterns of health care utilization, adverse health and medical conditions, and disadvantageous schooling and cognitive outcomes. Given the persistent links between childhood circumstances and later life socioeconomic and health outcomes (40-41), the disadvantages experienced as children may follow them for decades to come. Jutte and colleagues (7) note that social conditions can be just as consequential for children's health and educational outcomes as more traditional biological markers, such as low birth weight and Apgar scores. Future science should further examine whether family structure plays a causal role in determining children's outcomes, and clinicians and policy makers might more broadly consider the risk factors that link children's living arrangements to adverse outcomes.

REFERENCES

1. Child Trends. Family structure: Indicators on children and youth. *Child Trends Data Bank.* 2011(December, 2011):http://www.childtrendsdatabank.org/sites/default/files/59_Family_Structure_December.pdf.
2. Mollborn S, Fomby P, Dennis J. Who matters for children's early development? Race/ethnicity and extended household structures in the United States. *Child Indicators Research.* 2011;4:389-411.
3. Dunifon R, Kowaleski-Jones L. The influence of grandparents in single-mother families. *Journal of Marriage and Family.* 2007;69:465-481.
4. Solomon J, Marx J. To grandmother's house we go: Health and school adjustment of children raised solely by grandparents. *The Gerontologist.* 1995;35:386-394.
5. Gorman BK, Braverman J. Family structure differences in health care utilization among U.S. Children. *Social Science & Medicine.* 2008;67(11):1766-1775.
6. Brown SL, Rinelli LN. Family structure, family processes, and adolescent smoking and drinking. *Journal of Research on Adolescence.* 2010;20(2):259-273.
7. Jutte DP, Brownell M, Roos NP, et al. Rethinking what is important: Biologic versus social predictors of childhood health and educational outcomes. *Epidemiology.* 2010;31(3):314-323.
8. Wen M. Family structure and children's health and behavior: Data from the 1999 national survey of america's families. *Journal of Family Issues.* 2008;29:1492-1519.

9. Victorino CC, Gauthier AH. The social determinants of child health: Variations across health outcomes--a population-based cross-sectional analysis. *BMC Pediatrics.* 2009;9:53.

10. Scharte M, Bolte G, GME Study Group. Increased health risks of children with single mothers: The impact of socio-economic and environmental factors. *European Journal of Public Health.* 2012:doi: 10.1093/eurpub/cks1062

11. Waite LJ. Marriage and family. In: Poston DL, Micklin M, eds. *Handbook of population*. New York: Springer, 2006:87-108.

12. Brown BV. The single-father family. *Marriage and Family Review.* 2000;29(2-3):203-220.

13. Zoil-Guest KM. A single father's shopping bag: Purchasing decisions in single-father families. *Journal of Family Issues.* 2009;30(5):605-622.

14. Stewart SD, Menning CL. Family structure, nonresident father involvement, and adolescent eating patterns. *Journal of Adolescent Health.* 2009;45:193-201.

15. DeLeire T, Kalil A. Good things come in threes: Single-parent multigenerational family stucture and adolescent adjustment. *Demography.* 2002;39:393-413.

16. Kenney CT, McLanahan SS. Why are cohabiting relationships more violent than marriages? *Demography.* 2006;43(1):127-140.

17. Mutchler JE, Baker LA. The implications of grandparent coresidence for economic hardship among children in mother-only families. *Journal of Family Issues.* 2009;30(11):1576-1597.

18. Fuller-Thomson E, Minkler M. American grandparents providing extensive child care to their grandchildren: Prevalence and profile. *The Gerontologist.* 2001;41:201-209.

19. Brandon PD. Welfare receipt among children living with grandparents. *Population Research and Policy Review.* 2005;24:411-429.

20. Roe KM, Minkler M, Saunders F, et al. Health of grandmothers raising children of the crack cocain epidemic. *Medical Care.* 1996;34:1072-1084.

21. Geller A, Garfinkel I, Western B. Paternal incarceration and support for children in fragile families. *Demography.* 2011;48:25-47.

22. Monserud MA, Elder GH. Household structure and children's educational attainment: A perspective on coresidence with grandparents. *Journal of Marriage and Family.* 2011;73:981-1000.

23. McLanahan SS, Percheski C. Family structure and the reproduction of inequalities. *Annual Review of Sociology.* 2008;34:257-276.

24. Nuru-Jeter AM, Sarsour K, Jutte DP, et al. Socioeconomic predictors of health and development in middle childhood: Variations by socioeconomic status meausre and race. *Issues in Comprehensive Pediatric Nursing.* 2010;33:59-81.

25. Krueger PM, Burgard SA. Work, occupation, income, and mortality. In: Rogers RG, Crimmins EM, eds. *International handbood of adult mortality*. New York: Springer, 2011:263-288.

26. Mirowsky J, Ross CE. *Education, social status, and health*. Hawthorne, NY: Aldine De Gruyter, 2003.

27. Conley D. *Being black, living in the red: Race, wealth and social policy in america, 2nd ed.* Berkeley, CA: University of California Press, 2009.

28. Bond Huie SA, Krueger PM, Rogers RG, et al. Wealth, race, and mortality. *Social Science Quarterly.* 2003;84:667-684.

29. Boulet SL, Schieve LA, Boyle CA. Birth weight and health and developmental outcomes in US children, 1997-2005. *Maternal and Child Health Journal.* 2009;15:836-844.

30. McCormick MC, Brooks-Gunn J. Concurrent child health status and maternal recall of events in infancy. *Pediatrics.* 1999;104:1176-1181.

31. Rubin DB. *Multiple imputation for nonresponse in surveys*. New York: Wiley, 1987.

32. Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods.* 2002;7:147-177.

33. Schafer JL, Ezzati-Rice TM, Johnson W, et al. The nhanes iii multiple imputation project. *Retrieved from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Datasets/NHANES/NHANESIII/7A/doc/jsm96.pdf.* 2001.

34. Schenker N, Raghunathan TE, Chiu P-L, et al. Multiple imputations of missing income data in the national health interview survey. *Journal of the American Statistical Association.* 2006;101:924-933.

35. Royston PM. Multiple imputation of missing values: Further update of ice, with an emphasis on categorical variables. *The Stata Journal.* 2009;9(3):466-477.

36. StataCorp. *Stata statistical software: Release 11.0*. College Station, TX: Stata Press, 2009.

37. Monette S, Séguin L, Gauvin L, et al. Validation of a measure of maternal perception of the child's health status. *Child: Care, Health and Development.* 2007;33(4):472-481.

38. Bird CE, Rieker PP. *Gender and health: The effects of constrained choices and social policies*. New York: Cambridge University Press, 2008.

39. Davé S, Nazareth I, Senior R, et al. A comparison of father and mother report of child behaviour on the strengths and difficulties questionnaire. *Child Psychiatry and Human Development.* 2008(39):4.

40. Haas SA. Health selection and the process of social stratification: The effect of childhood health on socioeconomic attainment. *J Health Soc Behav.* 2006;47:339-354.

41. Montez JK, Hayward MD. Early life conditions and later life mortality. In: Rogers RG, Crimmins EM, eds. *International handbook of adult mortality*. New York: Springer, 2011.

Tabe 1: Means and percentage distributions of outcomes, by family structure, children aged birth through 17, 1997-2011

	Nuclear family	Cohabiting couple	Single mother	Single father	Extended nuclear family	Extended cohabiting	Extended single mother	Extended single father	Skipped generation
Barriers to Care									
Num. of reasons delayed care, mean	.125	.193	.204	.109	.169	.214	.179	.111	.133
Has routine place for care, %	91.1	88.6	89.6	85.8	89.7	88.9	90.9	85.6	88.4
No Rx because of cost, %	2.1	3.8	4.9	2.7	3.5	5.4	4.3	3.9	2.7
No dentist because of cost (age>=2), %	5.5	8.8	9.3	6.7	6.8	11.9	6.5	7.1	5.7
Utilization of Medical Care									
No checkup last 12 mos., %	26.1	25.3	26.1	35.6	24.1	23.7	20.5	27.2	29.1
ER visits last 12 mos., %									
None	81.4	73.3	73.6	80.3	79.1	70.5	71.2	77.7	75.9
1 visit	12.7	16.9	15.7	13.6	13.2	17.6	16.7	14.7	14.4
2-3 visits	4.9	7.6	8.1	5.3	6.2	8.9	9.5	5.9	7.6
4-9 visits	.9	1.9	2.2	.7	1.4	2.3	2.2	1.3	1.7
10-12 visits	.1	.2	.2	.0	.1	.2	.3	.3	.3
13+ visits	.1	.2	.2	.0	.1	.5	.2	.1	.1
Health and Medical Conditions									
Headaches last 12 mos. (ag >=3), %	5.3	6.6	8.5	5.5	5.5	3.3	6.2	7.1	9.0
Activity limitation, %	6.1	7.4	10.4	8.2	5.7	5.8	6.6	8.7	12.8
Cold last 2 weeks, 1998-2011, %	17.8	19.9	19.1	13.8	18.6	19.3	21.7	18.9	17.7
3+ ear infections last 12 mo., %	6.1	7.5	6.8	3.8	6.4	8.4	9.1	6.6	6.1
Condition requiring Rx for 3+ mos., %	11.1	10.7	14.9	10.4	9.3	6.5	11.7	11.6	17.7
Asthma severity, %									
Never diagnosed with asthma	89.0	87.1	81.9	87.1	89.0	90.1	84.7	84.9	80.5
Diagnosed, but no attacks in 12 mos.	6.5	7.5	10.0	8.3	5.7	5.4	8.1	9.4	11.2
Diagnosed & attack in 12 mos.	3.3	3.3	4.7	3.3	3.3	3.1	3.8	3.1	5.0
Diagnosed & hospitalized 12 mos.	1.3	2.2	3.4	1.3	2.1	1.5	3.5	2.6	3.2
Anemia last 12 mos., %	.953	1.623	1.761	.674	1.548	1.292	1.793	1.073	1.461
Global health, %									
Poor	0.2	0.2	0.5	0.1	0.2	0.5	0.4	0.3	0.5
Fair	1.3	2.2	3.1	1.4	1.6	1.8	2.8	2.2	4.0
Good	13.3	19.2	20.4	15.1	20.3	19.9	23.5	25.0	23.4
Very good	27.5	28.8	29.6	29.1	26.9	29.9	26.8	25.2	26.4
Excellent	57.8	49.6	46.4	54.3	51.0	48.0	46.5	47.4	45.7
Schooling and Cognitive Outcomes (age>=6)									
Schooldays missed last year, mean	3.97	4.55	5.51	3.86	4.85	5.36	5.84	4.11	5.23
Learning disability, %	7.5	11.5	11.6	9.4	7.2	11.6	9.8	10.5	13.5
ADD/ADHD, %	7.0	10.9	10.1	10.5	6.0	10.1	8.7	11.5	14.3
Number (unweighted)	111,047	10,150	30,971	4,078	5,477	619	7,383	1,221	2,882

Table 2: Exponentiated coefficients for health care outcomes

	Barriers to Care				Utilization	
	Reasons for Delay	Routine Place for Care	Cost of Rx	Cost of Dental Care	No Checkup	Times ER/ED
			Panel A: Reduced Model[a]			
Nuclear family	ref.	ref.	ref.	ref.	ref.	ref.
Cohabiting couple	1.568***	0.657***	2.031***	1.856***	1.232***	1.588***
	(1.417,1.736)	(0.604,0.716)	(1.747,2.362)	(1.654,2.083)	(1.154,1.315)	(1.493,1.690)
Single mother	1.765***	0.826***	2.289***	1.858***	1.049*	1.679***
	(1.666,1.870)	(0.776,0.878)	(2.092,2.505)	(1.737,1.987)	(1.007,1.093)	(1.609,1.753)
Single father	0.975	0.537***	1.436**	1.302**	1.421***	1.138*
	(0.822,1.157)	(0.473,0.609)	(1.136,1.816)	(1.103,1.537)	(1.301,1.552)	(1.025,1.264)
Extended nuclear family	1.288***	0.877*	1.742***	1.431***	1.074	1.231***
	(1.140,1.454)	(0.770,0.998)	(1.423,2.133)	(1.189,1.724)	(0.979,1.178)	(1.126,1.346)
Extended cohabiting	1.712**	0.731*	2.775***	2.838***	1.176	1.672***
	(1.223,2.398)	(0.537,0.995)	(1.765,4.365)	(1.919,4.197)	(0.884,1.565)	(1.333,2.097)
Extended single mother	1.537***	0.835**	2.212***	1.350***	1.039	1.665***
	(1.376,1.717)	(0.744,0.937)	(1.882,2.600)	(1.168,1.559)	(0.958,1.127)	(1.548,1.790)
Extended single father	0.958	0.552***	1.902***	1.474*	1.215*	1.404***
	(0.721,1.274)	(0.444,0.686)	(1.301,2.781)	(1.087,1.998)	(1.024,1.441)	(1.184,1.664)
Skipped generation	1.166	0.758***	1.070	1.056	1.111	1.518***
	(0.983,1.381)	(0.651,0.882)	(0.815,1.407)	(0.849,1.314)	(0.996,1.239)	(1.339,1.721)
			Panel B: Full Model[b]			
Nuclear family	ref.	ref.	ref.	ref.	ref.	ref.
Cohabiting couple	1.283***	0.855***	1.399***	1.370***	1.041	1.041
	(1.157,1.422)	(0.783,0.933)	(1.202,1.629)	(1.216,1.544)	(0.973,1.113)	(0.973,1.113)
Single mother	1.307***	1.195***	1.275***	1.142***	0.875***	0.875***
	(1.225,1.394)	(1.118,1.278)	(1.153,1.410)	(1.058,1.233)	(0.836,0.915)	(0.836,0.915)
Single father	0.848	0.667***	1.026	0.974	1.249***	1.249***
	(0.711,1.013)	(0.585,0.760)	(0.806,1.306)	(0.824,1.152)	(1.143,1.365)	(1.143,1.365)
Extended nuclear family	1.263***	0.907	1.777***	1.455***	0.965	0.965
	(1.120,1.423)	(0.794,1.036)	(1.450,2.178)	(1.204,1.759)	(0.877,1.063)	(0.877,1.063)
Extended cohabiting	1.549**	0.855	2.381***	2.504***	0.966	0.966
	(1.115,2.152)	(0.626,1.167)	(1.507,3.761)	(1.685,3.721)	(0.727,1.283)	(0.727,1.283)
Extended single mother	1.317***	1.039	1.665***	1.064	0.852***	0.852***
	(1.181,1.469)	(0.922,1.171)	(1.408,1.968)	(0.915,1.237)	(0.784,0.926)	(0.784,0.926)
Extended single father	0.833	0.698**	1.421	1.155	0.968	0.968
	(0.618,1.124)	(0.561,0.868)	(0.968,2.086)	(0.848,1.572)	(0.812,1.153)	(0.812,1.153)
Skipped generation	0.883	1.068	0.668**	0.723**	0.852**	0.852**
	(0.742,1.049)	(0.911,1.252)	(0.503,0.886)	(0.578,0.906)	(0.760,0.956)	(0.760,0.956)
N	173,828	173,828	173,828	152,545	173,828	173,828

Notes: *p < 0.05; **p < 0.01; ** p < 0.001

[a]The models in Panel A adjust for age, age squared, sex, race/ethnicity, nativity, survey year, quarter of interview, Census region, the number of children in the family, low birth weight, and very low birth weight.

[b]The models in Panel B adjust for family income, caregivers' education, proportion of caregivers who are employed, and home ownership, in addition to all the covariates included in the models in Panel A.

Table 3: Exponentiated coefficients for health and medical conditions, and schooling and cognitive outcomes

	Health and Medical Conditions								Schooling and Cognitive Outcomes		
	Headache	Activity Limitation	Cold	Ear Infection	Requiried Rx for 3+ Mos.	Asthma Severity	Anemia	Global Health	School Days Missed	Learning Disability	ADD/ ADHD
Panel A: Reduced Model											
Nuclear family	ref.	ref.	ref.	ref.	ref.	ref.			ref.	ref.	ref.
Cohabiting couple	1.516***	1.558***	1.065	1.171**	1.180***	1.345***	1.415**	0.643***	1.202***	1.844***	1.956***
	(1.338,1.719)	(1.399,1.734)	(0.983,1.153)	(1.046,1.310)	(1.076,1.294)	(1.231,1.470)	(1.139,1.758)	(0.609,0.679)	(1.078,1.340)	(1.617,2.103)	(1.726,2.215)
Single mother	1.572***	1.850***	1.189***	1.433***	1.393***	1.495***	1.609***	0.651***	1.483***	1.768***	1.724***
	(1.467,1.684)	(1.740,1.966)	(1.133,1.247)	(1.339,1.535)	(1.325,1.464)	(1.424,1.570)	(1.380,1.876)	(0.629,0.672)	(1.394,1.577)	(1.652,1.893)	(1.605,1.851)
Single father	0.891	1.134	0.815**	0.876	0.710***	0.916	0.711	0.894**	0.927	1.245*	1.403***
	(0.745,1.066)	(0.972,1.322)	(0.720,0.922)	(0.684,1.123)	(0.630,0.800)	(0.808,1.039)	(0.433,1.166)	(0.831,0.961)	(0.845,1.017)	(1.051,1.475)	(1.216,1.617)
Extended nuclear family	1.310**	1.260**	1.062	1.081	1.077	1.160*	1.338*	0.723***	1.420**	1.357**	1.292*
	(1.087,1.579)	(1.073,1.480)	(0.959,1.175)	(0.937,1.248)	(0.947,1.224)	(1.022,1.316)	(1.018,1.759)	(0.672,0.778)	(1.138,1.771)	(1.099,1.674)	(1.017,1.641)
Extended cohabiting	0.831	1.662*	0.776	1.202	0.932	1.223	1.562	0.631***	1.358	2.030*	1.967*
	(0.389,1.775)	(1.074,2.570)	(0.587,1.027)	(0.832,1.737)	(0.610,1.424)	(0.865,1.729)	(0.625,3.900)	(0.515,0.774)	(0.898,2.055)	(1.185,3.478)	(1.044,3.707)
Extended single mother	1.780***	1.467***	1.208***	1.333***	1.334***	1.588***	1.391**	0.539***	1.572***	1.598***	1.559***
	(1.515,2.091)	(1.282,1.678)	(1.107,1.317)	(1.194,1.489)	(1.203,1.479)	(1.441,1.750)	(1.113,1.739)	(0.506,0.574)	(1.373,1.800)	(1.369,1.866)	(1.332,1.824)
Extended single father	1.553**	1.558**	1.112	1.071	0.954	1.114	1.317	0.548***	1.064	1.527**	1.738***
	(1.161,2.078)	(1.195,2.033)	(0.902,1.372)	(0.800,1.433)	(0.766,1.190)	(0.897,1.382)	(0.674,2.575)	(0.473,0.634)	(0.886,1.278)	(1.147,2.033)	(1.308,2.310)
Skipped generation	1.449***	2.016***	1.151*	1.289*	1.508***	1.515***	1.398	0.550***	1.403***	2.219***	2.299***
	(1.208,1.738)	(1.722,2.360)	(1.002,1.322)	(1.053,1.578)	(1.307,1.740)	(1.334,1.721)	(0.944,2.068)	(0.496,0.609)	(1.212,1.623)	(1.862,2.646)	(1.949,2.712)
Panel B: Full Model											
Nuclear family	ref.	ref.	ref.	ref.	ref.	ref.			ref.	ref.	ref.
Cohabiting couple	1.243**	1.316***	1.046	1.089	1.164**	1.244***	1.134	0.848***	1.073	1.521***	1.671***
	(1.092,1.414)	(1.181,1.468)	(0.964,1.135)	(0.969,1.224)	(1.059,1.279)	(1.136,1.362)	(0.908,1.417)	(0.801,0.898)	(0.948,1.215)	(1.329,1.739)	(1.469,1.900)
Single mother	1.180***	1.392***	1.125***	1.304***	1.288***	1.308***	1.151	0.927***	1.215***	1.308***	1.384***
	(1.090,1.278)	(1.301,1.491)	(1.066,1.187)	(1.207,1.409)	(1.217,1.362)	(1.238,1.381)	(0.962,1.377)	(0.893,0.962)	(1.129,1.307)	(1.210,1.413)	(1.275,1.502)
Single father	0.760**	0.992	0.795***	0.827	0.697***	0.860*	0.604*	1.101**	0.864**	1.067	1.253**
	(0.633,0.913)	(0.849,1.159)	(0.702,0.901)	(0.645,1.059)	(0.618,0.787)	(0.758,0.976)	(0.367,0.993)	(1.024,1.185)	(0.789,0.945)	(0.899,1.267)	(1.084,1.448)
Extended nuclear family	1.204	1.151	1.078	1.041	1.076	1.166*	1.288	0.813***	1.301*	1.192	1.193
	(0.995,1.457)	(0.980,1.352)	(0.973,1.195)	(0.902,1.203)	(0.944,1.226)	(1.027,1.324)	(0.976,1.700)	(0.755,0.877)	(1.055,1.605)	(0.967,1.469)	(0.940,1.514)
Extended cohabiting	0.690	1.412	0.784	1.114	0.944	1.189	1.364	0.827	1.248	1.632	1.689
	(0.320,1.488)	(0.913,2.184)	(0.592,1.039)	(0.772,1.608)	(0.622,1.433)	(0.838,1.685)	(0.544,3.420)	(0.670,1.020)	(0.761,2.047)	(0.948,2.812)	(0.896,3.186)
Extended single mother	1.398***	1.152*	1.194***	1.226***	1.285***	1.499***	1.123	0.726***	1.288***	1.190*	1.291**
	(1.186,1.648)	(1.004,1.321)	(1.096,1.300)	(1.095,1.373)	(1.157,1.427)	(1.360,1.652)	(0.893,1.413)	(0.681,0.773)	(1.127,1.473)	(1.018,1.392)	(1.101,1.515)
Extended single father	1.184	1.189	1.105	0.981	0.913	1.047	1.055	0.755***	0.869	1.087	1.412*
	(0.881,1.590)	(0.905,1.560)	(0.894,1.365)	(0.731,1.317)	(0.730,1.142)	(0.842,1.301)	(0.539,2.066)	(0.650,0.878)	(0.718,1.053)	(0.814,1.450)	(1.059,1.882)
Skipped generation	1.017	1.386***	1.115	1.155	1.378***	1.363***	0.982	0.840**	1.067	1.442***	1.762***
	(0.844,1.226)	(1.176,1.634)	(0.969,1.283)	(0.940,1.419)	(1.188,1.598)	(1.196,1.554)	(0.652,1.479)	(0.757,0.933)	(0.918,1.239)	(1.199,1.734)	(1.477,2.102)
N	142,165	173,828	160,001	173,828	173,828	173,828	173,828	173,828	113,205	113,205	113,205

Notes: *p < 0.05; **p < 0.01; ** p < 0.001

[a]The models in Panel A adjust for age, age squared, sex, race/ethnicity, nativity, survey year, quarter of interview, Census region, the number of children in the family, low birth weight, and very low birth weight. All models, except the model for school days missed, also adjust for whether children have had a checkup in the last year.

[b]The models in Panel B adjust for family income, caregivers' education, proportion of caregivers who are employed, and home ownership, in addition to all the covariates included in the models in Panel A.