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Effects of Family Structure on Children's Use of Ambulatory Visits and Prescription Medications

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Objective. To examine the effects of family structure, including number of parents, number of other children, and number and type of other adults, on office visits, emergency room visits, and use of prescription medications by children.

Data Source. The Household Component of the 1996–2001 Medical Expenditure Panel Survey (MEPS).

Study Design. The study consisted of a nationally representative sample of children 0–17 years of age living in single-mother or two-parent families. We used negative binomial regression to model office visits and emergency room visits and logistic regression to model the likelihood of prescription medication use. Our analyses adjusted for demographic and socioeconomic characteristics as well as measures of children's health and parental education and child-rearing experience.

Data Collection/Extraction Method. We combined 1996–2001 MEPS Full Year Consolidated Files and Medical Conditions Files.

Principal Findings. Descriptive data showed that children in single-mother families had fewer office visits than children in two-parent families; however, the effect of number of parents in the family on children's office visits or use of prescription medications was completely explained by other explanatory variables. By contrast, children living in families with many other children had fewer total and physician office visits and a lower likelihood of using a prescription medication than children living in families with no other children even after adjusting for other explanatory variables. Children who lived with other adults in addition to their parents also had fewer office visits and a lower likelihood of using a prescription medication than children who lived only with their parents.

Conclusions. Children living in families with many other children or with other adults use less ambulatory care and prescription medications than their peers. Additional research is needed to determine whether these differences in utilization affect children's health.

Key Words. Family structure, utilization, children's health care

For three decades after the 1960s, the percentage of U.S. children under the age of 18 living in single-parent households, particularly single-mother households, increased steadily (U.S. Census Bureau 2000). Although this trend

stabilized in the mid-1990s, 20 million U.S. children under 18 live in single-parent households today. Approximately 16 million of these children live in single-mother households (U.S. Census Bureau 2000). Recent demographic data also suggest that stabilization in the number of single-parent households does not necessarily represent increased stability for America's families. These data point to the replacement of truly single-mother households with cohabiting households, in which unmarried or divorced single mothers live with a male partner (Research on Today's Issues 2002).

Studies indicate that children's health and well-being are intimately linked to the structure of their families (Blake 1981, 1989; McLanahan and Sandefur 1994; Downey 1995, 2001). Children living in single-parent households are at a significant disadvantage compared with children in two-parent households, as they are more likely to be poor, experience food insecurity, and have limited resources (Urban Institute 2001). Children in single-parent households are also at higher risk for emotional, behavioral, and educational problems. Recent findings suggest that children in cohabiting households exhibit problems similar to those of children in single-parent households (Manning and Lichter 1996; Smock 2000; New Federalism 2001; Urban Institute 2001, 2002; Aronson and Huston 2004).

Family size and number of siblings can also affect children's outcomes and well-being. In particular, social and behavioral scientists have consistently documented an inverse relationship between number of siblings and children's intellectual development and educational achievement (Cicirelli 1978; Blake 1981; Kuo and Hauser 1997; Phillips 1999; Downey 2001). These scientists have theorized that parental resources are finite and that each additional child in a family represents time and energy drawn away from parents or other caretakers; in effect, parental resources are "diluted" as the number of children in the family increases, resulting in worse outcomes for each child (Blake 1989; Downey 1995, 2001; Powell and Steelman 1995; Kuo and Hauser 1997; Phillips 1999).

In contrast to the relative abundance of research on family structure and children's behavioral and educational outcomes, limited information is

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available regarding the impact of family structure on children's use of health care. Previous work has focused primarily on the impact of single motherhood on children's access to and utilization of care. Using data from the late 1970s, Cafferata and Kasper (1985) found that healthy children in single-mother families had more physician visits during the year. Using data from the early 1990s, Heck and Parker (2002) found that children in single-mother and in two-parent families were equally likely to have a physician visit at high levels of maternal education, whereas at low levels of maternal education children of single mothers were more likely to have a physician visit. Two other studies showed slight or no differences between single-mother families and two-parent families in physician visits (Newacheck 1992; Simpson et al. 1997). Three studies using data from the 1980s found a negative relationship between family size and use of physician services, but family structure was not the focus of the studies (Newacheck and Halfon 1986; Rosenbach 1989; Newacheck 1992). Two studies of childhood immunization found that mothers who had more children were less likely to vaccinate them (Bates and Wolinsky 1998; Luman et al. 2003). However, no study has simultaneously assessed the impact on health care utilization of multiple dimensions of family structure including number of parents, number of children, presence of adults in addition to the parents, and cohabitation. Recently, the American Academy of Pediatrics underscored the importance of understanding how family structure affects the medical care children receive (American Academy of Pediatrics Task Force on the Family 2003).

Our study aims to fill this gap in the literature. Specifically, we examined the effect of single-mother families, number of children in the family, and number and types of other adults in the family on office visits to physicians and other medical providers, emergency room visits, and the likelihood of using a prescription medication. We also conducted secondary analyses to assess the effects of cohabitation. To identify the independent effect of family structure on outcomes, we controlled for detailed measures of socioeconomic status, children's health status, and parental education and child-rearing experience.

METHODS

Conceptual Framework

Our conceptual framework assumes that children are dependent on parents or other adults to obtain access to and use health care, and that attributes of the children, the parents, and the family influence parents' demand for their

children's care. Consistent with the literature on the demand for health care, parents' demand for their children's care is expected to be affected by the children's age, sex, race and ethnicity, and health status; insurance coverage and other determinants of money and time (e.g., urban versus rural residence); family income; and parental education, knowledge about health and health care, and child-rearing experience. In addition, parents' demand for their children's health care is expected to be influenced by family structure.

Family structure is likely to influence the ability of parents to meet children's health care needs. Single mothers may have less social support and experience greater stress and time demands than two-parent couples (Heck and Parker 2002). More children in the family may dilute the time and energy that parents can devote to any particular child (e.g., Blake 1989; Downey 2001). The presence of adults in the household in addition to the parents can help with child-rearing, but can also serve as a drain on parental resources (e.g., Blake 1981, 1989). In particular, single mothers who cohabit with a male partner may have less social support (e.g., Lerman 2002) and may need to invest extra time in the cohabiting relationship. Recent data indicate that cohabiting relationships are less stable than marriage (Research on Today's Issues 2002), which can also be a source of stress.

Data Source

The source of data for our study was the Household Component of the 1996–2001 Medical Expenditure Panel Survey (MEPS), a nationally representative survey on the use of medical care conducted by the Agency for Healthcare Research and Quality (Cohen et al. 1996; MEPS HC-020 1997; MEPS HC-028 1998; MEPS HC-038 1999; MEPS HC-050 2000; MEPS HC-060 2001). The 1996–2001 MEPS used an overlapping panel design, in which the subjects selected in any given year were followed for two calendar years. Each subject participated in six rounds of data collection over the 2-year period. The MEPS core questionnaire obtained information about each subject's health status, use of medical care, medical care expenditures, socioeconomic characteristics, and health insurance coverage. The expenditure and utilization data were verified and supplemented through surveys of medical providers and pharmacies.

Defining Families

The MEPS's primary sampling unit is called reporting unit. A reporting unit is a family-based entity defined as "a person or group of persons living in the

same dwelling unit who are related by blood, marriage, adoption, foster care, or other family associations" (MEPS HC-020 1997; MEPS HC-028 1998; MEPS HC-038 1999; MEPS HC-050 2000; MEPS HC-060 2001). Adult family members living away from a particular reporting unit constitute a separate reporting unit for data collection purposes, as do unmarried students living away from home. For this study, we defined a child's family as the people living within the same reporting unit. These are the people who exert a day-to-day influence on the child whether they are formally related to the child or simply living in the same household in close relationship and interaction with the family. Of note, the U.S. Census Bureau defines family as "a group of two or more persons related by birth, marriage, or adoption and residing together in a household" (U.S. Census Bureau 2000). Thus our definition of family based on MEPS reporting units, which allows for "other family associations" as well, is broader than the Census definition in that it includes cohabiting adults.

We defined two-parent families as families where both the father and the mother (biological, adopted, or step) of the subject child were living in the same reporting unit as the child. Correspondingly, we defined single-mother families as families where the child's mother was living in the same reporting unit but the father was absent. Owing to their small numbers, we excluded from the study children living in single-father families (3.0 percent of children) and children who lived with no parent (2.5 percent of children). We also excluded children living in foster families because these families have different utilization patterns (Digiuseppe and Christakis 2003; Rubin et al. 2004).

We defined other family members as follows: (1) other children were children under 18 living in the same reporting unit as the subject child, who could be biological, adopted, or step siblings; (2) other adults were adults living in the same reporting unit as the subject child, not including the father or mother of the subject child; and (3) "grandparent-like adults" were other adults living in the same reporting unit as the subject child who were at least 20 years older than the child's mother but were not the child's father (these adults could be grandparents, great uncles or aunts, or older uncles or aunts of the child).

In addition, we subdivided single-mother families into cohabiting and noncohabiting families. We defined cohabiting single-mother families as single-mother families with exactly one other adult who was male and whose age was within 10 years of the mother's age. Thus, single-mother families with no other adult, one other female adult, one male "grandparent-like adult," or more than one other adults were all considered noncohabiting families.[1]

Study Sample and File Construction

As discussed earlier, we focused our study on children under 18 living in two-parent families or single-mother families. The 1996–2001 MEPS included 26,401 such children. To construct the analytic file, we arranged the data for each child into person-years based on the duration of data collection. Thus children with complete utilization data for 1996 and 1997, 1997 and 1998, 1998 and 1999, 1999 and 2000, or 2000 and 2001 contributed two observations to the analytic file. Although most children in the study sample had data for exactly 1 or 2 years, some had data for part of a year. We excluded fractional years of data. Our final analytic file consisted of 38,656 observations corresponding to person-years of data.

Statistical Analysis

We estimated multivariate regression models using four different measures of utilization as dependent variables: (1) total number of office visits to medical care providers, including physicians and nonphysician providers, during the year; (2) number of physician office visits; (3) number of emergency room visits; and (4) whether the child used a prescription medication during the year. We defined office visits as visits that took place in office-based settings or clinics.[2] As the variables for number of visits assume small, nonnegative integer values, we used negative binomial regression to model these variables (Cameron and Trivedi 1998). Use of a prescription medication is a binary (yes/no) variable; therefore, we used logistic regression to model this variable (Hosmer and Lemeshow 1989).

We used the same explanatory variables in all regression models. The key explanatory variables in the study were the family structure variables: (1) an indicator variable for living in a single-mother family (versus a two-parent family); (2) indicator variables for the number of other children in the family, categorized as none, one, two, three, or four or more; and (3) indicator variables for the number and type of other adults in the family, categorized as none, one or more without a "grandparent-like adult," and one or more with at least one "grandparent-like adult." In secondary analyses, we replaced the indicator variables for the number and type of other adults with indicator variables for cohabiting and noncohabiting single-mother families.

The other explanatory variables in the models included indicator variables for the child's age, sex, and race or ethnicity, categorized as non-Hispanic white, non-Hispanic black, Hispanic, Asian, or other; indicator variables for family income, categorized as poor (<1.00 times federal poverty line), low

income (1.00–1.99 times poverty), middle income (2.0–3.99 times poverty), or high income (4.00+ times poverty); indicator variables for insurance coverage, categorized as no insurance, private insurance, or public insurance (e.g., Medicaid or SCHIP); and an indicator variable for residence in a metropolitan area (versus a nonmetropolitan area.)

The other explanatory variables also included indicator variables for the child's birth order, categorized as first, second, third, or fourth or higher; indicator variables for the mother's educational attainment, categorized as less than high school, some high school, high school graduate, some college, or college graduate; indicator variables for the mother's age, categorized as 21 years or younger, 22–29, 30–39, 40–49, or 50 years or older; and indicator variables for the year of the data. We included birth order in the models to capture differences in parents' experience with child-rearing, because we assumed child-rearing experience would influence how parents seek and obtain health care for their children and we wanted to avoid confounding the effects of experience and other effects of number of children in the family (e.g., dilution of parental resources). In particular, birth order captures what parents learn in rearing their older children that they can apply to their younger children as these children age. For example, parents have had much more experience caring for 6-year-old children when the 6-year-old in a family with three children is the third-born than when the same child is the first-born.[3] We included maternal education and age to capture differences in mothers' knowledge about health and health care as well as additional dimensions of their judgment and life experience that could influence the care they seek for their children.

Last, the other explanatory variables included detailed measures of the child's health status, including self-rated (or parent-rated) general health, categorized as excellent, very good, good, fair, or poor; self-rated (or parent-rated) mental health; indicator variables for "having frequent cough and colds," "not being as healthy as other kids," and having any physical, social, or developmental limitation; and indicator variables for having asthma, attention deficit/hyperactivity disorder, diabetes, and seizure disorder. We excluded acute pediatric conditions that usually require a provider visit for diagnosis (e.g., otitis media) to reduce the chance of endogeneity. However, we conducted sensitivity analyses using acute conditions that parents can diagnose without seeing a provider (e.g., upper respiratory infection) and found no change in our results.

We used the coefficient estimates from the negative binomial and logistic regression models to obtain the predicted mean number of visits per year and

the predicted proportion of children who used a prescription medication for each value of each family structure variable (e.g., number of parents), adjusted for all the other explanatory variables, as follows. First, we used the estimated coefficients to predict the number of visits per year and the probability of receiving a prescription medication for each child, alternately assigning the child to each category of the family structure variable of interest (e.g., number of parents), but leaving all other explanatory variables at their original values. Second, we averaged the individual predictions across all the children in the study sample.

We weighted all analyses using weights that reflect both the sample design of the MEPS and survey nonresponse, and we adjusted standard errors for clustering of observations within children and within families. A p-value of .05 or less was chosen as the criterion for statistical significance in all analyses.

RESULTS

Descriptive Data

The children in the study sample averaged 2.77 (standard deviation [SD], 5.82) total office visits to medical care providers, 2.10 (SD, 3.25) office visits to physicians, and 0.15 (SD, 0.48) visits to emergency rooms annually. About 52.8 percent of the children received a prescription medication each year.

Table 1 reports selected characteristics of the study sample.[4] The percentages of single-mother and two-parent families, 22.6 and 77.4 percent, respectively, were consistent with U.S. Census data (U.S. Census Bureau 2000). Nearly four-fifths of children lived in a family with at least one other child, and nearly two-fifths of children lived with at least two other children. Four-fifths of children lived in a family with no other adults in addition to their parents, and very few lived with a "grandparent-like adult."

Unadjusted analyses revealed strong associations between office visits and use of a prescription medication, on one hand, and family structure, on the other (Table 2). Compared with children in two-parent families, children with single mothers averaged fewer total and physician office visits and were less likely to use a prescription medication. However, children living with a single mother averaged more emergency room visits than children living with two parents. Children who lived with other children had fewer office visits and were less likely to use a prescription medication than children who lived with no other children. In fact, the data exhibited a strong dose response: the higher the number of other children the lower the number of office visits and the

Table 1: Characteristics of Study Sample

Category	*Variable*	*N**	*Percent*†
Family structure			
Number of parents	Two parents	28,623	77.4
	Single mother	10,033	22.6
Other children	None	7,141	21.7
	1	14,919	40.6
	2	9,677	23.2
	3	4,336	9.4
	4+	2,583	5.1
Other adults	None	30,232	81.2
	1+without a grandparent	6,400	14.6
	1+with at least 1 grandparent	2,024	4.2
Demographic and socioeconomic characteristics			
Age	0–1	1,449	3.9
	2	2,214	6.0
	3–5	6,928	18.6
	6–9	9,791	24.5
	10–11	4,902	12.3
	12–13	4,673	11.6
	14–17	8,699	23.1
Sex	Female	19,016	48.9
	Male	19,640	51.1
Race/ethnicity	Asian	993	3.6
	Black	6,076	14.4
	Hispanic	12,317	15.9
	White	19,000	65.4
	Other	270	0.7
Family income	Poor	8,983	16.5
	Low income	9,620	21.0
	Middle income	12,203	34.0
	High income	7,850	28.5
Health insurance	Uninsured	4,347	8.8
	Public	10,167	19.0
	Private	24,142	72.2
Metropolitan residence	Yes	30,887	81.6
	No	7,769	18.4
Maternal education	No high school	4,236	5.8
	Some high school	6,204	12.1
	High school graduate	12,344	32.4
	Some college	8,847	25.7
	College graduate	7,025	24.0
Maternal age	21 or younger	685	1.5
	22–29	6,791	15.7
	30–39	18,803	48.2
	40–49	11,090	31.3
	50 or older	1,287	3.3

continued

Table 1: *Continued*

Category	*Variable*	*N**	*Percent*†
Birth order	First born	20,383	55.5
	Second born	12,002	30.4
	Third born	4,377	10.1
	Fourth born or higher	1,894	4.0

*Unweighted number of person-years.

†Weighted percentage of person-years.

lower the likelihood of using a medication. Last, children who lived with at least one other adult in addition to their parents had fewer office visits and were less likely to use a prescription medication than children who lived only with their parents.

Multivariate Analyses

Our multivariate analyses identified the independent effects of family structure on the number of office and emergency room visits and on the likelihood

Table 2: Mean Number of Visits and Probability of Receiving a Prescription Medication, by Family Structure, Unadjusted

Variable	*Total Office Visits (per Child)*	*Physician Office Visits (per Child)*	*Emergency Room Visits (per Child)*	*Prob. of Prescription Medication (%)*
Number of parents				
Two parents†	2.89	2.21	0.14	54.1
Single mother	2.35**	1.71**	0.19**	48.3**
Other children				
None†	3.41	2.51	0.18	58.5
1 other	2.86**	2.20**	0.15	55.3**
2 other	2.53**	1.92**	0.14**	49.6**
3 other	2.03**	1.57**	0.14*	43.9**
4+	1.76**	1.31**	0.11**	39.7**
Other adults				
None†	2.90	2.21	0.15	54.8
1+without a grandparent	2.17**	1.56**	0.14	44.0**
1+with at least 1 grandparent	2.30**	1.70**	0.16	45.4**

†Comparison category for the variable.

*$.01 < p < .05$ for test of difference with the comparison category.

**$p < .01$ for test of difference with the comparison category.

Note: All results are annualized.

Table 3: Predicted Number of Visits and Probability of Prescription Medication, by Family Structure, Adjusted for Other Explanatory Variables[†]

Variable	*Total Office Visits (per Child)*	*Physician Office Visits (per Child)*	*Emergency Room Visits (per Child)*	*Prob. of Prescription Medication (%)*
Number of parents				
Two parents[‡]	2.83	2.14	0.15	53.1
Single mother	2.86	2.08	0.16	51.8
Other children				
None[‡]	2.95	2.20	0.17	55.5
1 other	2.86	2.15	0.16	53.9
2 other	2.82	2.13	0.14*	51.9**
3 other	2.56*	1.94*	0.14*	47.6**
4+	2.33**	1.75**	0.10**	46.3**
Other adults				
None[‡]	2.93	2.18	0.15	53.8
1+without a grandparent	2.35**	1.80**	0.15	48.3**
1+with at least 1 grandparent	2.58*	1.95*	0.14	49.5**

[†]Predicted values are adjusted for the child's age, sex, and race or ethnicity; family income; the child's health insurance coverage; metropolitan residence; the child's birth order; the mother's education and age; and the child's health status. Predicted values for each family structure are variable (e.g., number of parents) are also adjusted for the other two family structure variables.

[‡]Comparison category for the variable.

*$.01 < p < .05$ for test of difference with the comparison category.

**$p < .01$ for test of difference with the comparison category.

Note: All results are annualized.

of using a prescription medication, adjusting for other variables that influence these outcomes (Table 3). Interestingly, living with a single mother did not have an independent effect on the number of office visits, emergency room visits, or use of prescription medication by children (Table 3).

By contrast, the number of other children in the family had consistent effects to reduce the number of office visits, the number of emergency room visits, and the likelihood of using a prescription medication. For instance, other things equal, children who lived with four or more other children averaged 2.33 total office visits, 1.75 physician visits, and 0.10 emergency room visits annually, compared with 2.95 total visits, 2.20 physician visits, and 0.17 emergency room visits for children who lived in families with no other children ($p < .01$ for all comparisons). Additionally, 46.3 percent of children who lived with four or more other children used a prescription medication, compared with 55.5 percent of children who lived with no other children ($p < .01$). The multivariate analyses found a dose response of office visits, emergency

Table 4: Predicted Number of Visits and Probability of Receiving a Prescription Medication, by Selected Demographic and Socioeconomic Characteristics, Adjusted for Other Explanatory Variables[†]

Variable	*Total Office Visits (per Child)*	*Physician Office Visits (per Child)*	*Emergency Room Visits (per Child)*	*Prob. of Prescription Medication (%)*
Race/ethnicity				
White[‡]	3.19	2.36	0.17	56.1
Black	1.71**	1.37**	0.14*	43.4**
Hispanic	2.41**	1.86**	0.13**	50.7**
Asian	1.73**	1.48**	0.09**	41.6**
Other	2.48*	1.77*	0.13	47.9
Family income				
Poor[‡]	2.55	1.91	0.17	51.3
Low income	2.61	1.96	0.17	49.6
Middle income	2.83*	2.13**	0.14**	53.4
High income	3.08**	2.31**	0.14**	55.3**
Insurance				
Uninsured[‡]	1.65	1.26	0.13	41.9
Public	3.11**	2.29**	0.16**	55.8**
Private	2.88**	2.17**	0.15*	53.4**
Maternal education				
No high school[‡]	1.91	1.59	0.12	47.2
Some high school	2.27**	1.83*	0.16**	50.4*
High school graduate	2.53**	1.97**	0.15	51.0*
Some college	2.99**	2.14**	0.17**	54.1**
College graduate	3.43**	2.50**	0.14	56.4**
Maternal age				
21 or younger[‡]	2.34	1.59	0.20	45.6
22–29	2.33	1.81*	0.18	49.3
30–39	2.72	2.09**	0.15*	52.7**
40–49	3.24**	2.37**	0.14**	55.1**
50 or older	3.70**	2.65**	0.15*	52.6*
Birth order				
First born	3.06	2.31	0.15	54.8
Second born	2.60**	1.96**	0.16	50.6**
Third born	2.51**	1.84**	0.16	49.3**
Fourth born or higher	2.18**	1.67**	0.18	50.9*

[†]Predicted values are adjusted for all the other explanatory variables in the model.

[‡]Comparison category for the variable.

*$.01 < p < .05$ for test of difference with the comparison category.

**$p < .01$ for test of difference with the comparison category.

Note: All results are annualized.

room visits, and use of prescription medications to the number of other children in the family, although this response was much less pronounced than the response in the unadjusted data (Table 2). In fact, Table 3 shows that children who lived in families with no, one, or two other children had the same numbers of total visits and physician visits, other things equal; the number of other children in the family did not lead to fewer visits until there were at least three other children. Similarly, children living with no or one other child were equally likely to use a prescription medication, whereas the probability of prescription medication use fell substantially as the number of other children rose to three or four.[5]

Living with one or more other adults in addition to the parents was associated with fewer office visits and a lower probability of using a prescription medication, but no difference in emergency room visits (Table 3). Utilization did not differ significantly between children who lived with a grandparent and those who lived with other adults but without a grandparent.

In sensitivity analyses, we estimated multivariate models that included an interaction between number of other children in the family and number of parents and found that the effect of number of other children on the study outcomes was similar for children in single-mother and in two-parent families. Other nonsignificant interactions included those between number of other children, on one hand, and child age and family income, on the other. However, when we tested an interaction between number of other children in the family and maternal education we found that the effect of other children to reduce physician office visits was most pronounced in children of mothers with low educational attainment ($p<.01$).

In secondary analyses, we assessed the effect of cohabitation on the study outcomes (2.0 percent of children lived with a cohabiting single mother). We found that children living with a single-mother who cohabited averaged 2.45 total office visits and 1.81 physician visits annually, other things equal, compared with 2.83 total visits and 2.14 physician visits for children in two-parent families ($p<.05$ for total office visits and $p<.01$ for physician visits). Children living with a noncohabiting single-mother had similar numbers of office visits (2.86 total visits and 2.07 physician visits) as children in two-parent families. Additionally, 48.1 percent of children in cohabiting single-mother families used a prescription medication, compared with 51.6 percent of children with a noncohabiting single-mother and 53.1 percent of children with two parents ($p<.05$ for the comparison of cohabiting single-mother families with two-parent families). Cohabitation had no effect on emergency room visits.

Several of the other explanatory variables in the multivariate models were also notable for their independent effects on ambulatory visits and use of prescription medications including race/ethnicity, family income, insurance coverage, maternal education, maternal age, and birth order. To highlight the latter three, higher maternal education resulted in more total and physician office visits and in a higher likelihood of using a prescription medication. Further, children of older mothers had more office visits and fewer emergency room visits than children of younger mothers. Other things equal, children who were later in the birth order had fewer total and physician office visits and a lower likelihood of using a prescription medication than first-born children, consistent with the notion that parents' child-rearing experience affects the care their children receive. Results for these explanatory variables are reported in Table 4.

DISCUSSION

We found that family structure has a substantial effect on the use of office visits and prescription medications by children even after adjusting for demographic and socioeconomic variables, parental education and experience in child rearing, and detailed measures of children's health status. Previous research has mainly assessed the influence of number of parents on children's use of ambulatory care (Cafferata and Kasper 1985; Heck and Parker 2002). Our study breaks new ground by examining dimensions of family structure beyond the number of parents, including the number of other children in the family, the number and types of other adults, and cohabitation.

Consistent with the earlier studies, we found no independent effect of number of parents on children's office visits (Newacheck 1992; Heck and Parker 2002) after controlling for other explanatory variables. The descriptive analyses indicate that children in single-parent families receive less care than children in two-parent families; however, the differences can be attributed to other characteristics. By contrast, we found sizable effects of the number of other children in the family on both office visits and medication use even after controlling for other explanatory variables. For instance, children in families with four or more other children had only about four-fifths as many total and physician office visits, other things equal, as children in families with no other children. The effect of four or more other children on the likelihood of using a prescription medication was larger than the independent effect of poverty and rivaled the effect of being uninsured. These results mirror findings on

childhood immunization showing a negative association between the number of children in the family and immunization status (Bates and Wolinsky 1998; Luman et al. 2003).

We also found that, compared with children who lived only with their parents, children living with other adults in addition to their parents had fewer total and physician office visits and a lower likelihood of using a prescription medication. Our secondary analyses found that children of cohabiting single mothers had fewer visits than children with noncohabiting single mothers or children with two parents.

As noted earlier, social scientists have theorized that parental resources are finite and that each additional child in a family represents time and energy drawn away from parents or other caretakers (Cicirelli 1978; Blake 1989; Powell and Steelman 1995; Kuo and Hauser 1997; Phillips 1999; Downey 2001). In her landmark work, Blake (1981) categorized parental resources into three types: settings, including home, clothing, food, books, and toys; treatments, including personal attention, quality time, and teaching; and opportunities, including schooling, music lessons, and other enrichment experiences. She argued that the higher the number of children, the more parental resources are divided, even taking into account economies of scale, and hence, the lower the "quality" of the children. Studies demonstrating an inverse relationship between the number of siblings and children's intellectual development and educational achievement are consistent with this view (Cicirelli 1978; Blake 1981; Powell and Steelman 1995; Phillips 1999; Downey 2001; Sandberg and Hofferth 2001). Our findings suggest that children's health care may be susceptible to the dilution of parental resources as well. In families with many children, parents may not have the time, energy, or financial resources to take each child for care as often as they otherwise would.

The presence in a household of other adults in addition to the parents can either provide additional resources for rearing children or, alternatively, serve as a resource drain (Blake 1981, 1989; Bumpass, Raley, and Sweet 1995; Manning and Lichter 1996; Downey 2001; Aronson and Huston 2004). Our findings are consistent with the notion that other adults, and especially cohabiting males, generally compete for parental resources that would otherwise be used to take children for health care. Even children who live with their grandparents have fewer office visits and are less likely to use prescription medications than children who live only with their parents.

Our study has several limitations. First, we did not study single-father families; thus our findings cannot be generalized to these families. Second, our data did not enable us to identify grandparents directly. Consequently, we

used an indirect approach in which we identified adult family members who were at least 20 years older than the child's mother and classified them as "grandparent-like adults." "Grandparent-like adults" could be older relatives of the child, but are not necessarily grandparents. Nonetheless, these relatives may be functionally similar to grandparents, and the percentage of families with "grandparent-like adults" in our study mirrored the percentage of families living with grandparents as reported in the U.S. Census (U.S. Census Bureau 2000). Similar considerations apply to the indirect approach we used to identify cohabiting single mothers. Our method could not distinguish a similar age male relative living with the mother from a cohabiting male, nor could it identify cohabiting males when there was a third adult in the household. However, this "measurement error" would be expected to bias our results toward understating the effects of cohabitation.

Third, birth order may not have fully captured parents' child rearing experience if the health care parents seek for a child is influenced not only by their experiences with the child's older siblings but also by their experiences with the child's younger siblings. If this were the case, for example, the parents of a 6-year-old who is the first-born in a family with three children would bring more experience to bear on their child's health care than the parents of a 6-year-old who is an only child. This would imply that the effects of number of children in the family might not be fully unconfounded from the effects of child-rearing experience.

Although there is no way to know for certain, the findings in Table 3 suggest that, in our analyses, the number of other children captures dilution of parental resources and related effects rather than parents' child-rearing experience. It seems reasonable to assume that the effects of child-rearing experience would be greatest for the first few children and then taper off with additional children, whereas resource dilution effects would be small or absent at first and then increase rapidly after a threshold number of children is reached (Downey 1995). The findings for number of children in Table 3 are consistent with the latter pattern.

Finally, our data did not enable us to determine the appropriateness of children's visits or prescription medications, or their impact on children's health. We cannot assume that the lower use of office visits and prescription medications that we found would result in worse health outcomes. Additional research is needed to determine whether differences in utilization by family structure have health consequences.

Despite these limitations, this study sheds new and important light on the role of family structure in children's health care, and lends a novel dimension

to the maxim that health care providers should consider children in a family context. The study findings suggest that children can be vulnerable to decreased ambulatory care and possibly unmet need as a result of their family structure. It would be helpful to raise awareness among health care providers so that they can monitor children in cohabiting households or children with many siblings more closely for follow-up appointments. In addition, policies that provide support for working parents with many children, such as family leave days, may enable them to take their children for care while alleviating some of the stress and demand on their time.

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NOTES

1. We refer to our analyses of cohabitation as "secondary" because of the obvious imprecision in constructing the cohabitation variable. Our variable is sure to lack both specificity and sensitivity, although it seems likely that sensitivity is the bigger problem.
2. The MEPS does not capture the situation where a sibling of a patient asks to be assessed by the health care provider "unofficially" (i.e., without registration or documentation). We do not know how often this situation occurs; however, given medical-legal and reimbursement considerations, it seems likely that substantive "unofficial" contacts between providers and patients occur infrequently.
3. Birth order is sufficient to capture the effects of parental child-rearing experience if the way parents seek care for a particular child is only influenced by what they learned from rearing that child's older siblings. If parents care-seeking for a particular child is also influenced by what they learn from rearing the child's younger siblings, however, then birth order is insufficient to capture child-rearing experience and the number of children may capture some of this effect as well. We argue later in the paper that our findings are consistent with number of children capturing mainly effects that are unrelated to child-rearing experience, such as resource dilution.
4. In Table 1, the percentage of 0–1 year olds is smaller than expected owing to the exclusion of fractional years in the analysis, as described in the methods section.

5. Additional statistical tests found that children living with three or four or more other children had fewer total visits than children living with no, one, or two other children when the latter were considered together. Similarly, children living with two, three, or four or more other children were less likely to use a prescription medication than children living with no or one other child when the latter were considered together, and children living with three or four or more other children were less likely to use a prescription medication than children living with two other children ($p < .05$ for all comparisons).

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