Parental Mental and Pain-Related Health and Pediatric Ambulatory Care Sensitive Emergency Department Visits and Hospitalizations

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Objective. To investigate the types of parental psychiatric and pain-related (PR) conditions that are associated with inadequate management of children's health and medical needs.

Data Sources. The 1997–1998 Thomson/Medstat MarketScan® claims and administrative dataset.

Study Design. A cross-sectional study that assessed the associations between parents' claims for psychiatric and PR conditions, and their children's well-child care as well as emergency department (ED) visits and hospitalizations for conditions that can be treated effectively in outpatient settings (ambulatory care sensitive [ACS] conditions).

Data Extraction Methods. Claims were extracted for 258,313 children of ages 0–17 years and their parents, who had insurance coverage for a full 2-year period.

Principle Findings. Multiple parental psychiatric and PR diagnoses were associated with child ACS emergency services/hospitalizations. Maternal depression was negatively associated with a child having the recommended well-child visits (odds ratio [OR]: 0.92, 95 percent confidence intervals [CI]: 0.84–0.99). The combined diagnoses of maternal depression and back pain was positively associated with a child having an ACS-ED visit (OR: 1.64, 95 percent CI: 1.33–2.03) and a child having an ACS hospitalization (OR: 2.04, 95 percent CI: 1.34–3.09).

Conclusions. Pediatricians' ability to manage child health may be enhanced with coordinated management of parental psychopathology and PR health conditions.

Key Words. Ambulatory care sensitive conditions, maternal child health

Children who do not receive timely medical care for certain medical conditions may be at risk for emergency care and/or hospitalization (Parker and Schoendorf 2000; Kozak, Hall, and Owings 2001). Approximately one-third of all hospitalizations among children occur for medical conditions that can potentially be managed with timely and effective ambulatory care (Parker and Schoendorf 2000). Examples of such conditions include: dehydration, asthma,

bronchitis, severe ear-nose-and-throat (SENT) conditions, pneumonia, gastroenteritis, and kidney/urinary tract infections. These conditions are often referred to as ambulatory care sensitive (ACS) conditions, and hospitalizations for these conditions are referred to as ACS hospitalizations (Billings et al. 1993).

Other factors, such as low use of preventive services (e.g., pediatric well-child visits, dental check-ups, and vaccinations) and frequent visits to the emergency department (ED) for ACS conditions, may also be indicative of poor access to timely pediatric care. Although this has yet to be studied among children, Oster and Bindman (2003) found that barriers to primary care may have contributed to higher ED visits for ACS conditions (ACS-ED) among black adults and Medicaid adult patients. Other studies have also found ED service use to be inversely associated with access to primary care providers and directly associated with parental dissatisfaction with the quality or convenience of their nonemergency-based primary care facility (Smith and McNamara 1988; Halfon et al. 1996). Andersen (1995) reported that there are many enabling factors that moderate access to care, such as personal income and insurance, and presence of adequate medical staff and facilities in the community. However, factors other than tangible enabling resources may influence a child's receipt of timely pediatric services in a nonemergency-based setting.

Parental psychological characteristics may be considered to be predisposing factors (Andersen 1995) because they exist before the child's need for services and influence a child's receipt of timely medical care (Fairbrother et al. 2005; Gaskin and Mitchell 2005; Minkovitz et al. 2005). Parents with mental health (MH) conditions that create narrow or self-focused attention, due to distress, withdrawal, or ambivalence, may have poor or inconsistent communication with their family members, thereby compromising their ability to recognize their children's health needs (Teagle 2002; Bussing et al. 2003). Parents with these disorders may also experience more than the usual difficulty navigating the pediatric medical care system and monitoring

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children's treatments. (Because parents generally are responsible for children, the term "parent" is used throughout this article, although a few such "parents" are legally their "primary guardian.")

PR conditions may create a similar situation in that parents may be less able to respond to children's health/medical care needs due to their own stress and treatment demands. No published work, to date, has investigated the relationship of parental PR medical conditions to unmet pediatric service need; however, recent literature has shown that people with depression and pain have greater reduction in role functioning than people with depression alone (Emptage, Sturm, and Robinson 2005).

Moreover, no published studies have, as yet, investigated: (1) the relationship of specific types of parental MH conditions to pediatric ACS-ED visits and hospitalizations; (2) how parental psychopathology compares with parental PR medical conditions in terms of their relationship with children's preventive care use; (3) the effect of comorbid MH and PR conditions with regard to child medical management; and (4) how usage of pediatric ACS-ED visits and ACS hospitalizations is associated with maternal health and paternal health problems. This study investigates these issues by examining the following hypotheses:

Hypothesis 1: Children of parents with MH and/or PR conditions are less likely to receive annual well-child visits than children whose parents do not have such conditions.

Hypothesis 2: Children of parents diagnosed with MH or PR conditions are more likely to experience ACS-ED visits and ACS hospitalizations than children whose parents do not have such conditions.

METHODS

Two-years of service use was compared for children whose parents were diagnosed with the various MH conditions and/or several debilitating PR conditions (arthritis, back pain, and migraines) to children of parents who did not receive such diagnoses. All conditions were defined by the International Classification of Diseases 9th Revision Clinical Modification (ICD-9-CM) codes. Separate analyses were conducted to test the association of children's use of services with maternal conditions and with paternal conditions. The appropriate human subjects protection review board approved all study procedures.

Data Source

The hypotheses were investigated using the 1997–1998 Thomson Medstat MarketScan[®] databases. These datasets contain standardized, detailed, and enrollee-specific clinical utilization information across inpatient, outpatient, prescription drug, and MH “carve-out” services from the medical claims of approximately 45 large employers and health plans. These datasets provided a sufficient sample size to detect meaningful differences in health care patterns, especially for relatively rare types of utilization such as hospitalizations. No personal identifying information is available in the datasets.

Study Population

Adults were selected as parents if they were 18 years of age or older, were listed as either the primary beneficiary or the spouse on their health plan, and had at least one child dependent. Parents and their children were linked together by a common family identification number. Parents and children not continuously enrolled in a health plan or without complete coverage during 1997–1998 were not included in this study. All parents were active users of the medical care system and all had private health insurance. Over 93 percent of the main beneficiaries listed on the health plan were employed full-time. Children of parents with diagnoses of organic psychotic conditions (ICD-9-CM codes 290–294) were excluded from the study in order to produce a more homogenous sample of children (183 children were excluded). Based on these criteria, 258,313 children and 262,799 parents were included in the study population. Multiple children can have the same parents. The majority of this study population resided in the eastern and north central regions of the United States. Details on the distribution of the population by U.S states, grouped by three-digit zip area, are shown in the Supplementary Material Appendix A.

Outcome Variables

Well-Child Visits. Based on the American Academy of Pediatrics (AAP) and the Health Plan Employer Data and Information Set (HEDIS) recommendations (2006), well-child visits refer to pediatric office visits in which health and developmental history is assessed, a physical exam is performed on the child, and the physician provides education and anticipatory guidance for the parent. The AAP recommends one annual well-child visit for children ages 3–17 years, skipping an annual visit for children ages 7 and 9 years. For this study, we assessed if children ages 3–5 and 11–17 years met AAP recommendations by whether they had one well-child visit in 1997 and one

visit in 1998. Children who turned 6–10 years of age within the first year of the 2-year study period were considered to have met AAP recommendations for well-child visits if they had one visit during the study period, because they would have been the ages of 7 or 9 years at some point within the study period. Children born or turning ages 1–2 years within the first year of the study period were excluded from this part of the analysis because determining adherence to the AAP recommended well-child schedule for this age group (i.e., having six visits within first 15 months of age) could only be conducted for those born within the first 9 months of the study. These methods for determining receipt of recommended well-child visits were similar to those published by Yu et al. (2002). CPT codes used for capturing well-child visits from the children's outpatient claims dataset included: 99381–99382 (new patients ages 0–5 years), 99391–99392 (established patients ages 0–5 years), 99383–99384 (new patients 6–17), and 99393–99394 (established patients ages 6–17 years).

ACS-ED Visits and ACS Hospitalizations. ACS-ED visits and ACS hospitalizations were identified in the claims files, based on having a primary ICD-9-CM diagnosis for one of the ACS conditions. The ACS conditions used was based on the conditions used by Casanova and Starfield (1995), with the exception of certain conditions omitted in this study because of their low prevalence and potentially high severity among children, including chronic obstructive pulmonary disease, congestive heart failure, hypertension, angina, diabetes, and pelvic inflammatory disease. Parker and Schoendorf (2000) made similar modifications to their study on ACS conditions among children. A complete list of ACS conditions used for identifying these claims appears in Table 1.

Explanatory Variables

The primary independent variables were parental psychiatric/MH diagnoses and the parental PR diagnoses (i.e., arthritis, back pain, and migraine headaches) obtained from the outpatient claims and hospital admission files. Claims coded only for test procedures were not included.

For children whose parents have MH or PR diagnoses, they too may be prone to such conditions (Kramer et al. 1998; Kendler et al. 2001; Lesesne et al. 2003; Olfson et al. 2003), which could potentially affect the outcomes. Studies have also found child psychopathology to be associated with having asthmatic conditions (Calam et al. 2003; Ortega, Goodwin et al. 2004; Ortega, McQuaid

Table 1: List of ACS Conditions and ICD 9-CM Codes

<i>ACS Conditions</i>	<i>ICD 9-CM Codes</i>
Immunizable-preventable	033, 045, 320, and 391 codes
Epileptic convulsions	345 codes
Convulsions	780 codes
Severe ear, nose, and throat infections	382, 462-465, and 4721 codes
Pulmonary and other tuberculosis	011-019 codes
Bacterial pneumonia	481-483 codes
Asthma	493 codes
Cellulitis	681-686 codes
Hypoglycemia	2512
Gastroenteritis	5,589
Kidney/urinary tract infection	590 codes
Dental conditions	521-528 codes
Dehydration—volume depletion	2,765 codes
Iron deficiency anemia	280 codes
Nutritional deficiencies	260-268 codes

ACS, ambulatory care sensitive; ICD 9-CM, International Classification of Diseases 9th Revision Clinical Modification.

et al. 2004), which may increase the odds of having ACS-ED visits and ACS-hospitalizations. Therefore, this study controlled for the presence of any MH or behavioral health, asthma, or PR diagnoses of children during the study period.

Furthermore, this study controlled for other factors that may influence child health service utilization, such as child characteristics (i.e., age and sex), family characteristics (number of children in the family, family residence [i.e., three-digit zip code], and family's health plan type), and parental characteristics (i.e., single parent on health plan, and age). Separate analyses were conducted for mothers and for fathers.

Statistical Analysis

To characterize the child population, children were categorized into four mutually exclusive groups defined by their parents' diagnoses: (1) children of parents without any MH or PR diagnoses; (2) children who only had a mother diagnosed with either a MH or PR condition; (3) children who only had a father diagnosed with either a MH or PR condition; and (4) children whose mother and father were both diagnosed with either a MH or PR condition. Analysis of variance tests and χ^2 tests were used to assess differences in child groups by a range of family characteristics.

Child service outcomes were modeled as a function of each parent's conditions. Separate analyses were conducted based on maternal diagnoses

and paternal diagnoses. The children's outcomes were evaluated as a function of the parents' MH and PR diagnoses, and the presence of co-occurring common MH and PR diagnoses (e.g., depression with back pain). For each child enrollee, the outcome variables (well-child visits, ACS-ED visits, and ACS hospitalizations) were dichotomized (child did/did not have recommended well-child visits; child did/did not have at least one ACS-ED visit; child did/did not have at least one ACS hospitalization, respectively, during the 2-year study period). Hypotheses were tested using logistic regression with generalized estimating equations (GEE) with robust variance estimates. GEE was used to correct for the within-family correlations (children within a family are likely to have similar characteristics), which can lead to an increased risk of Type 1 error (Liang and Zeger 1993). Version 8.2 of *Stata* statistical software was used to perform regression analyses.

RESULTS

Among the 258,313 children in this study, 176,080 of them had parents without MH and PR diagnoses; 42,741 had only a mother diagnosed with either MH or PR conditions; 26,080 had only a father diagnosed with either MH or PR conditions; and 13,432 had both parents diagnosed with either MH or PR conditions (Table 2). Partly because of the large sample sizes, all groups were significantly different ($p < .01$) based on the listed characteristics. Having an asthma, attention deficit disorder, substance dependence, MH, or PR diagnosis was particularly higher for children whose parents had MH or PR diagnoses compared with the other children. The logistic regression models adjusted for all of these child characteristics. The most common group characteristics were: age 14–18 years (data not shown); having one other sibling in the household; residing in the northeast, central, and southern census regions; being in a managed care plan; having both parents on the plan (which suggests both parents were in the household); and having parents between the ages of 31–50 years.

With regard to the outcome variables, having at least one ACS-ED visit or one ACS hospitalization was more common among children whose parents had MH or PR diagnoses compared with the other children (Table 2). Contrary to the hypothesis, having the recommended well-child visits was also more common among children whose parents had MH or PR diagnoses compared with other children. Further analysis of the outcome variables by parental diagnostics revealed that the odds of a child having an ACS-ED visit

Table 2: Child Demographic Characteristics*

Child Characteristics	All Children (N = 258,313)	Children Whose Parents Were Not Diagnosed with Either a Mental or Pain Related [†] Condition (N = 176,080; 68.17%)	Children Whose Mother Was Diagnosed with Either a Mental or Pain Related Condition Only (N = 42,741; 16.54%)	Children Whose Father Was Diagnosed with Either a Mental or Pain Related Condition Only (N = 26,080; 10.09%)	Children Whose Mother and Father Were Diagnosed with either a Mental or Pain Related Condition (N = 13,432; 5.19%)
Age (mean, SD)	10.74 (4.79)	10.62 (4.80)	11.08 (4.74)	10.91 (4.76)	10.94 (4.72)
Sex (%)					
Male	51.30	51.28	50.86	51.96	51.65
Female	48.70	48.72	49.14	48.04	48.35
No. of children in family (%)					
1	24.98	25.09	25.99	24.45	21.34
2	45.23	45.11	44.87	45.73	47.07
3 or more	29.79	29.80	29.14	29.82	31.60
Health characteristics (%)					
Asthma	3.12	2.89	3.62	3.45	3.94
Attention deficit					
Disorder (with and without hyperactivity)	3.57	2.75	5.44	4.16	7.33
MH condition	6.81	4.47	11.48	8.99	18.37
PR condition	2.60	2.08	3.62	3.34	4.60
Substance dependence	0.51	0.36	0.85	0.72	1.09
Residential region (%)					
Northeast	26.69	27.37	24.55	26.08	25.92
North central	34.14	32.27	38.99	35.20	41.10
South	29.95	31.42	26.86	28.98	22.51
West	8.73	8.47	9.05	9.34	9.88
Unknown	0.48	0.47	0.56	0.41	0.60

Table 2. Continued

Child Characteristics	All Children (N = 258,313)	Children Whose Parents Were Not Diagnosed with Either a Mental or Pain Related [†] Condition (N = 176,080; 68.17%)	Children Whose Mother Was Diagnosed with Either a Mental or Pain Related Condition Only (N = 42,741; 16.54%)	Children Whose Father Was Diagnosed with Either a Mental or Pain Related Condition Only (N = 26,080; 10.09%)	Children Whose Mother and Father Were Diagnosed with either a Mental or Pain Related Condition (N = 13,432; 5.19%)
Family's plan type (%)					
Fee for service	33.75	32.11	37.10	36.23	39.66
Managed Care	58.15	59.74	54.99	55.71	52.11
Undetermined	8.10	8.15	7.91	8.07	8.23
Parents on plan (%)					
Both parents	81.86	80.50	81.14	82.93	100.00
Mother only	10.12	10.27	18.86	0.00	0.00
Father only	8.02	9.24	0.00	17.07	0.00
Mean parental age (%)					
18–30	4.19	4.46	3.86	3.53	2.93
31–40	41.93	42.74	40.46	40.24	39.27
41–50	40.29	39.44	41.65	41.68	44.38
51 +	7.57	7.28	8.02	8.74	7.62
Outcomes (%)					
Having recommended well-child visits [‡]	10.72	10.61	10.40	10.67	11.42
Having at least one ACS-ED visit	3.33	2.95	4.20	3.63	4.92
Having at least one ACS hospitalization	0.67	0.64	0.77	0.61	0.79

*Overall, the groups were significantly different at the $p < .01$ level.

[†]PR conditions included back pain, migraine headaches, and arthritis.

[‡]Only children of 3–17 years of age were included; children ages 6–10 years were expected to have one visit during the study, while all other children were expected to have two visits (one in 1997 and one in 1998). Analysis for this variable excluded 10,782 children of 0–2 years of age. MH, mental health; PR, pain-related; ACS, ambulatory care sensitive; ED, emergency department.

increased with the number of parents diagnosed with any of these conditions; the adjusted odds ratio (OR) was 1.28 (95 percent confidence intervals [CI]: 1.21–1.36) when one parent had MH or PR diagnoses and 1.50 (95 percent CI: 1.36–1.65) when both parents had any of these diagnoses (data not shown).

Tables 3 and 4 show the adjusted ORs for each child service outcome as a function of the type of maternal and paternal diagnoses. As seen in Table 3, maternal depression was the only diagnosis found to be inversely associated with a child having recommended well-child visits (OR: 0.92; 95 percent CI: 0.84–0.99). Unexpected was the finding that mothers' diagnoses for adjustment reaction and migraine headache were associated with increased likelihood of well-child care. Most of the listed maternal health diagnoses were significantly associated with a child having an ACS-ED visit indicating increased odds of emergent care. These diagnoses included maternal depression, schizophrenia, anxiety, personality disorder, adjustment reaction, back pain, arthritis, and migraine headaches. The maternal health conditions positively associated with a child having an ACS hospitalization included anxiety, back pain, and arthritis. The combination of maternal depression and back pain was also significantly associated with a child having an ACS-ED visit (OR: 1.64; 95 percent CI: 1.33–2.03) and an ACS hospitalization (OR: 2.04; 95 percent CI: 1.34–3.09). Maternal MH diagnoses that were not associated with any of the child outcomes (and not listed in the table) include: paranoia or other nonorganic psychosis, hysteria, agoraphobia, and social phobia.

The pattern of association for these child service outcomes in relation to paternal morbidity was similar to that of maternal morbidity. However, there were no significant associations between a child having recommended well-child visits and the paternal MH diagnoses. Furthermore, paternal diagnoses of back pain and migraine headaches were positively associated with their children having recommended well-child visits. Paternal diagnoses positively associated with a child having an ACS-ED visit included adjustment reaction, back pain, and migraine headaches. Paternal depression was significantly associated with a child having an ACS hospitalization. Specific paternal comorbidities that were positively associated with a child having an ACS-ED visit included having diagnoses for both depression and adjustment reaction (OR: 1.41; 95 percent CI: 1.08–1.85) and adjustment reaction and back pain (OR: 1.39; 95 percent CI: 1.00–1.94). Paternal health conditions that were not significantly associated with any of the child outcomes (and not listed in the table) included: bipolar disorder; anxiety; hysteria; agoraphobia; social phobia; personality disorder; and arthritis.

Table 3: Adjusted Odds Ratios (ORs) for Well-Child Visits, Child ACS-ED Visits, and Child ACS Hospitalizations by Maternal Diagnoses[†]

Maternal Diagnoses	Sample of Children (Total N = 237,604)		Child Service Utilization OR (95% CI)	
	N	%	Having Recommended Well-Child Visits [‡]	Having at Least One ACS-ED Visit Having at Least One ACS Hospitalization
Depression	13,987	5.89	0.92 (0.84, 0.99)*	1.12 (1.01, 1.24)*
Schizophrenia	187	0.08	0.59 (0.22, 1.59)	2.09 (1.08, 4.07)*
Bipolar disorder	988	0.42	0.85 (0.63, 1.14)	1.31 (0.93, 1.84)
Anxiety	7,525	3.17	1.04 (0.93, 1.15)	1.14 (1.00, 1.30)*
Personality disorder	547	0.23	0.80 (0.55, 1.16)	1.74 (1.17, 2.59)*
Adjustment reaction	12,826	5.40	1.13 (0.05, 1.23)*	1.14 (1.03, 1.26)*
Back pain	18,697	7.87	1.04 (0.97, 1.11)	1.33 (1.23, 1.44)*
Arthritis	4,091	1.72	1.15 (0.98, 1.34)	1.38 (1.19, 1.60)*
Migraine headaches	8,985	3.78	1.17 (1.07, 1.28)*	1.21 (1.09, 1.34)*
Depression with back pain	2,068	0.87	1.00 (0.81, 1.22)	1.64 (1.33, 2.03)*

*Statistically significant at the $p < .05$ level.

[†]Each value was adjusted for child's age, child's sex, child having a mental/behavioral health, pain-related, or asthma diagnosis, number of children in family, health plan type, residential zip area, number of parents listed on the plan, maternal age, all other maternal diagnoses listed in the table as well as other maternal mental/behavioral health diagnoses (not listed in the table) that were captured during the 2-year study period. The reference group is children whose mothers did not receive any of the mental health, arthritis, back pain, or migraine headache diagnoses during the study period.

[‡]Only children of 3–17 years of age were included; children ages 6–10 years were expected to have one visit during the study period, while all other children were expected to have two visits (one in 1997 and one in 1998). Analysis for this variable excluded 10,068 children of 0–2 years of age. ACS, ambulatory care sensitive; ED, emergency department; CI, confidence interval.

Table 4: Adjusted Odds Ratios (ORs) for Well-Child Visits, Child ACS-ED Visits, and Child ACS Hospitalizations by Paternal Diagnoses[†]

Paternal Diagnoses	Sample of Children (Total N= 232,152)		Child Service Utilization OR (95% CI)		
	N	%	Having Recommended Well-Child Visits [‡]	Having at Least One ACS-ED Visit	Having at Least One ACS Hospitalization
Depression	6,808	2.93	1.01 (0.91, 1.13)	1.05 (0.90, 1.21)	1.37 (1.03, 1.83)*
Adjustment reaction	8,480	3.65	1.04 (0.95, 1.14)	1.22 (1.08, 1.37)*	1.03 (0.79, 1.35)
back pain	17,118	7.37	1.11 (1.04, 1.19)*	1.13 (1.04, 1.24)*	0.99 (0.81, 1.19)
Migraine headaches	2,632	1.13	1.19 (1.01, 1.40)*	1.29 (1.06, 1.56)*	0.71 (0.41, 1.25)
Depression with adjustment reaction	1,391	0.60	1.02 (0.82, 1.27)	1.41 (1.08, 1.85)*	1.12 (0.60, 2.10)
Adjustment reaction with back pain	889	0.38	1.16 (0.88, 1.53)	1.39 (1.00, 1.94)*	1.70 (0.88, 3.29)

*Statistically significant at the $p < .05$ level.

[†]Each value was adjusted for child's age, child's sex, child having a mental/behavioral health, pain-related, or asthma diagnosis, number of children in family, health plan type, residential zip area, number of parents listed on the plan, paternal age, all other paternal diagnoses listed in the table as well as other paternal mental/behavioral health and arthritis diagnoses (not listed in the table) that were captured during the 2-year study period. The reference group is children whose fathers did not receive any of the mental health, arthritis, back pain, or migraine headache diagnoses during the study period.

[‡]Only children of 3–17 years of age were included; children ages 6–10 years were expected to have one visit during the study period, while all other children were expected to have two visits (one in 1997 and one in 1998). Analysis for this variable excluded 10,027 children of 0–2 years of age. ACS, ambulatory care sensitive; ED, emergency department; CI, confidence interval.

Table 5 shows the adjusted ORs for each child service outcome as a function of one parent having a depression diagnosis with any PR diagnoses while the other parent does not. Maternal depression with PR diagnoses, in the absence of paternal MH or PR diagnoses, was significantly associated with a child having an ACS-ED visit (OR: 1.66; 95 percent CI: 1.38–1.99) and a child having an ACS hospitalization (OR: 2.14; 95 percent CI: 1.53–3.01). Paternal depression with PR diagnoses, in the absence of maternal MH or PR diagnoses, also doubled the odds of a child having an ACS hospitalization (OR: 2.12; 95 percent CI: 1.21–3.71). Only 57 children had both parents diagnosed with these conditions; therefore, this study was unable to detect the outcomes for this small group of children.

DISCUSSION

Parental MH and PR conditions are associated with meaningful and sometimes large increases in odds of child ACS-ED visits and child ACS hospitalizations. MH conditions, especially depression, and PR conditions (i.e., arthritis, back pain, and migraines) had somewhat similar associations with children's use of ACS-ED visits and ACS hospitalizations. But only depression in mothers significantly reduced the odds of timely well-child care, although inadequate well-child care has been discussed as one mechanism by which children may come to need emergent care for ACS conditions.

It was expected that several parental psychiatric conditions, such as depression, agoraphobia, social phobia, and schizophrenia, would be associated with inadequate child medical management as these conditions often manifest symptoms of social withdrawal, poor communication, reduced motivation, and impaired attention and problem solving (U.S. Department of Health and Human Services [DHHS] 1999). However, maternal depression was the only parental condition that significantly manifested the expected relationship with all three child medical service outcomes (i.e., maternal depression had the expected association with well-child services and child ACS-ED visits; maternal depression with back pain had the expected association with child ACS-ED visits and child ACS hospitalizations).

It was also expected that symptoms of some MH conditions could increase pediatric care seeking. For example, parents with anxiety who have fear or dread of severe health consequences (DHHS 1999) may be more assertive about seeking care frequently and in accessible nonemergency outpatient facilities. However, maternal anxiety was only significantly associated with a

Table 5: Adjusted Odds Ratios (ORs) for Well-Child Visits, Child ACS-ED Visits, and Child ACS Hospitalizations by Maternal and Paternal Diagnoses[†]

Maternal and Paternal Diagnoses	Sample of Children (Total N = 211,477)		Child Service Utilization OR (95% CI)	
	N	%	Having Recommended Well-Child Visits [‡]	Having at Least One ACS-ED Visit
Maternal Diagnoses				Having at Least One ACS Hospitalization
Depression with any pain-related conditions	2,678	1.27	1.12 (0.94, 1.34)	1.66 (1.38, 1.99)*
No mental health or pain-related conditions	923	0.44	1.09 (0.83, 1.44)	1.18 (0.85, 1.64)

*Statistically significant at the $p < .05$ level.

[†]Each value was adjusted for child's age, child's sex, child having a mental/behavioral health, pain-related, or asthma diagnosis, number of children on family plan, health plan type, residential area, mean parental age, and parents having other mental/behavioral health diagnoses during the study period. The reference group is children whose parents did not receive any of the mental health, arthritis, back pain, or migraine headache diagnoses during the study period.

[‡]Only children of 3–17 years of age were included; children ages 6–10 years were expected to have one visit during the study period, while all other children were expected to have two visits (one in 1997 and one in 1998). Analysis for this variable excluded 9,313 children of 0–2 years of age. ACS, ambulatory care sensitive; ED, emergency department; CI, confidence interval.

higher odds of a child having ACS-ED visits and ACS hospitalizations. A common feature of anxiety and many other MH conditions is that they cause a high level of emotional distress (DHHS 1999), and perhaps this is sufficient to keep the parents from attending to the child's needs in a timely manner.

The relationship between parental health and the child outcomes might be stronger when mothers are afflicted with MH conditions rather than the father, as mothers are more likely to take children to the doctor and to manage child health issues. In general, this may be true. However, the relationship was similar when either the mother or father had a diagnosis of depression along with a PR condition, and the other parent did not have any mental or PR diagnoses; the children had twice the odds of having an ACS hospitalization.

One of the strengths of this study is the use of a large claims dataset that provided a sample size sufficient to detect differences in health care patterns. However, using this type of data also have limitations. First, the sample represents people in the United States who are insured and accessing medical care. Moreover, parents with MH and PR disorders were likely to be receiving treatment for these conditions. It is unknown if the observed results would hold in an uninsured or publicly insured population. Additionally, this dataset does not contain important socioeconomic variables (e.g., income, race/ethnicity) that might have affected both the likelihood of having a parent with mental conditions as well as a child receiving timely care. On the other hand, issues such as financial barriers to care and families living in poorer residential areas, which have been associated both with parental mental disorders (Lorant et al. 2003) and lack of adequate nonemergency-based outpatient services are not likely to be important factors in this privately insured population with 93 percent of parents employed full time. Also, most of the parental diagnoses were captured in nonemergency, primary care facilities thereby implying that each parent diagnosed with a condition had access to these services. Another limitation of these data is that they only provide diagnoses; therefore, this study was unable to verify the parents' true functional status. Finally, only the associations between parental MH and PR diagnoses and the child service outcomes could be detected; no causal linkage can be inferred because the direction of the relationship could not be determined.

More than 20 percent of mothers had either a MH or PR diagnosis during the 2 years. Eight percent of parents had a diagnosis of depression. Although it may be premature to assess attributable risk with this study, this comparatively large prevalence indicates that these parental disorders might regularly influence the quality and timeliness of children's medical care.

Moreover, the associations found in this study were observed among parents who are likely to have been receiving treatment for their MH and PR conditions. Despite the potential impact of parental health on children, physicians who treat adults are often unable to monitor children since the current medical system is not structured to reward physicians for monitoring family members of their patients. Therefore, these findings support medical models presented previously by Zuckerman and Parker (1995), such as the two-generation health care approach, which highlights the importance of reducing fragmentation of care between parents and children. Recognition of the links between parental health problems and those of their children, as well as practice settings in which adult medical providers work in proximity to pediatricians may help improve recognition of the need for and the effectiveness of communication between adult and child providers. Innovative approaches are indicated in which pediatric providers can be informed (with parent consent/release of information) of the parents' health needs. This may help ensure that children's emerging needs for medical care are addressed before they require emergent care or hospitalization for ACS conditions.

Future research may provide insight into whether effective parental medical treatment, especially for depression, improves the likelihood of a child receiving timely care and reduces the likelihood of emergent care and hospitalization. The results of this study, together with a growing literature, suggests that physicians, MH providers, policy makers, and insurers need to consider parental MH, and now PR conditions, as potential influences on the medical care management of children of all ages.

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The Committee on Human Research (the institutional review board) has determined that this project meets the E-4 criteria for exemption from the HHS regulations (45 CFR part 46).

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SUPPLEMENTARY MATERIAL

The following supplementary material for this article is available online:
Appendix A. Geographic Distribution of Study Population.

This material is available as part of the online article from: <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1475-6773.2007.00790.x>
(this link will take you to the article abstract).

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