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Association of Parent Preventive Care with their Child's Recommended Well-Child Visits

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Abstract

BACKGROUND: Receipt of recommended well-child care is lowest for children without insurance, many of whom receive care in community health centers (CHCs).

OBJECTIVE: To understand if there is an association between parent preventive care and their children's well-child visits.

METHODS: We used electronic health record data to identify children and link them to parents both seen in an OCHIN network (CHC; n = 363 clinics from 17 states), randomly selected a child aged 3 to 17 with 1 ambulatory visit between 2015 and 2018. We employed a retrospective, cohort study design and used general estimating equations Poisson regression to estimate yearly rates of well-child visits based on parent preventive care adjusted for relevant covariates and stratified by child age for 3 linked samples: mother only, father only, and two parents.

RESULTS: We included 75,398 linked mother only pairs, 12,438 in our father only, and 4,156 in our 2-parent sample. Children in the mother only sample had a 6% greater rate of yearly well-child visits when their mother received preventive care (adjusted rate ratio [ARR] = 1.06; 95% CI = 1.03–1.08) compared to no preventive care. Children in the father only sample had a 7% greater rate of yearly well-child visits when their father received preventive care (ARR = 1.07; 95% CI = 1.04–1.11) versus no preventive care. Children in the two parent sample had an 11% greater rate of yearly well-child visits when both parents received preventive care (ARR = 1.11; 95% CI = 1.03–1.19) compared to neither receiving preventive care.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2022.03.019>.

The authors have no conflict of interest to disclose.

CONCLUSIONS: These findings suggest focusing on receipt of healthcare for the whole family may improve well-child visit rates.

Keywords

child health; family health; health service research; well-child visits

THE AMERICAN ACADEMY of Pediatricians (AAP) recommends yearly well-child visits for children and adolescents aged 3 to 21 years to promote health, screen for health conditions and developmental delays, and assess the function of the family.^{1,2} Additionally, well-child visits are associated with less emergency department use.³ Yet, between 30% and 50% of children do not receive well-child care as recommended; uninsured patients and those with low-income are less likely to receive well-child care as recommended compared to those with health insurance and high-income.⁴⁻⁶ Conversely, several child factors are associated with well-child visit compliance including having health insurance coverage and a usual source of care,^{6,7} having income four times the poverty level, and patients less than 13 years of age.⁴

Parental factors such as demographics, health status, usual source of care, and health insurance coverage are also associated with the receipt of healthcare for children, including well-child care.⁸ For example, having college-educated parents is shown to increase rates of well-child visit rates.^{4,5} However, maternal depression is associated with reduced well-child checks.⁹ Previous research showed that children of parents without a usual source of care had 35% lower odds of having a well-child visit than children of parents with a usual source of care,¹⁰ and inadequate prenatal care is subsequently associated with fewer well-child visits for the infant.^{11,12} Children whose parent enrolled in Medicaid health insurance coverage had an increased probability of receiving an annual well-child visit compared to children whose parents did not enroll in Medicaid coverage.⁸

Parent's preventive care receipt may be linked to their children's well-child care too. Mothers who received the human papillomavirus (HPV) vaccine were 3.5 times more likely to report HPV vaccination for their 11 to 14 year old children than mothers who were not vaccinated.¹³ Several studies found that a mother's healthcare visits were associated with their children's healthcare visits,^{14,15} and parent healthcare utilization was associated with well-child visits.⁵ Less is known about the relationship between parent preventive care and well-child visits. Since receipt of recommended well-child care is lowest for children without health insurance and those with low-incomes,^{4,6} we focused our study on patients seen in community health centers (CHCs). CHCs provide services to patients regardless of their insurance status and thus care for millions of families with low-incomes, including 1 in 9 children.¹⁶ The goal of this paper was to estimate the association of parental preventive care receipt on their child's well-child visits among patients seen in community health centers (CHCs). We hypothesized that children of parents with preventive care would have higher compliance for guideline-concordant well-child visits (ie, one visit per year) than children of parents without preventive care.

METHODS

DATA SOURCE

We utilized a previously identified national cohort of children that linked to at least one parent.¹⁷ This linked cohort was created with data from OCHIN (not an acronym) Inc., a network of CHCs from across the United States (U.S.) consisting of a single instance of Epic electronic health record (EHR) records.¹⁸ Briefly, we used emergency contact records and/or guarantor fields to identify patients who were linked to children and designated as “mother” or “father.” These records are important for child appointments as they represent the person to call if there is an emergency (ie, emergency contact) and they provide information about who is responsible for payment for the visit (ie, guarantor field). The algorithm then included “mothers” and “fathers” that were 12 to 55 years older than the child in an attempt to exclude nonparent caregivers, such as grandparents or siblings. This methodology was previously validated using Oregon Medicaid administrative data, which has household case identification numbers, and we found 98% agreement between the sources.¹⁹ We then selected children aged 3 to 17 and included EHR data from CHCs that provided adult preventive care and well-child care from 2015 to 2018. Demographics and visit-level data were from the Accelerating Data Value Across a National Community Health Center (ADVANCE) clinical research network (CRN) of PCOR-net. OCHIN leads the ADVANCE CRN and contains EHR data in its data warehouse.²⁰

POPULATION

We identified 138,648 distinct children between the ages 3 to 17 with at least one ambulatory visit at an eligible CHC (363 CHCs in 17 states) since 2015. These children belonged to 91,992 distinct family-units as described above. Using simple random selection, we chose one child per family-unit as the high intraclass correlation of well-child visits among siblings within a family would produce unstable models. We then identified three mutually exclusive populations for study: family-units in which the child was linked to: 1) a female parent only, which we call ‘mother only’ (n = 75,398); 2) a male parent only, which we call ‘father only’ (n = 12,438); and, 3) 2 parents, which we call ‘two parent’ (n = 4156) sample. The two parent families included 339 same-sex couples (305 female, 34 male).

DEPENDENT VARIABLES

The outcome measure was rates of well-child visits per calendar-year within the family’s observation period. The observation period consisted of each calendar year between and containing dates of the child’s first and last ambulatory encounter within the ages of 3 to 17 years in 2015–2018. Well-child visits were defined through a combination of provider type (MD, DO, NP, PA) and current procedural terminology (CPT) codes 99381–99384, 99391–99394, G0438, G0439.

INDEPENDENT VARIABLES

In both populations where a child was linked with only one parent, the main independent variable was a binary variable denoting whether or not the parent received preventive care at any time during the family’s observation period. Parent preventive care was identified

through a combination of provider type (MD, DO, NP, PA) and CPT codes 99385–7, 99395–7; prenatal care was excluded. Where children were linked to two parents, we included a set of indicator variables that distinguished whether neither, one, or both parents received preventive care during the study period.

COVARIATES

We adjusted for covariates based on Andersen and Aday's²¹ conceptual model of healthcare access and previously identified variables associated with well-child visits.⁴ In our analyses of children in the mother only and father only samples, child covariates included the following: age at observation start, health insurance status (always, sometimes, never insured), and U.S. region (Northeast, South, Midwest, West). We also included the following parent covariates: age at study start, race and ethnicity (non-Hispanic white, non-Hispanic Black, non-Hispanic other, Hispanic, not recorded), preferred language (English, non-English), last recorded federal poverty level (FPL) at visit categorized as (>138%, 138%, not recorded), last known health insurance status (private insurance, public insurance, uninsured), and total number of unresolved chronic conditions documented in the patient's problem list at study end. For the analyses of children linked to two parents, we adjusted for the same child covariates as listed above, and for parent covariates, we included each parent's age and number of unresolved chronic conditions at study end; further, we aggregated parent data for race and ethnicity using the same values as before if parents identified equivalently or used the value *mixed* if parent-reported values did not agree; we used an indicator for if at least one parent preferred English language; insurance status and FPL combined each parent's individual value as described above. Lastly, in this study we did not include covariates for child's gender or chronic conditions as these values did not yield any noticeable changes in our model estimates.

STATISTICAL ANALYSIS

For each of the three parent study samples, we described child and parent characteristics overall and by whether or not the parent had documented preventive care use during the observation period. We then used general estimating equations (GEE) Poisson regression to estimate the yearly rates of well-child visits, for each of the 3 samples adjusted for all covariates previously stated. Lastly, for each of the 3 samples, we repeated this GEE modeling stratified by child age at observation period start (grouped as ages: 3–6, 7–11, and 12–17). A robust sandwich variance estimator with an exchangeable correlation structure was used in all models to account for clustering on the child's primary CHC. GEE-derived adjusted rate ratios (ARR) and 95% confidence intervals (CI) were estimated and reported. All analyses utilized 2-sided testing with set 5% type I error and were conducted using Stata 15.

This study was reviewed and approved by the Oregon Health & Science University Institutional Review Board (STUDY00019958) with a waiver of consent and authorization, as the research involves minimal risk, does not adversely affect the rights of subjects, and could not be practicably carried out without the waiver.

RESULTS

We included 75,398 linked pairs in our mother only sample, 12,438 linked pairs in our father only sample, and 4156 families linked in our two parent sample (Table 1). The majority of children in each sample were insured throughout the study (84% of children in the mother only sample, 81% of children in the father only sample, and 80% for children in the two parent sample). Just over 30% of parents in all samples had ≥ 3 chronic conditions. Sixty-six percent of mothers and 57% of fathers in the mother only and father only samples had ≥ 1 non-preventive care visits during the study period, whereas 68% of parents in the two parent sample had ≥ 1 non-preventive care visits during the study period. Appendix Tables 1–3 show demographics for each sample including for parents who received preventive care and those that did not.

From adjusted GEE regression models in the mother only sample (Table 2), children had a 6% greater rate of well-child visits if their mother received preventive care (ARR = 1.06; 95% CI = 1.03–1.08) compared to no preventive care. The rates of well-child visits were 7% greater if their father received preventive care compared to no preventive care for the father only sample (ARR = 1.07; 95% CI = 1.04–1.11). In the two parent sample, a child had an 11% greater rate of well-child visits when both of their parents received preventive care (ARR = 1.11; 95% CI = 1.03–1.19) compared to no preventive care. The covariate-adjusted well-child visit rates for each sample are reported in Appendix Table 4.

Overall, similar patterns were seen in child age stratified GEE regression models (Table 3). However, the rates were higher for well-child visits when parents received preventive care compared to no preventive care among those aged 12 to 17 than for the nonstratified results. Children aged 12 to 17 in the mother only sample had a 7% greater rate of well-child visits if their mother received preventive care (ARR = 1.07; 95% CI = 1.04–1.10) compared to no preventive care. The rate of well-child visits for children aged 12 to 17 was 8% greater if their father received preventive care for the father only sample (ARR = 1.08; 95% CI = 1.04–1.14) versus no preventive care. In the two parent sample, a child aged 12–17 had a 17% greater rate of well-child visits if both of their parents received preventive care (ARR = 1.17; 95% CI = 1.05–1.30) compared to neither parent receiving preventive care.

DISCUSSION

Among patients seen in CHCs, this study examined the association of parental preventive service receipt on well-child visits. The children in this study received a similar percent of recommended well-child care to previous research of families with low-income.^{4,6} We found an association between parent preventive care and recommended well-child care receipt among children who could be linked to a parent and both were seen in the same CHC network. Our findings together with previous research emphasize the importance of family healthcare receipt on a child's health and highlight that both mothers and fathers have an influence. Indeed, the National Academies of Medicine (NAM) Vibrant and Healthy Kids: Aligning Science, Practice, and Policy Report recommends supporting children, families, and caregivers as an important step for improving child health.²² In addition, the AAP promotes well-child visits as a time to “assess the health and function of a family and

child” including a focus on family strengths.² The NAM Vibrant and Healthy Kids Report also recommend that funders “include in their portfolios research on the development of preventive interventions that target fathers.”²² One small study found 53% of fathers attended a well-child visit with their child in the last year and believed attending was a way to support their child.²³

The association of well-child visits and preventive care was strongest when both parents received preventive care in the same healthcare setting. This suggests that when a family receives care together and the parents both receive preventive care, their children could benefit. This may be of demonstrable advantage of medical specialties and settings that care for or interact with the entire family, such as family medicine and pediatrics. We also found the highest rates of well-child care receipt among 12 to 17-year olds if their parents received preventive care. This suggests that parental behavior may be particularly influential for adolescents despite it being a time of increased independence for the child. These findings are notable because adolescence is an important time to monitor health, as substance use, sexually transmitted infections, and drinking and driving peak.²⁴ Alternately, this may reflect lower rates of preventive care in this age group as adolescents are known to have lower rates of preventive care than younger children.

There are currently recommendations for clinicians who treat children to inquire about parental issues while treating the child to help with the provision of appropriate care. For example, the AAP recommends clinicians assess parent physical and mental health, substance use, sources of support, and stress.²⁵ Indeed, clinicians who see children can impact parental health.^{26,27} Our findings suggest well-child care could be increased if clinicians worked to increase preventive care visits for parents. Additional research should dive deeper into which services were received during the preventive care and well-child visits and assess potential interventions to increase preventive care for parents to see if it influences child healthcare. Future study should also evaluate the mechanisms involved with the association between parent preventive care and well-child visits, as we do not know the specific reasons parents sought preventive care for themselves or their children.

The coronavirus (COVID-19) pandemic has had a large impact on healthcare services over the last year and a half. Practices decreased in-person office visits, while increasing telemedicine.²⁸ How these changes have impacted, and continue to impact, the receipt of healthcare for parents and their children is largely unknown. Yet, changes to the healthcare system due to COVID-19 may allow for new ways to provide family-centered healthcare. For example, in a recent commentary, we suggested an option for a healthcare visit to focus on the health of everyone in the family or having all family members receiving care from the same physician or team.²⁹ Future research should assess the impact of the COVID-19 pandemic on preventive care and well-child visits.

This study has several limitations. First, this is a study of association, not causation. Second, we were only able to measure preventive care and well-child visits for linked parents and children seen in the OCHIN network CHCs. We could not account for care received outside the network, nor could we account for parents who did not link to a child with our linkage algorithm. Yet, previous research found more than 66% of patients with a

visit to a CHC, had another visit within three years.³⁰ Third, our definition of family was limited and excluded families that did not consist of mothers and/or fathers. It is also possible that our algorithm included those who were not a mother or a father, but our methodology was previously validated using public health insurance administrative data, which has household case identification numbers, and found 98% agreement between the sources.¹⁹ Fourth, yearly well-child recommendations are based on expert opinion and there is controversy about their necessity.^{31,32} Lastly, 18,822 parents did not have a visit during the family observation period so we used ‘last known’ health insurance to capture the status closest to the observation period. That said, of the parents that did have an encounter during the observation period, only 21% had different insurance status across their visits. Future studies should work to understand how changes in parent health insurance patterns impact these associations. In addition, other healthcare utilization outcomes should be considered (eg, immunizations, body mass index assessments, mental health screening, etc.) to obtain a comprehensive view of how parent preventive care is associated with their child’s healthcare. Although these limitations reduce generalizability, this study is a crucial first step to understanding the importance of parental healthcare utilization on well-child care.

CONCLUSION

Parent preventive care is associated with well-child visits; the strongest association is among children who link to two parents who both had preventive care. These findings suggest focusing on receipt of healthcare for the whole family may improve well-child visit rates, particularly in the CHC setting.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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WHAT'S NEW

Parent preventive care is associated with well-child visits; the strongest association is among children who link to two parents who both had preventive care. These findings suggest focusing on receipt of healthcare for the whole family may improve well-child visit rates, particularly in the community health center setting.

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Characteristics of Parent(s) and their Linked Child, Child Having Had at Least One Ambulatory Visit the OCHIN Network (2015–2018)

Table 1.

Parent Characteristics	Group, No. (%)		
	Mother Only Sample	Father Only Sample	Two Parent Sample
	N = 75,398	N = 12,438	N = 4156
Parent 1 Age at Observation Period Start	Median = 35, range:15–72	Median = 42, range:15–72	Median = 37, range:15–72
Parent 2 Age at Observation Period Start	NA	NA	Median = 37, range:17–72
Race and Ethnicity	N (%)	N (%)	N (%)
Non-Hispanic white	23762 (31.5)	5324 (42.8)	1371 (33.0)
Non-Hispanic Black	11387 (15.1)	1357 (10.9)	308 (7.4)
Non-Hispanic Other	3558 (4.7)	1367 (11.0)	344 (8.3)
Hispanic	33454 (44.4)	3508 (28.2)	1451 (34.9)
Mixed ⁸	NA	NA	667 (16.0)
Unknown	3237 (4.3)	882 (7.1)	15 (0.4)
English Language Preferred	45821 (60.8)	7503 (60.3)	2285 (55.0)
Last Known Insurance Status			
Private	13377 (17.7)	3602 (29.0)	496 (11.9)
Private & Public*	NA	NA	416 (10.0)
Private & Uninsured*	NA	NA	198 (4.8)
Public	46574 (61.8)	6403 (51.5)	1707 (41.1)
Public & Uninsured*	NA	NA	652 (15.7)
Uninsured	15447 (20.5)	2433 (19.6)	687 (16.5)
Federal Poverty Level			
>138%	12834 (17.0)	2663 (21.4)	556 (13.4)
<=138%	50781 (67.4)	7008 (56.3)	2589 (62.3)
Above & Below 138%*	NA	NA	802 (19.3)
Not Documented	11783 (15.6)	2767 (22.2)	209 (5.0)
Parent 1 Chronic Conditions ⁷			
0	22980 (30.5)	4062 (32.7)	1205 (29.0)
1	16615 (22.0)	2485 (20.0)	943 (22.7)

Parent Characteristics	Group, No. (%)		
	Mother Only Sample	Father Only Sample	Two Parent Sample
	N = 75,398	N = 12,438	N = 4156
2	12419 (16.5)	2071 (16.7)	630 (15.2)
3+	23384 (31.0)	3820 (30.7)	1378 (33.2)
Parent 2 Chronic Conditions †			
0	NA	NA	1246 (30.0)
1	NA	NA	906 (21.8)
2	NA	NA	714 (17.2)
3+	NA	NA	1290 (31.0)
Parent 1 Non-Preventive Care Visits ‡			
0	15905 (21.1)	3141 (25.3)	811 (19.5)
1	9728 (12.9)	2188 (17.6)	532 (12.8)
>1	49765 (66.0)	7109 (57.2)	2813 (67.7)
Parent 2 Non-Preventive Care Visits ‡			
0	NA	NA	815 (19.6)
1	NA	NA	470 (11.3)
>1	NA	NA	2871 (69.1)
Parent 1 Pregnant During Observation Period			
Yes	11290 (15.0)	NA	336 (8.1)
Parent 2 Pregnant During Observation Period	NA	NA	389 (9.4)
Child Characteristics	Mother Only Sample	Father Only Sample	Two Parent Sample
Female	38,155 (50.6)	5,817 (46.8)	2,005 (48.2)
Age at Observation Start	median=8, range:3-17	median=11, range:3-17	median=8, range:3-17
Insurance Status	N (%)	N (%)	N (%)
Always insured	63071 (83.7)	10097 (81.2)	3317 (79.8)
Sometimes insured	8793 (11.7)	1636 (13.2)	706 (17.0)
Never insured	3534 (4.7)	705 (5.7)	133 (3.2)
Chronic Conditions †			
0	42047 (55.8)	7825 (62.9)	2261 (54.4)

Parent Characteristics	Group, No. (%)		
	Mother Only Sample	Father Only Sample	Two Parent Sample
	N = 75,398	N = 12,438	N = 4156
1	20178 (26.8)	2837 (22.8)	1149 (27.6)
2	8124 (10.8)	1100 (8.8)	470 (11.3)
3+	5049 (6.7)	676 (5.4)	276 (6.6)
Non-Well Child Visits/Year			
0-1	22781 (30.2)	3243 (26.1)	1041 (25.0)
1-2	25632 (34.0)	4351 (35.0)	1348 (32.4)
2+	26985 (35.8)	4844 (38.9)	1767 (42.5)
Pregnant During Observation Period			
Yes	505 (0.7)	62 (0.5)	26 (0.6)
Region [§]			
Northeast	9854 (13.1)	1575 (12.7)	290 (7.0)
South	1970 (2.6)	188 (1.5)	21 (0.5)
Midwest	10344 (13.7)	1436 (11.5)	374 (9.0)
West	53230 (70.6)	9239 (74.3)	3471 (83.5)
Total Years Observed ^{//}	Median = 2, range: 1-4	Median = 2, range: 1-4	Median = 2, range: 1-4

* These covariate values only used in Two Parent Sample and represent contrasting values for the parents for the given covariate.

[†] The number of chronic conditions listed in the patient's problem list that are unresolved as of study end.

[‡] Number of non-preventive care ambulatory visits during the observation period.

[§] States include: Northeast (MA); South (FL, GA, NC, TX); Midwest (IN, MN, OH, WI); West (AK, CA, MT, NM, NV, OR, UT, WA)

^{//} Rounded up to nearest whole calendar-year.

Unadjusted and Adjusted Rate ratios of Yearly Well-child visit with Parent Preventive Care (2015–2018)

Table 2.

	Unadjusted Rate Ratio (95% CI)	Adjusted [†] Rate Ratio (95% CI)
Mother only sample		
Mother received preventive care*	1.06 (1.03, 1.09)	1.06 (1.03, 1.08)
Father only sample		
Father received preventive care*	1.10 (1.07, 1.13)	1.07 (1.04, 1.11)
Two parent sample		
One parent received preventive care*	1.08 (1.04, 1.11)	1.06 (1.03, 1.09)
Both parents received preventive care*	1.15 (1.08, 1.22)	1.11 (1.03, 1.19)

* Well-child visits & parent preventive care visits were identified through the combination of provider type (MD, DO, NP, PA) and CPT codes (for children: 99381–99387, 99391–99397, G0438, G0439; for parents: 99385–7, 99395–7).

[†] Adjusted for child’s age, health insurance, U.S. region, and parent covariates for age, race and ethnicity, language, poverty level, insurance type, and number of chronic conditions. All rate ratios statistically significant, *P*-value < .05.

Table 3.

Adjusted Rate Ratios of Yearly Well-child Visit with Parent Preventive Care, Stratified by Child Age at Observation Period Start (2015–2018)

	Child Age Strata			
	3–7 years Adjusted [†] Rate Ratio (95% CI)	8–11 years Adjusted [†] Rate Ratio (95% CI)	12–17 years Adjusted [†] Rate Ratio (95% CI)	12–17 years Adjusted [†] Rate Ratio (95% CI)
Mother only sample				
Mother received preventive care*	1.04 (1.02, 1.07)	1.06 (1.03, 1.10)	1.07 (1.04, 1.10)	1.07 (1.04, 1.10)
Father only sample				
Father received preventive care*	1.09 (1.05, 1.14)	1.04 (0.99, 1.10)	1.08 (1.04, 1.14)	1.08 (1.04, 1.14)
Two parent sample				
One parent received preventive care*	1.05 (0.99, 1.11)	1.05 (0.99, 1.11)	1.10 (1.02, 1.17)	1.10 (1.02, 1.17)
Both parents received preventive care*	1.06 (0.97, 1.15)	1.13 (1.01, 1.26)	1.17 (1.05, 1.30)	1.17 (1.05, 1.30)

* Well-child visits and parent preventive care visits were identified through the combination of provider type (MD, DO, NP, PA) and CPT codes (for children: 99381–99387, 99391–99397, G0438, G0439; for parents: 99385–7, 99395–7).

[†] Adjusted for child’s age, health insurance, U.S. region, and parent covariates for age, race and ethnicity, language, poverty level, insurance type, and number of chronic conditions. Statistically significant *P*-value < .05 in bold.