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Increasing Access to Dental Care for Medicaid Preschool Children: The Access to Baby and Child Dentistry (ABCD) Program

SYNOPSIS

Objective. Washington State's Access to Baby and Child Dentistry (ABCD) Program, first implemented in Spokane County in 1995, offers extended dental benefits to participating Medicaid-enrolled children and higher fees for certified providers. This study aimed to determine the program's effect on children's dental utilization and dental fear, and on parent satisfaction and knowledge.

Methods. The study used a posttest-only comparison group design. Trained interviewers conducted telephone interviews with 465 parents of children ages 13 to 36 months (49% ABCD, 51% Medicaid-enrolled children not in ABCD). One year later, 282 of 465 parents completed a follow-up survey. Utilization and expenditures were calculated from Medicaid claims.

Results. Forty-three percent of children in the ABCD Program visited a dentist in the follow-up year, compared with 12% of Medicaid-enrolled children not in the ABCD Program. An ABCD child was 5.3 times as likely to have had at least one dental visit as a child not in the program. ABCD children were 4 to 13 times as likely to have used specific dental services. Parents of ABCD children were more likely to report having ever tried to make a dental appointment, less likely to report that their children were fearful of the dentist, and were more satisfied, compared to parents of non-ABCD children.

Conclusion. The authors conclude that the ABCD Program was effective in increasing access for preschool children enrolled in Medicaid, reducing dental fear, and increasing parent satisfaction.

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Children from low-income families in the United States have notoriously limited access to dental services. Although the Medicaid program requires every state to provide preventive dental services for all Medicaid-eligible children under the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program, the results of a recent study suggest that only about one in five Medicaid-eligible children in the US receive any preventive dental services by age 20.[1] This pattern of low dental utilization is a serious public health problem,[2,3] especially in the light of American Academy of Pediatric Dentistry guidelines recommending that preventive dental procedures begin in the first year of life and continue every six months, with two fluoride treatments recommended per year.[4] In short, utilization of dental care is inequitable; those who need care the most are often the least likely to receive it.[3,5]

The Washington State Access to Baby and Child Dentistry (ABCD) Program was instituted in 1995 to increase access to dental care for preschool children from birth to five years of age who are served by the Medicaid program. The program was initially launched in Spokane County and has subsequently been implemented in other Washington counties.[6–8] All dentists in the state are eligible to become certified providers. Spokane County, with about 400,000 primarily urban or suburban residents, was chosen as the initial implementation site because the dentists in the area were willing to cooperate and because the relationship between the regional public health department and the local dental society was good. There is no significant public delivery system for dental care in this part of the state. Spokane County's water supply is not fluoridated.

The ABCD Program in Spokane County was recognized with the 1999 Maternal and Child Health Award from the National Association of County and City Health Officials. The program is paid for by a combination of local, state, and federal tax dollars.

The program's goal is to provide early intervention, by dentists in private practice, to prevent and control major dental problems and associated costs that could otherwise escalate in the future. The program focuses on preschool children to circumvent the cycle of painful emergency treatment that is common among low-income recipients of dental care and that often results in the development of permanent fears and avoidance of dental care.[10] The program also focuses on visits during the first one to two years of life because the care required is primarily preventive and does not require extensive interventions, as might be required in older children. This reduces the impact on busy dental practices.[7,8] The ABCD Program assumes that providing preventive dental care on a routine basis will result in children who have better oral health and less dental fear and therefore will be easier to treat.

The ABCD Program in Spokane County consisted of four components: outreach, training and certification of dental professionals, enhanced dental benefits, and enhanced dental fees. The state Medical Assistance Administration entered into an interagency agreement with the Spokane Regional Health District to provide funds for outreach. Health District staff carried out efforts to market the program to potential clients through community organizations and agencies and the media. Outreach sites included health fairs, Special Supplemental Nutrition Program for Woman, Infants, and Children (WIC) centers, Head Start sites, food banks, churches, welfare offices, and immunization clinics. No attempt was made to screen children.

The Health District provided an orientation and follow-up for families to ensure that they understood how to identify a provider and how to use care appropriately. Emphasis in the orientation was placed on being on time and not missing appointments. This educational program was developed with considerable input from local dentists.

Enrolled children received all routine dental services for children under the EPSDT program as well as enhanced benefits that included coverage for three fluoride varnish treatments per year, fluoride-releasing glass ionomer materials used as sealants and fillings in primary teeth, and family preventive oral health instruction once per year.

In cooperation with the local dental society, the program offered training for participating dentists and dental office staff, who were then certified to receive enhanced Medicaid payments for dental services. Faculty from the University of Washington offered a full-day program of instruction on child management, preventive education, and use of fluoride varnish and fluoride-releasing glass ionomer fillings, both as sealants and filling material, among other topics. A periodic newsletter offered clinical tips on caring for young children and kept participants aware of program activities. As new dentists joined, additional training was provided.

The Medicaid program pays dentists on a fee-for-service basis. Payments for ABCD-certified dentists were enhanced by a series of add-on fees. This was done to

raise the level of maximum allowable payments to the 75th percentile of all usual and customary fees. Dental office staff were trained and given assistance in following billing procedures so delays in payment could be substantially reduced.

Our evaluation of the ABCD Program in Spokane County addressed the following three questions: Did the ABCD Program increase access to dental care for preschool children under Medicaid? Did other factors influence the use of dental care among these children? Did the ABCD Program change parents' attitudes and knowledge about their children's dental care?

METHODS

The ABCD Program's initial target population was 18,835 Medicaid-enrolled children in Spokane County who were <5 years old in 1995. As of April 1997, about 41% (7,714) of the county's Medicaid-enrolled children <5 years old participated in the ABCD Program. On August 31, 1997, 1,200 Medicaid households with at least one child between the ages of 13 months and 36 months were sampled. Sampling of eligible preschool children was performed by a computer programmer employed by the state's Medicaid program. Under a confidentiality agreement, dental claims for sampled children were extracted from the state's database by this programmer, and later linked to the survey participants' responses.

The sampled households were about evenly divided between families with a child who entered the ABCD Program at any time during the study period (n = 586; 49%) and families with Medicaid-enrolled children not in the ABCD Program (n = 614; 51%). Approximately 93% of the ABCD children entered the program before August 31, 1997; their length of enrollment averaged 1.2 years. The remaining 7% of the ABCD children (n = 34) were enrolled after August 31, 1997; they averaged 99 days in the program between September 1, 1997, and August 31, 1998.

We estimated the effect of the ABCD Program on utilization of professional dental care using a posttest-only comparison group design,[9] with ABCD children as the treatment group and non-ABCD Medicaid-enrolled children as the comparison group. We conducted a baseline survey in October 1997, and a follow-up survey of respondents to the initial survey one year later. We measured a child's dental utilization using the parent's self-report at the follow-up survey and Medicaid dental claims for September 1, 1997, through August 31, 1998. We hypothesized that if the ABCD Program worked, children in the ABCD Program should have a greater likelihood of seeing a dentist and receiving preventive services, as measured by dental claims, than Medicaid-enrolled children not in the ABCD Program.

We also estimated the effect of the ABCD Program on parents' attitudes and knowledge about children's dental care using the same design. We hypothesized that if the program increased utilization of dental services, parents of ABCD children would receive more information about dental care from dental professionals than parents of non-ABCD children, which would result in greater knowledge gains among ABCD parents than among non-ABCD parents. Similarly, if the program worked, parents of children in the program should have reported more favorable attitudes about their children's dental care than parents of children not in the program.

The design controlled for most threats to internal validity except selection bias.[9] When Medicaid parents were invited to enroll their children in the ABCD Program, parents who had positive attitudes about prevention and dental care for children may have been more likely to enroll their children in the program than other parents. Thus, observed differences between the treatment and comparison groups may be due partly to these differences rather than to the effect of the program itself. To reduce the effect of threats to internal validity from selection bias, we performed multivariate analyses that controlled for child, parent, and family characteristics.

Data collection. The Social and Economic Science Research Center (SESRC) at Washington State University conducted a telephone survey to collect the baseline measures. On October 3, 1997, parents of the children in the initial sample received a letter from the Department of Social and Health Services, which administers the Medicaid program in Washington State, introducing them to the study and encouraging their participation in the telephone survey. Two weeks later, parents received an advance letter from the SESRC indicating that an interviewer would be contacting them shortly. The letter asked parents to provide a phone number and best time to call on a postcard that was entered into a drawing in which 20 randomly chosen parents received $50 gift certificates from a local grocery store. The study design was reviewed and approved by the Institutional Review Board of the Department of Social and Health Services, and the SESRC obtained the verbal consent of all participants at the start of the interviews.

Of the 1,200 households in the initial sample, the

SESRC was unable to contact 555 parents because they either had no telephone or had an unpublished number (n = 186); because Medicaid records included an inaccurate or disconnected telephone number (n = 254); because the telephone was in use for another device such as a fax machine (n = 13); or because the parent was deceased, the parent had moved out of Spokane County, or the child was not between the ages of 13 months and 36 months (n = 91). Interviewers made up to 10 attempts to contact each of the 645 remaining parents. The SESRC completed a total of 465 interviews by November 24, 1997, for a response rate of 72% (465/645). The average length of the interviews was 25 minutes. (Although a few respondents were grandparents or other caregivers, 98% were parents, so we use this term for convenience.)

One year later, the SESRC conducted a follow-up telephone survey of parents who had responded to the first survey, using similar methods. The SESRC mailed an advance letter to parents, and parents were asked to return an enclosed postcard with their current telephone number, the best time to call, and whether they would prefer a mailed questionnaire. About 61% of the parents who completed initial interviews (n = 282) completed the follow-up survey, 76% by telephone interview and 24% by mailed questionnaire. We used Spokane County health department files to determine ABCD status.

Measures. *Dental utilization.* We constructed measures of dental utilization that included, first, the parent's self-report at the baseline and follow-up interviews of whether he or she had ever tried to make a dental appointment for the child and whether the child had ever seen a dentist. At the follow-up survey, parents also reported whether, compared to one year earlier, it was easier or harder getting dental services for the child. In addition, we used Medicaid dental claims for September 1, 1997, through August 31, 1998, to measure annual dental utilization and expenditures. (A table showing the billing codes that were used is available from the corresponding author.)

Dental advice. During the follow-up interviews, if a child had ever seen a dentist, parents were asked if the child's dentist or hygienist had ever talked to the parent about regularly looking at the child's teeth, paying attention to foods that cause decay, using toothpaste with fluoride, having an adult brush the child's teeth every day, taking the child to the dentist for regular check-ups, or having the dentist put fluoride varnish on the child's teeth. We hypothesized that if dentists practiced what was taught at the ABCD training session, parents of ABCD children who took their children to the dentist would be more likely to report having been given each of these types of advice than parents of children not in the program.

Dental satisfaction. We measured parents' satisfaction with their children's dental care at follow-up using the 18-item RAND Dental Satisfaction Scale, which we revised for children in the follow-up survey.[10] If, according to the parent, the child had never been to a dentist, the parent was asked to think about what he or she would expect if the child needed dental care "today." The possible responses ranged from 1 to 5, with 5 indicating greatest satisfaction. (Copies of the survey instrument are available from the corresponding author.)

Dental fear. Parents rated their child's dental fear at the follow-up survey using a modified item from the Corah Dental Anxiety Scale.[11] We asked parents how their child would feel if the child had to go to the dentist "tomorrow." We categorized a child as fearful if the parent responded that the child would feel afraid that the visit would be unpleasant or painful, or that the child would be very frightened of what the dentist might do.

Dental knowledge. We measured parents' knowledge about dental care for preschool children at follow-up through a single item, whether the parent agreed or disagreed with the statement: "A child's baby teeth should be filled only when they hurt."

Factors influencing dental utilization. We also measured factors that might influence dental utilization based on Grembowski, Andersen, and Chen's public health model of dental utilization. These factors, or baseline control variables, were divided into the following three groups: Structure, History, and Cognition.[5] *Structure* variables included the child's age, the parent's age, whether the parent was the child's mother or another adult, whether the parent had a high school or less education, whether the parent was single, the number of people in the household, whether the parent had someone to watch other children at home when at the dentist, whether the child or family had sources of dental insurance in addition to the Medicaid dental program, and whether the parent was enrolled in Washington State's Medicaid program.

We also included the parent's self-reported racial identification as a Structure variable, dichotomized as

white vs not white because Spokane County has a low percentage of Medicaid recipients who are not white. Like socioeconomic status, race is an indicator of status hierarchies that form the social context in which the decision to visit or avoid the dentist is made.

History variables captured past utilization, preventive behaviors, and health status of the child and parent at baseline, as reported by parents, and included: the parent's rating of the child's medical health, the child's number of medical preventive visits in the past year, the child's number of medical sickness visits in the past year, the parent's rating of the child's oral health, the child's brushing frequency, the parent's oral health, whether the parent had a usual source of dental care, and whether the parent had seen a dentist in the past year. We measured the parents' level of stress and worry in daily life using the 12-item scale developed by Belle; higher values indicate more stress or worry.[12] To measure parents' mental health, we used the five-item Mental Health Index from the Short Form Health Survey, with higher values indicating better mental health.[13]

Cognition variables measured dental health–related knowledge, attitudes, and beliefs and included whether the parent agreed with the statement that it is extremely important to receive professional dental care on a regular basis, and whether the parent agreed with the statement that baby teeth should be filled only when they hurt. We measured the parent's satisfaction with their own dental care using the 18-item RAND dental satisfaction scale, with higher values indicating greater satisfaction.[10] We used the Corah Dental Anxiety Scale to measure the parent's dental fear based on the sum of the following four items: how the parent would feel if he or she had to visit the dentist tomorrow, how the parent would feel while waiting in a dental office, how the parent would feel while waiting for the dentist to prepare the drill, and how the parent would feel when the dentist was preparing instruments for cleaning teeth. Higher scores represent greater fear.[11]

Data analysis. To determine whether households that participated in the study were different from those that did not, we used a chi-square test to find out whether the proportion of ABCD households in the study sample (n = 465) was significantly different from the proportion of ABCD households the initial sample (n = 1,200). We also performed a chi-square test to determine whether parents in the study sample who completed a follow-up survey were significantly different from those who did not. Next, we conducted bivariate statistical tests to determine whether the ABCD parents and children in the study sample were significantly different from the non-ABCD parents and children in terms of the Structure, History, and Cognition variables.

We estimated separate, stepwise logistic regression models to identify the Structure, History and Cognition variables that were associated significantly with any lifetime use of dental services for Medicaid preschool children in the ABCD group and comparison group. We entered the significant covariates from the three models into a single logistic regression model, along with the ABCD Program variable (coded 1 if the child was in ABCD or 0 if not), to estimate ABCD effects on any lifetime use of dental services. Similar procedures were followed for estimating ABCD effects on dental utilization, dental expenditures, and dental knowledge, satisfaction, and fear.

RESULTS

Among the 645 parents reached by telephone, the percentage of those with children in the ABCD Program was similar for the 465 parents who completed baseline interviews (47%) and the 180 who did not (48%; $P = 0.77$). Of the 465 children in the study sample, 228 (49%) were enrolled in ABCD, while 237 (51%) were in the comparison group. Among children in the study sample, the percentage enrolled in the ABCD Program was similar for the 282 children whose parents completed follow-up interviews (48%) and the 183 children whose parents did not complete follow-up interviews (51%; $P = 0.42$).

The baseline characteristics of children and parents in the study sample are shown in Table 1. For the Structure variables, we found no statistically significant differences between the characteristics of ABCD and non-ABCD children, parents, and households, with one exception. Parents of ABCD children were less likely to report knowing someone who could watch their other children when they took their preschool children to the dentist. Of the History variables, we found the following statistically significant differences: more parents in the ABCD Program rated their children's oral health as fair or poor than parents of Medicaid-enrolled children not in the ABCD Program; ABCD parents were more likely to report giving their children fluoride drops; and ABCD parents had a higher average worry/stress score. In addition, fewer ABCD parents than non-ABCD parents reported having a usual source of dental care for themselves.

Table 1. Baseline characteristics of children, parents, and households in the study sample, by parental self-report (*N* = 465 parents participating in baseline interviews)

Characteristic	*Children in ABCD program* n = 228	*Medicaid-enrolled children not in ABCD program* n = 237	*P-value*
Structure variables			
Mean age of children (years)	1.75	1.67	0.14
Mean age of parents (years)	27	28	0.63
Average household size (number of people)	4.22	4.09	0.32
Percent parents who were mothers	90	86	0.25
Percent single parents	45	39	0.18
Percent of parents not self-identifying as white	15	13	0.59
Percent parents with high school education or less	43	37	0.24
Percent parents who had no one to watch other children at home when at dentist	18	5	0.00
Percent parents enrolled in Medicaid	61	58	0.54
Percent of children or families with dental coverage in addition to Medicaid	23	25	0.51
History variables			
Percent of parents rating child's oral health fair or poor	9	3	0.01
Percent children who brushed at least once per day with toothpaste and supervision	59	55	0.36
Percent children receiving fluoride drops	58	46	0.01
Percent parents rating their own oral health fair or poor	35	32	0.49
Percent parents rating child's general health fair or poor	10	5	0.07
Mean number of medical visits because child was sick in past 12 months	2.15	2.01	0.17
Mean number of child's preventive medical visits in past 12 months	1.95	1.96	0.92
Parents' mean worry/stress score	1.65	1.58	0.05
Parents' mean mental health score	3.94	3.95	0.91
Percent parents with a usual source of dental care	67	76	0.04
Percent parents with dental visit in previous 12 months	66	69	0.53
Percent parents rating their past dental care fair or poor	17	18	0.88
Cognition variables			
Percent parents who agreed with statement that baby teeth should be filled only when they hurt	45	51	0.22
Percent parents who agreed with the statement that regular professional dental care is extremely important	87	81	0.08
Parents' mean dental satisfaction score	3.31	3.41	0.13
Parents' mean dental fear score	8.94	8.95	0.96

The parents in the two groups were generally similar in terms of the Cognition variables. A slightly higher percentage of ABCD parents said they thought professional dental care is extremely important ($P = 0.08$).

Outcomes: bivariate results. *Dental utilization.* At the one-year follow-up, a higher percentage of ABCD parents (77%) than of non-ABCD parents (48%) said that they had ever tried to make an appointment for their child to

see a dentist in the child's lifetime (odds ratio [OR] = 3.58; 95% confidence interval [CI] 2.13, 6). Also, by parental report, a higher percentage of ABCD children (71%) than of non-ABCD children (42%) had ever had a dental visit (OR = 3.39; 95% CI 2.06, 5.59).

Dental utilization data from Medicaid claims for children in the study sample reveal a similar pattern, as shown in Table 2. A higher percentage of ABCD children (43%) than of non-ABCD children (12%) visited the dentist in the one-year follow-up period (OR = 5.50; 95% CI 3.45, 8.79). It is possible that the OR for use of dental care during the follow-up period was higher than that for any lifetime use of dental care because parents who responded to the follow-up survey were different from those who did not. To address this question, we compared the OR for annual dental use for parents who responded to the follow-up survey (5.70) with the OR for parents who did not respond to the follow-up survey (5.74), and they were nearly identical.

Similarly, ABCD children received a significantly greater average number of dental services across all categories, except surgical, than non-ABCD children in the study sample. In particular, the ABCD children received more oral exams, fluoride varnish, oral health education,

Table 2. Dental utilization for ABCD and non-ABCD children in the study sample, according to Medicaid dental claims data, September 1, 1997, to August 31, 1998 (*N* = 465 children)

Characteristic	*Children in ABCD program* n = 228	*Medicaid-enrolled children not in ABCD program* n = 237	*P-value*
Percentage of children using any dental services	43	12	0.00
Mean number of services, by category			
Diagnostic	0.76	0.19	0.00
Preventive	10.27	0.24	0.00
Restorative	0.43	0.08	0.01
Endodontic	0.09	0.004	0.03
Surgical	0.01	0.004	0.64
Adjunctive	0.16	0.02	0.00
Mean number of services, by type of procedure			
Oral exams	0.65	0.15	0.00
Limited visual assessment	0.004	0.008	0.59
Emergency oral exams	0.00	0.00	—
X-rays	0.10	0.04	0.06
Prophylaxes	0.009	0.004	0.54
Oral health education	0.53	0.11	0.00
Fluoride varnish	0.61	0.10	0.00
Topical fluoride applications	0.06	0.03	0.20
Sealants	0.07	0.00	0.15
Primary amalgams	0.10	0.02	0.09
Composites/resin/glass ionomer	0.16	0.06	0.17
Crowns	0.25	0.004	0.01
Pulpotomies	0.08	0.004	0.03
Simple extraction	0.01	0.004	0.64
Adjunctive pain control/sedation	0.01	0.00	0.17
Adjunctive behavior management	0.13	0.02	0.00

Table 3. Dental expenditures for ABCD and non-ABCD children in the study sample, according to Medicaid dental claims data, September 1, 1997, to August 31, 1998 (*N* = 465 children)

Characteristic	*Children in ABCD program* n = 228	*Medicaid-enrolled children not in ABCD program* n = 237	*P-value*
Mean per-child expenditure (dollars)	89.28	15.19	0.00
Mean per-child add-on expenditure included in total (dollars)	1.35	0.11	0.00
Mean per-child expenditure (dollars), by category			
Diagnostic	17.24	4.33	0.00
Preventive	25.67	4.20	0.00
Restorative	37.21	5.94	0.00
Endodontic	5.33	0.32	0.04
Surgical	0.33	0.21	0.77
Adjunctive	3.49	0.18	0.00
Mean per-child expenditure (dollars), by type of procedure			
Oral exams	16.35	3.99	0.00
Limited visual assessment	0.04	0.07	0.58
Emergency oral exams	0.00	0.00	—
X-rays	0.82	0.28	0.05
Prophylaxes	0.00	0.00	—
Oral health education	11.18	2.10	0.00
Fluoride varnish	12.41	1.89	0.00
Topical fluoride applications	0.52	0.22	0.17
Sealants	1.56	0.00	0.15
Primary amalgams	4.75	0.85	0.10
Composites/resin/glass ionomer	11.44	4.48	0.18
Crowns	27.07	0.53	0.01
Pulpotomies	5.33	0.32	0.04
Simple extraction	0.33	0.21	0.77
Adjunctive pain control/sedation	0.15	0.00	0.17
Adjunctive behavior management	2.78	0.18	0.00

crowns, pulpotomies, and behavior management services.

According to Medicaid claims data, expenditures were significantly higher for ABCD children for most dental services during the follow-up period (Table 3). The average add-on expenditure per child in the ABCD Program was $1.35 over the one-year period.

Table 4 summarizes dental utilization and expenditures for children with one or more dental visits during the follow-up year. In general, the children in the two groups had similar utilization and expenditures. However, the ABCD children received, on average, one more preventive service than the non-ABCD children. The mean per-child expenditures for preventive and adjunctive services were significantly higher for the ABCD children than for the non-ABCD children among those who had one or more dental visits during the follow-up year.

At the follow-up survey, parents were asked whether it was easier or harder getting dental care for their children, compared to one year earlier. No significant differences were seen between groups. Overall,

Table 4. Dental utilization and expenditures for ABCD and non-ABCD children with any use of services during follow-up year (*N* = 128 children)

Characteristic	*Children in ABCD program* n = 99	*Medicaid-enrolled children not in ABCD program* n = 29	*P-value*
Mean per-child expenditure (dollars)	205.61	124.15	0.22
Mean per-child expenditure (dollars), by category			
Diagnostic	39.72	35.42	0.21
Preventive	59.12	34.36	0.00
Restorative	85.71	48.56	0.49
Endodontic	12.29	2.60	0.34
Surgical	0.75	1.74	0.56
Adjunctive	8.04	1.46	0.03
Mean per-child number of services, by category			
Diagnostic	1.76	1.59	0.42
Preventive	2.93	1.93	0.01
Restorative	0.99	0.66	0.57
Endodontics	0.21	0.03	0.31
Surgical	0.02	0.03	0.73
Adjunctive	0.37	0.14	0.10

23% of the parents thought is was easier getting dental care, 63% thought it was the same, and 14% thought it was harder.

Dental advice. Among parents who reported that their children had ever been to a dentist, a higher percentage of ABCD parents (96%) than of non-ABCD parents (87%) reported at follow-up that the dentist or hygienist had talked to them about regular dental check-ups (P = 0.04), while 90% of ABCD parents vs 71% of non-ABCD parents reported that the dentist had talked to them about putting fluoride varnish on their children's teeth (P = 0.003). Participation in the ABCD Program did not influence parents' reports that the dentist had talked them about regularly looking at the child's teeth; foods that cause decay; using toothpaste with fluoride; or adult supervision of brushing.

Satisfaction with child dental care. Satisfaction, overall, was fairly high. The average score was 3.5 at follow-up on a 1 to 5 scale, with 5 representing greatest satisfaction. ABCD parents were more satisfied with their children's dental care than non-ABCD parents, with mean child satisfaction scores of 3.64 for ABCD parents and 3.47 for non-ABCD parents (P = 0.02). The difference was smaller and no longer significant (P = 0.17) when only children who had ever been to a dentist, according to parent report, were considered.

Children's dental fear. At follow-up, only 19% of parents described their children as fearful. Fewer ABCD parents (14%) than non-ABCD parents (24%) reported that their children were fearful (OR = 0.50; 95% CI 0.27, 0.94). When only children who had ever been to a dentist were assessed, fewer ABCD parents (9%) than non-ABCD parents (18%) also reported that their children were fearful (OR = 0.44; 95% CI 0.17, 1.16); however, this nine-point difference was not statistically significant (P = 0.09).

Dental knowledge. At follow-up, parents were asked if they agreed with the statement that baby teeth should only be filled when they hurt. The difference between the groups was not significant; 31% of ABCD parents, compared with 38% of non-ABCD parents (P = 0.19), agreed

with the statement. Similarly, there was no difference between the two groups when only parents of children with parent-reported dental visits were considered (25% ABCD vs 34% non-ABCD; $P = 0.26$).

Regression estimates of ABCD Program effects. *Dental appointments.* Forward stepwise logistic regression was performed to identify the Structure, History, and Cognition variables associated with ever trying to make a dental appointment for the child. At follow-up, parents of children in the ABCD Program were more than three times as likely to have tried to make a dental appointment as parents of non-ABCD children (OR = 3.66; 95% CI 2.07, 6.46). Only one Structure variable, average household size, showed a significant association; greater likelihood of having tried to make an appointment was associated with smaller household size ($P = 0.02$). Three History variables were associated with having sought to make an appointment. Parents who reported that their children had fair or poor oral health were more likely to have tried to make an appointment than parents who reported that their children had good, very good, or excellent oral health (OR = 5.05; 95% CI 1.06, 24.03). Reporting more medical visits due to illness was also associated with greater likelihood of having tried to make an appointment ($P = 0.05$). However, having fewer preventive medical visits was associated with greater likelihood of having sought to make a dental appointment ($P = 0.05$). No Cognition variables were associated with having sought to make an appointment.

Lifetime dental utilization. A similar procedure was followed to estimate ABCD effects on whether a child had ever seen a dentist, as reported by parents, controlling for Structure, History, and Cognition variables. Controlling for these factors, children in the ABCD Program were about three times as likely to have ever seen a dentist as non-ABCD children (OR = 3.16; 95% CI 1.89, 5.27). The child's age was associated positively with ever seeing a dentist ($P = 0.02$). Two variables were associated with ever seeing a dentist at a lower level of statistical significance ($0.05 < P < 0.10$): whether the parent reported that the child's general health was fair or poor (OR = 3.51; 95% CI 0.89, 13.80), and whether the parent reported that the child brushed optimally (OR = 1.62; 95% CI 0.97, 2.69).

Utilization data from Medicaid dental claims. Table 5 shows use of dental services in the one-year follow-up period according to Medicaid dental claims, controlling for the Structure, History, and Cognition variables. Children in the ABCD Program were more than five times as likely to have any dental visits during the year as non-ABCD children (OR = 5.61; 95% CI 3.40, 9.26). Similarly, children in the ABCD Program also were from 4 to 13 times as likely to utilize specific categories of dental services, except surgical services. Two Structure variables were associated positively with whether the child used any dental services in the one-year follow-up period: the child's age in years ($P = 0.008$) and parent enrollment in Medicaid (OR = 1.63; 95% CI 1.01, 2.61).

Dental satisfaction. Next, stepwise logistic regression was performed to identify the Structure, History, and Cognition variables associated with the child's dental satisfaction. Controlling for these factors, ordinary least squares revealed that the ABCD Program increased parents' satisfaction with dental services for their children, on average, by 0.22 points on a 1 to 5 scale, relative to parents of non-ABCD children ($P = 0.002$). When only children who had ever seen a dentist were considered, the result was similar, with 0.19-point difference ($P = 0.036$). None of the Structure and History variables were associated with

Table 5. Effect of ABCD Program on dental utilization: logistic regression results controlling for Structure, History, and Cognition variables

	Program effects	
Dependent variable	*Odds ratio*	*95% CI*
Any use of dental services in one-year follow-up period	5.61	3.40, 9.26
Any use of dental services, by category		
Diagnostic	5.60	3.42, 9.16
Preventive	6.47	3.85, 10.88
Restorative	4.01	1.27, 12.69
Endodontic	6.43	0.77, 53.88
Surgical	0.96	0.06, 16.28
Adjunctive	13.32	3.07, 57.74

CI = confidence interval

satisfaction with child dental care. Two Cognition variables showed significant associations: parents who were more fearful of dental care ($P < 0.0005$) and had more stress or worry ($P < 0.0005$) were less satisfied with their children's dental care.

Dental fear. Stepwise logistic regression, controlling for the Structure, History, and Cognition variables, revealed that ABCD parents were less likely to report at follow-up that their child was afraid of dental care (OR = 0.35; 95% CI 0.17, 0.72) than parents of non-ABCD children. No Structure and History variables were associated with children's dental fear. One Cognition variable showed a significant association: children were described as more fearful if their mother had more stress/worry ($P = 0.0005$).

Dental knowledge. Finally, stepwise logistic regression revealed that parents who rated their dental health as fair or poor were less likely to agree with the statement "A child's baby teeth should be filled only when they hurt," and those who had better mental health were also less likely to agree with the statement. In analyses controlling for the Structure, History, and Cognition variables, the ABCD Program had no effects on whether parents agreed or disagreed with this statement (OR = 0.72; 95% CI 0.43, 1.20).

DISCUSSION

Increasing dental access for children from low-income families is likely to result in improvements in oral health.[14] Using a quasi-experimental design and evidence collected through parent interviews and Medicaid dental claims, we found that the ABCD Program increased use of dental care services among Medicaid-enrolled preschool children, reduced children's dental fear, and increased parents' satisfaction with their children's dental care.

The findings indicating greater use of dental services by ABCD children than by Medicaid-enrolled children not in ABCD are consistent with earlier findings about the program.[15,16] Parents of ABCD children in the study sample were more likely than non-ABCD parents to have sought to make an appointment to see the dentist by the end of the follow-up period. The rates even exceed the countywide boost typically seen when children in this age group are enrolled in Head Start or similar state-financed programs.[17] ABCD children received more dental services during the follow-up period than non-ABCD children. In particular, they received more preventive services, as anticipated in the program design. Similarly, given epidemiologic evidence that low-income children have higher rates of caries,[2,3,18] and that the ABCD children had more dental examinations than the Medicaid-enrolled children not in the ABCD Program, the natural result was more restorations given to ABCD children. The fact that ABCD children received more restorations and had *less* dental fear than the non-ABCD children suggests that the training component of the program may have improved dentists' skills in providing invasive treatments. Many ABCD-certified dentists had little training in treating young children and saw few low-income children prior to the study; thus, we posit this effect to be the result of enhanced skills.

While the ABCD Program increased use of dental services, children had insufficient dental care to meet the guidelines of the American Academy of Pediatric Dentistry (AAPD).[4] Even with the enhanced program, children were not receiving the intensity of visits and specific preventive treatments recommended. This indicates that further efforts are needed to inform both certified dentists and parents that the program offers enhanced benefits satisfying AAPD guidelines.[19]

The ABCD Program had less influence on parents' dental knowledge and attitudes than anticipated. On the issue of the importance of preventive versus symptomatic care for primary teeth, the program did not appear to have an impact. One in three parents in both groups still reported that baby teeth should only be treated when the child is in pain. While responses from ABCD parents indicate that dentists and hygienists were more likely to talk to them about regular check-ups and the need for fluoride treatments than to parents of non-ABCD children, no communication differences were found on other topics such as diet and the adult supervision of tooth brushing. Attention to diet is especially important because the components of diet that lead to dental caries are also important in the management of obesity, diabetes, and heart disease. Interestingly, many dentists did not bill Medicaid for the Family Health Education benefit. Dental office personnel may have been unfamiliar with this coverage, which is rarely available in typical commercial insurance programs.[20]

One limitation of our study is that parents and children self-selected into the ABCD Program. However, regression analyses controlled for a variety of factors, including sociodemographic characteristics, prevention-related attitudes and behavior, past medical and dental

care, and sources of dental insurance other than Medicaid, and few of these variables were associated with the study's dependent variables. Other, unmeasured characteristics of parents and children might account partially for the program's effects.

Another possible limitation is that parents who completed the baseline and follow-up surveys may be different from those who did not. However, program participation was similar for respondents and nonrespondents in both surveys, and statistical tests indicated no significant baseline differences in children's oral health and lifetime use of dental care for parents who did vs parents who did not respond to the follow-up survey.

A third possible limitation is that 7% of the sampled children enrolled into the ABCD Program after the start of the study and, therefore, were not exposed to the program for the entire follow-up period. This limitation may have reduced our estimates of the program's effects. Finally, although the ABCD Program was not found to have had an effect on parents' dental knowledge, the single-item measure may lack sufficient sensitivity to detect knowledge changes that may have occurred.

Despite these limitations, we conclude that the ABCD Program increased access to dental care among Medicaid preschool children, reduced children's dental fear, and increased parents' satisfaction with children's dental care, but had no effect on parents' dental knowledge. While these are important benefits, the program can be improved to increase access to dental care for most Medicaid preschool children, and to increase parents' knowledge about caries and oral health promotion for preschool children.

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