

**DISCUSSION PAPER 102
AUGUST 2006**

**EFFECTS OF A SCHOOL-BASED, EARLY CHILDHOOD INTERVENTION ON
ADULT HEALTH AND WELL BEING:
A 20-YEAR FOLLOW UP OF LOW-INCOME FAMILIES**

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Effects of a School-Based, Early Childhood Intervention on Adult Health and Well Being:
A 20-Year Follow Up of Low-Income Families

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ECRC Paper Series

March, 2006

ABSTRACT

Although the benefits of early childhood interventions are well established, few studies have investigated effects into adulthood, especially for large-scale, publicly funded programs. We conducted a 20-year follow-up at age 24 of a cohort of 1539 low-income children (93% black, 7% Hispanic) born in 1979 or 1980 who enrolled in the Child-Parent Center (CPC) Program in 20 sites or an alternative early childhood intervention in randomly selected or matched schools in Chicago, Illinois. The program provides educational enrichment, family support services, and health services in the Chicago public school system from preschool to up to third grade. Relative to the comparison group and adjusted for many background factors, CPC preschool participants by age 24 had higher rates of school completion (71.4% vs. 63.7%, $p = .01$), higher rates of attendance in 4-year colleges (14.7% vs. 10%, $p = .02$), and more years of completed education (11.7 vs. 11.4 yrs, $p = .001$). They were more likely to have health insurance (70.2% vs. 61.5%, $p = .005$). They also had lower rates of felony arrests (16.5% vs. 21.1%; $p = .02$) and incarceration (20.6% vs. 25.6%; $p = .03$) as well as criminal convictions; lower rates of depressive symptoms (12.8% vs. 17.4%, $p = .057$); and lower rates of out-of-home placement (4.7% vs. 8.8%, $p = .005$). Participation in the school-age program and in the extended intervention also was linked to better health and well-being on some indicators. Some program effects were stronger for males, 2-year preschool participants, and children in centers rated high in child-initiated activities. For parents of study participants, both preschool and extended intervention was associated with higher educational attainment. Preschool intervention also was associated with lower rates of parental disability, whereas extended intervention was associated with higher employment. Participation in a school-based intervention beginning in preschool was associated with a wide range of positive outcomes in adulthood for children and their parents. Findings provide strong evidence that established early education programs high in quality can have enduring effects on general health and well-being.

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I. INTRODUCTION

Early childhood interventions have demonstrated consistent positive effects on children's health and well being. Their impacts are unique in two important ways. First, early childhood interventions (ECI) in the first five years of life show links to a broad range of positive outcomes up to two decades later, including better reproductive health and birth outcomes, higher cognitive skills, school achievement and performance, higher school completion and attainment, higher earnings capacity and lower rates of delinquency and crime, and school remediation.¹⁻¹⁰ Positive outcomes for parents also have been documented in programs from birth to age 3.^{1,4} Most of these outcomes are key contributors to health status. Few if any other interventions have shown such multifarious impacts. The second unique feature of the empirical evidence is that ECIs have proven cost-effective in returning benefits to participants and the public through cost savings on treatment and increased earnings that exceed costs by an average ratio of 6 to 1.¹¹⁻¹³ This cost effectiveness is greater than other childhood investments.^{11, 14} Consequently, public investments in early education are growing across the nation.

Although the intervention services to enhance children's well-being range from prenatal nutrition and home visitation up to age 2 to early education by age 4, the focus on early intervention to promote health and well-being is only beginning to be documented as a health promotion strategy. Comprehensive preschool programs for low-income children provide center-based educational enrichment, family social services and parenting education, and health and nutrition services. Several limitations in the knowledge base are evident. One is that there is only a small amount of evidence that large scale public programs have long-term effects into adulthood.^{1, 15-16} Most previous studies have assessed small-scale model programs. A second major limitation is that no previous studies have investigated a broad set of health and well-being

outcomes. Most of the evidence concerns school attainment and social behavior. Because education and delinquency are significant predictors of health behavior and economic well-being in adulthood,^{1, 3, 8} early childhood programs may have broader effects. Third, due to the traditional focus on model programs that include few families,^{6, 7} differential effects by program, child, and family attributes have not been tested.¹⁷ It would be unexpected that programs have uniform effects. Finally, family outcomes of large scale early childhood interventions are not known. Because many early interventions provide family services such as parenting classes and health services, impacts on parents would be expected. In the Nurse-Family Partnership Program, home visitation by nurses in the first two years was associated with lower rates of teenage births and parent employment, and with lower rates of crime.¹⁸ Preschool programs and other early interventions have lacked similar family assessments.

One of the few studies of a large-scale program that has assessed effects comprehensively is the Chicago Longitudinal Study, which investigates the Child-Parent Center (CPC) Program. In an earlier study,¹⁹ participation in the CPC preschool intervention was associated with significantly higher rates of school completion by the end of adolescence, significantly lower rates of juvenile arrest for both violent and nonviolent offenses, and lower rates of school remedial services. School-age intervention was associated with lower rates of school remedial services, and, in addition, extended intervention for 4-6 years was linked to significantly lower rates of remedial education and juvenile arrests for violent offenses. A cost-benefit analysis of the program revealed relatively high economic returns.²⁰

In this report, we conduct a follow-up study at age 24 to determine program links with measures of educational attainment, economic status, crime, health status and behavior, mental health, and life course outcomes for parents of participants. The study is unique in several

respects. It is the first prospective investigation of a public early childhood intervention on adult well-being into the third decade. Second, it is one of the first studies to examine direct measures of health status and behavior including health insurance coverage, teen parenthood, and child maltreatment. We also investigated whether the effects of intervention vary program, child, and family factors. Previous reports have indicated that program length and instruction as well as high risk status are associated with greater effects by the end of childhood.^{21, 22} Given our previous findings and the well-established links among educational attainment, SES, crime, and health status,²³⁻²⁵ we hypothesize that program participation, especially in preschool and continued into school-age, will be associated with greater adult well-being in several domains for both participants and their parents.

II. METHODS

Sample and Design

The Chicago Longitudinal Study is a prospective investigation of the life course of a cohort of 1539 low-income minority children (93% black, 7% Hispanic) born in 1979 or 1980 who attended early childhood programs in 25 sites in 1985-1986.^{21, 26} Since 1985, data have been collected continuously on health and well-being from school records, frequent participant and family surveys, and many types of administrative records. The original sample included the complete cohort of 989 children who completed preschool and kindergarten in all 20 CPCs with combined programs. School-age services are provided in first to third grade in affiliated elementary schools. The preschool comparison group of 550 children in this quasi-experimental cohort design participated in alternative full-day kindergarten programs that were available to low-income families, and 15% had Head Start preschool. The preschool comparison group included all 374 kindergartners from 5 randomly selected schools plus 2 others that had full-day

kindergarten and extra instructional resources. The rest of the comparison group (n = 176) attended full-day kindergartens in 6 CPCs but had no preschool experience. They were located in separate classrooms but received some program services. As in previous studies,^{17, 19, 21} these two demographically similar groups were combined for analyses.

The intervention and comparison groups were matched on age, eligibility for and enrollment in government-funded early intervention, and neighborhood and family poverty.^{19, 21} Neighborhood poverty is defined as residence in a Title I school area. Family poverty is defined as eligibility for the subsidized lunch program (185% of federal poverty line or lower). The intervention and comparison groups participated in the study under informed consent. The legal and ethical requirements to serve children most in need prevented random assignment in this established program. Approvals have been granted by institutional review boards at the Universities of Wisconsin-Madison and Minnesota.

Based on the study design, we assessed the impact of 4 measures of CPC participation. For preschool, children entering the program at ages 3 or 4 years (original cohort, n = 989) were compared to all others who did not participate in CPC preschool but had the alternative intervention (preschool comparison group, n = 550, see Table 1). The effects of CPC school-age intervention were estimated by comparing children enrolling for at least 1 year from first to third grade regardless of whether they enrolled in CPC preschool (n = 850) with those having no school-age program participation (school-age comparison group, n = 689). The effects of CPC extended intervention were estimated by comparing children who began the CPC in preschool and continued through second or third grade for 4 to 6 years (n = 553) with 2 other groups: all other children who had less extensive or no participation (Extended-1, n = 986) and children whose CPC participation ended after kindergarten (Extended 2). Table 1 shows the pattern of participation and postprogram data collection in the study.

Table 1. Patterns of Participation of Original Intervention and Comparison Groups in the Chicago Longitudinal Study

Study category	Total Sample	Preschool Intervention Group*	Comparison Group*
Program Participants' Characteristics at Start of Study**			
Original Sample	1539	989	550
No. of cases with preschool participation	1073	989	84
No. of cases with CPC preschool	989	989	0
Years in CPC preschool (0-2)	--	1.55	0.0
No. of cases with Head Start preschool	85	1	84
No. of cases with kindergarten participation	1539	989	550
No. of cases with CPC participation	989	989	0
Full-day kindergarten, %	--	59.9	100.0
No. of cases with CPC school-age participation	850	684	166
Years of school-age program (0-3)	--	1.43	0.68
School-age participation, %	--	69.2	30.2
No. of cases with CPC extended intervention (4-6 y)	553	553	0
Extended participation, %	--	55.9	0.0
Total years of CPC program (0-6)	--	3.95	0.68
No. of cases with no CPC participation	384	0	384
No. of Lost cases in Postprogram Years			
Moved***			
From ages 6-9 y	118	67	51
From ages 10-14 y	247	146	101
Child death	41	27	14
Follow-up Study Characteristics of Participants at Age 22-24, No. of cases with data			
Educational attainment	1368	888	480
Public aid	1315	857	458
Arrest and incarceration	1418	918	500
Adult survey	1142	750	392
Employment and income	1389	902	487
One or more outcomes	1507	973	534
Three or more outcomes	1406	911	495
Parents of Participants			
Educational attainment	1438	931	507
Public aid	1440	932	508
Health	1489	961	528

*Cases for program participation cover the 6-year period (1983-1989) that defines enrollment in the CPC intervention.

**The CPC preschool comparison group participated in a full-day kindergarten program, and 84 had Head Start preschool. 176 cases in the preschool comparison group were eligible to receive limited services in the CPC kindergarten but enrolled in different classrooms. They are not part of the original CPC intervention group. Some cases in the comparison group participated in the school-age program because it was open to any child enrolled in elementary school from first to third grade. Fifteen children in the CPC intervention group enrolled in the alternative full-day kindergarten.

***Some of the children moving away or who were deceased were included in the follow-up study.

Four study features make group comparisons interpretable as program effects, and they also strengthen causal inference. First, the comparison group was largely chosen from randomly selected schools participating full-day kindergarten, which was the “treatment as usual.” In addition, 15% of the comparison group had Head Start. This contrast results in a conservative bias of program estimates compared to the more typical one in long-term studies between center-based intervention and home care. Second, over 80% of children in the neighborhood of the centers participated, which indicates that program participants are largely representative of the neighborhoods surrounding the centers. Most of the comparison group did not enroll in the CPCs because they did not live in a neighborhood with an intervention. Third, the pattern of effects for outcomes investigated in over time are largely explained by mechanisms central to the intervention theory, including the enhancement of developed abilities important for school success, family support behavior, and the quality of later school environments.²⁷ Finally, results of a wide range of selection and attrition analyses have consistently indicated that program estimates are robust to alternative analytic techniques and model specifications, including latent-variable structural modeling and propensity score approaches.^{10, 17, 19}

Age 24 Follow-up and Comparability of Intervention Groups

At an average age of 24 years, 90.3% (n = 1,389) of the original sample had valid data on educational attainment or employment. Recovery rates for the preschool intervention and comparison groups were 91.2% and 88.6%, respectively. Rates were higher for crime and public aid data (92-94%) and lower for mental health and health outcomes based on the adult survey at ages 22-24 (77%). The high rates of sample recovery are due to the use of many sources of administrative and survey data and to follow up tracking. About two thirds of the sample resided in Illinois between ages 20-24, with many others remaining in the midwest. As in previous

studies,^{10, 19-21} there was no evidence of selective attrition by program status that would affect findings. Respondents to the adult survey were less likely to have criminal justice system histories than the original study sample, but this did not vary by program status. Recovery rates for parent outcomes also exceeded 90%, with mothers of study participants usually being the primary data source.

Table 2. Equivalence of CPC Preschool Intervention and Comparison Groups on PreProgram Attributes for the Age 24 Follow-up Study and Original Samples

Child/Family Characteristics**	Age 24 Follow-up Sample (n = 1389)*			Original Sample (n = 1539 P value
	Preschool Intervention Group (N=902)	Comparison Group (N=487)	P value	
Sample recovery, %	91.2	88.6	--	--
Adult administrative records, %	98.7	98.8	1.0	.450
Black, %	93.7	92.6	.500	1.00
Female child, %	53.0	47.0	.049	.109
Low birth weight (<2500g), %	11.4	14.3	.163	.134
Reside in high poverty area, %xz	77.3	71.7	.023	.040
Child welfare case histories by age 4, %	3.2	5.3	.077	.069
Parent under age 18 at child birth, %x	9.7	10.3	.761	.695
Mother did not complete high school, %x	51.0	59.4	.003	.001
Single parent family status, %x	76.4	75.3	.688	.613
Mother not employed, %x	64.9	59.9	.087	.123
Child eligible for subsidized meals, %xy	83.3	82.3	.652	.384
Participate in TANF program, %x	62.8	60.9	.483	.609
Four or more children in family, %x	16.7	19.2	.259	.281
Missing 1 or more risk factors, %	11.4	13.4	.293	.035
Risk index (0 to 8), mean (SD)	4.50 (1.69)	4.49 (1.75)	.912	.802

*Follow-up study sample had known educational attainment by August 2003 or employment status from January 2002 to October 2004. P values show the significance of mean (or percentage) group differences for age 24 and the original samples. The preschool comparison group participated in an alternative full-day kindergarten but had no CPC preschool participation. School-age and extended intervention groups had similar profiles as the CPC preschool group.

**Data on child and family characteristics were collected from birth to age 3 based on multiple administrative records and parent surveys. Data on TANF (Temporary Assistance for Needy Families) and subsidized meals were collected up to age 8. Sample sizes ranged from 1270 to 1389 for the age 24 follow up and from 1342 to 1539 for the original sample group. xVariable included in the risk index. yEligibility defined at <130% of the federal poverty level. zHigh poverty is defined as residence in a school area in which 60% or more children live in families with low income.

As shown in Table 2, the age 24 follow-up groups and the original sample were similar on most characteristics. These were measured from state and local administrative records and family surveys between birth and age 3 and are updated from previous reports.^{10, 19-21} The intervention and comparison groups were similar on parental employment (mothers), low-income status (measured by eligibility for subsidized lunches), AFDC, single-parent family and teen parenthood status, large family size (4 or more children), and low birth weight status. They differed on parent educational attainment and neighborhood poverty status but in opposite directions, as the intervention group had higher rates of both parental high school completion and neighborhood poverty concentration. The latter difference is a function of the centers being located in the most disadvantaged neighborhoods and school areas. A summary of key attributes is the family risk index, which is the sum of the 8 aforementioned attributes coded dichotomously as risk factors. The preschool intervention and comparison groups experienced, on average, four and a-half risks. Intergroup child welfare histories also were similar. Group comparisons for the original sample at preschool entry largely mirror those of the follow-up sample. The only differences were the gender balance and missing data on the risk indicators. Finally, comparisons using school-age and extended intervention groups showed a similar pattern of group comparability.

Intervention

Since the CPC intervention is described fully in previous reports,¹⁹⁻²² we provide a summary of the main features. Located in or close to elementary schools in the Chicago public school system, the CPC program provides educational and family-support services to children between the ages of 3 and 9 (preschool to second or third grade). Within a structure of comprehensive services similar to Head Start, the intervention emphasizes the acquisition of

basic skills in language arts and math through relatively structured but diverse learning experiences that include teacher-directed, whole-class instruction, small-group and individualized activities, frequent field trips, and play. Literacy experiences involving word analysis, oral communication, and listening skills are highlighted as described in the instructional activity guide.²⁸ All teachers have bachelor's degrees and are certified in early childhood education.

Each center is directed by a head teacher and two coordinators. The parent-resource teacher coordinates the family-support component. The paraprofessional school-community representative provides outreach to families. Major elements of the intervention include: low child-to-staff ratios in preschool (17:2), kindergarten (25:2), and the primary grades (25:2); an intensive parent program that includes receiving parenting education, volunteering in the classroom, attending school events and field trips, furthering educational attainment, and receiving home visitation; and health and nutrition services, including screening and diagnostic services, speech therapy, meal services, and referrals by program nurses.^{21, 29}

The preschool program is 3 hours per day, 5 days a week during the school year, and usually includes a 6-week summer program. After full-day or part-day kindergarten, school-age services are provided under the direction of the curriculum parent-resource teacher. The school-age intervention is open to any child in the school, either in first and second grade in 14 sites or first through third grade in six sites. The eligibility criteria for the intervention are (1) residence in a high-poverty (Title I) school area, (2) demonstration of educational need as assessed by a screening interview and staff outreach, (3) agreement of parent(s) to participate. Rates of participation of eligible children were high as the program was located in areas not served by other preschools, and nearly all families could not afford private child care. The high level of

community participation helps ensure that findings are representative of eligible children rather than sample selective.

Outcome Measures

Educational attainment. Four measures of attainment by age 23 years (mean 23.5 years, August 2003) were assessed. They were derived from administrative records from colleges and universities in Illinois and other states, K-12 schools, and brief surveys of participants or family members. *High school completion* measured whether participants finished their high school education with an official diploma or received a GED or equivalent credential. All others were coded as “noncompleters.” *College attendance and 4-year college attendance* measured whether participants earned course credit for enrollment in a 2- or 4-year college program or in college awarding a bachelor’s degree. *Highest grade completed* was an ordinal indicator of educational attainment ranging from 6 to 16 (bachelor’s degree). Those completing high school or the GED were coded 12. Postsecondary education was derived from the number of credits earned in college courses. Measures of parental educational attainment closely paralleled their children’s and came from several administrative sources (e.g., public health and aid records) and parent surveys by children’s age 17. These and other outcomes are described more fully elsewhere.^{26,30}

Economic status. Several measures of economic well-being were assessed by age 24. Indicators of quarterly income were obtained from records of the Illinois Department of Employment Security and from the adult survey between ages 22-24. *Full-time employment* was measured from the adult survey and defined as 35 or more hours per week. To measure general socioeconomic status, a dichotomous variable indicated whether participants have ever *attended college or have a stable work history* defined as 4 quarters of earned income exceeding \$3000 over ages 22-24. *Parental employment* (full or part-time) was measured from public aid and

school system records, and surveys up to children's age 17.

Public aid participation included enrollment in any of three major programs (TANF, Food Stamps, and Medicaid) from ages 18-24 (1998-2004). The number of months of enrollment and cumulative prevalence were analyzed for sample members residing in Illinois in 1999 or later. We also assessed participation in the *Food Stamp program*. Data came from the Illinois Public Assistance Data Base maintained on behalf of the Illinois Department of Human Services. For parents of study participants, enrollment in each public aid program in Illinois was analyzed and covered children's ages 9 to 18 (1989-1998).

Health status and behavior. Many indicators were analyzed for children and parents. *Health insurance coverage*, from either public (i.e., Medicaid) or private (employer-based) sources, was assessed between ages 22-24. Public insurance came from state-level Medicaid records and the adult survey. Private insurance coverage came from adult survey responses (e.g., "Do you get health benefits from your employer?") and were supplemented with records from the Illinois Department of Employment Security.

Substance and tobacco use were assessed on the adult survey. *Substance use* was a dichotomous variable indicating whether individuals reported any of the following: current use of marijuana or harder drugs, drink alcohol more than once a day, have a substance use problem, or have received substance abuse treatment since age 16. *Frequent use* or misuse was restricted to marijuana or harder drug use at least a few times per week. *Tobacco use* was defined as currently smoking 1 or more cigarettes daily.

Disability status measured receipt of disability assistance (i.e., from SSDI or SSI) since age 18 from either the Illinois Department of Human Services or the adult survey. Finally, *teenage parenthood* was a dichotomous variable indicating if females gave birth to a child before

age 18. Data were from the adult survey and public aid records.

For parents, two measures were included. *Disability status* was measured by receipt of disability assistance (e.g., SSDI, SSI) by child's age 24 or a report of disability from parent surveys. Health problems were assessed by survey questionnaire. Parents indicated whether health problems prevented them from participating at their child's school. This information was supplemented with participant reports in the adult survey that a parent had a serious illness in years past.

Mental health: depressive symptoms. Using the depression subscale of the Brief Symptom Inventory,³¹ participants rated on the age 24 survey how often in the past month they felt either depressed, helpless, lonely, life isn't worth living, and sad (0 = not at all, 5 = almost every day). Scores from the 5 items were summed and ranged from 0 to 25. Higher scores indicated greater symptomology. A dichotomous variable also was analyzed, indicating the frequent presence of 1 or more symptoms defined at levels ranging from a few times a month to almost every day.

Criminal behavior. Arrest, conviction, and incarceration histories from ages 18-24 were obtained primarily from administrative records from county, state and federal agencies and supplemented with the adult survey. *Arrests* were measured dichotomously and with counts both overall and by whether charges were *felonies* or involved *violent* offenses (e.g., aggravated assault, armed robbery). *Convictions* were whether individuals were found guilty by courts, and included both felonies and charges for violence. *Incarceration* measured whether individuals were sentenced to correctional institutions at the state or federal levels or to jails at the county level. Most records were from Illinois and other midwestern states through December 9, 2004.

Child maltreatment. This included the prevalence and number of substantiated

(“indicated”) reports of *child abuse and neglect* from ages 4 to 17. These were based on data from Child Protective Services of the Illinois Department of Children and Family Services and the Cook County Juvenile Court. *Out of home placement* indicated whether youth were placed outside the home in foster care, treatment foster care, or were adopted over the same age period primarily because of maltreatment histories. Children who left Chicago before age 10 with no service record were excluded from the study sample.

Statistical Analysis

Following many previous analyses in this project,^{10, 19, 20} intervention effects were estimated by multiple, probit, and negative binomial regression and were tested with many alternative models. The main analyses are summarized as follows. First, the effects of CPC preschool (1 or 2 years vs. 0) and school-age (1-3 years vs. 0) services were assessed simultaneously with 2 dummy variables. Second, the effects of CPC extended intervention were assessed in two ways. First, with a dummy variable indicating participation for 4 to 6 years (preschool starting at age 3 or 4 and continuing to second or third grade) versus all other children, who had 0 to 4 years of participation (Extended-1). This contrast assesses whether children who received the full program did better than others regardless of intervention experience. Analyses that included children with 1 to 4 years yielded similar results. The 4-6 year group also was contrasted with children who attended only CPC preschool and kindergarten (Extended-2). This contrast assesses the added value of extended intervention above and beyond preschool and kindergarten. Kindergarten achievement also was included as a control variable. Notably, this is a conservative test of the effects of extended intervention.^{4, 10, 17}

Findings are reported as adjusted coefficients and group differences controlling for the influence of the covariates. Measured between birth and age 3 from several sources (birth

records, public aid, and family surveys), the covariates were gender of child, race/ethnicity, single-parent family status, parent educational attainment, parent employment, public aid status, eligibility for subsidized lunches, 4 or more children in the family, teen parenthood, and child welfare service history. Following established procedures,³² a dummy code for missing data on the risk indicators also was included. These have been common covariates in many previous studies.¹⁹⁻²² Analyses based on the family risk index instead of the individual indicators, and the addition of program site dummy variables and other family factors, yielded a similar pattern of results. The Extended-2 contrast included word analysis scores at the end of kindergarten.

Data were analyzed in STATA.³³ Dichotomous variables were analyzed with probit regression. Count data (e.g., number of quarters with income over \$3000) were analyzed by negative binomial regression. Continuous variables such as highest grade completed and quarterly income (natural log) were analyzed in multiple regression. To enhance interpretability, coefficients from probit and negative binomial regression were transformed to marginal effects. As found in previous reports,¹⁹⁻²¹ corrections for nonrandom attrition and clustering did not affect estimates, nor did alternative analyses using propensity score and latent variable selection modeling. Given the social and economic importance of the outcomes, adjusted group differences were interpreted as program effects at the .10 probability level, although emphasis was given to differences at the .05 level. To test differential effects by subgroups, program interaction terms were tested for children's gender, race/ethnicity, low birth weight status, parent education attainment, employment, single-parent status, overall family risk, length of preschool participation, instructional approach, and neighborhood poverty. Given their exploratory purpose, the statistical significance of subgroup effects was set at .05. However, emphasis was given to findings in which an overall main effect was detected.

III. RESULTS

Educational Attainment

Preschool participation. Major findings are shown in Table 3. Relative to the comparison group and controlling for preprogram characteristics, the preschool group had significantly higher rates of high school completion (71.4% vs. 63.7%, $p = .01$) and 4-year college attendance (14.7% vs. 10%, $p = .02$). They also had more total years of completed education (11.7 vs. 11.4 yrs, $p = .006$). Rates of overall college attendance were similar, which reflects the lack of differences in 2-year college attendance.

School-age participation. No group differences were found for any measure.

Extended program participation. Relative to fewer years of participation and controlling for preprogram characteristics, 4-6 year participants had higher rates of high school completion (73.9% vs. 65.5%; $p = .002$) and 4-year college attendance (16.7% vs. 13.1%, $p = .049$), as well as more years of completed education (11.8 vs. 11.5 yrs; $p = .001$). Relative to participation in preschool and kindergarten and controlling for kindergarten achievement, extended intervention was not associated with educational attainment (Extended-2).

Crime

Preschool participation. By age 24, the preschool group had significantly lower rates of felony arrest (16.5% vs. 21.1%, $p = .02$), incarceration (20.6% vs. 25.6%, $p = .033$), and multiple incarcerations than the comparison group. They also were less likely to be found guilty of a crime both overall (20.3% vs. 24.7%, $p = .063$) and for a felony (15.8% vs. 19.9%, $p = .026$) and a violent crime (5.1% vs. 7.1%, $p = .06$). No group differences were found on the overall arrest rate, although preschool participants had consistently lower levels. Analyses of count data (not shown) showed a similar overall pattern.

Table 3. Adjusted Means and Differences for Child-Parent Center (CPC) Preschool, School-Age, and Extended Intervention Groups for Young Adult Outcomes*

Outcomes Measures	Preschool				School-Age				Extended-1				Extended-2			
	Interv (n = 888)	Comp (n = 480)	Diff.	P Value	Interv (n = 778)	Comp (n = 590)	Diff.	p Value	Interv (n= 522)	Comp (n=846)	Diff.	P Value	Interv (n = 522)	Comp, PK + K (n=254)	Diff.	P Value
Educational attainment by age 23																
High school completion, %	71.4	63.7	7.7	.010	69.1	68.5	0.6	.845	73.9	65.5	8.4	.002	70.7	68.2	2.5	.500
Highest grade completed	11.73	11.44	.29	.006	11.62	11.64	-.02	.815	11.82	11.51	.31	.001	11.67	11.60	.07	.577
College attendance, %	29.4	27.4	2.0	.488	29.6	27.6	2.0	.471	30.9	27.4	3.5	.174	30.5	27.3	3.2	.381
4-year college attendance, %	14.7	10.0	4.7	.020	12.5	12.4	0.1	.959	16.7	13.1	3.6	.049	11.9	11.8	0.1	.974
Adult crime by age 24																
Any incarceration or jail, %	20.6	25.6	-5.0	.033	23.7	21.5	2.2	.316	21.7	24.7	-3.0	.157	24.6	24.7	-0.1	.962
2 or more incarceration/jail, %	7.0	9.0	-2.0	.046	8.1	8.6	-0.5	.593	5.5	9.7	-2.2	.019	5.5	7.4	-1.9	.137
Any arrest, %	35.8	40.0	-4.2	.185	37.5	36.9	0.6	.850	35.4	38.4	-3.1	.282	37.5	37.1	0.4	.919
2 or more arrests, %	24.6	26.8	-2.2	.396	27.2	25.3	1.9	.447	26.5	26.9	-0.4	.885	29.1	26.9	2.2	.510
Felony arrest, %	16.5	21.1	-4.6	.020	18.7	18.2	0.5	.770	18.4	20.6	-2.2	.231	21.9	20.6	1.3	.607
Any violent arrest, %	16.3	18.8	-2.5	.236	16.1	17.1	-1.0	.624	13.9	17.9	-4.0	.038	12.9	15.9	-3.0	.251
2 or more violent arrests %	3.1	3.1	0.0	.960	2.8	3.8	-1.0	.140	3.3	3.9	-0.6	.343	2.7	3.7	-1.0	.188
Any conviction, %	20.3	24.7	-4.4	.063	24.2	22.6	1.6	.469	21.3	24.6	-3.3	.123	24.6	24.3	0.3	.929
Felony conviction, %	15.8	19.9	-4.1	.026	18.2	16.8	1.4	.434	17.9	19.4	-1.5	.366	21.0	19.4	1.6	.509
Violent crime conviction, %	5.1	7.1	-2.0	.060	6.0	6.0	0.0	.976	5.5	8.0	-2.5	.011	6.1	8.0	-1.9	.139
Economic status by age 24																
Any quarterly income > \$3000, %	37.7	33.1	4.6	.150	35.3	37.0	-1.7	.585	38.3	34.6	3.7	.186	35.8	36.2	-0.4	.917
Number of quarters income > \$3000	1.57	1.38	.19	.146	1.47	1.55	-0.08	.556	1.60	1.45	.15	.198	1.51	1.51	.00	.998
Maximum quarterly income, \$ ^x	3365	3421	-56	.606	3475	3268	207	.753	3589	3258	331	.295	3645	3224	421	.512
If employed full-time, % [†]	39.4	37.4	2.0	.551	39.8	37.3	2.5	.431	42.7	36.4	6.3	.039	43.0	36.0	7.0	.091
Ever attended college or reported at least 4 quarters income, %	54.1	48.7	5.4	.088	51.0	53.9	-2.9	.336	55.5	50.3	5.2	.070	52.5	52.2	0.3	.941
Food Stamps, %	52.4	55.9	-3.5	.306	54.8	52.1	2.7	.415	52.4	54.4	-2.0	.520	53.8	53.5	0.3	.912
Food Stamps, mnths	13.0	12.1	0.9	.366	12.2	13.3	-1.1	.209	12.4	12.9	-0.5	.549	12.0	13.1	-1.1	.368
Public aid (overall), %	61.6	63.0	-1.4	.673	51.9	62.4	-0.5	.870	58.8	64.1	-5.3	.077	59.4	63.9	-4.5	.282
Public aid (overall), mnths	32.1	28.2	3.9	.074	28.4	33.9	-5.5	.009	29.3	31.7	-2.4	.215	27.1	33.1	-6.0	.027
Health and mental health by age 24																
Had child before age 18 (females), %	29.6	31.5	-1.9	.647	27.4	34.1	-6.7	.086	26.7	32.7	-6.0	.101	27.2	32.1	-4.9	.316
Any substance use (age 16+), %	25.8	28.3	-2.5	.417	26.9	26.4	0.5	.861	26.5	26.7	-0.2	.936	26.4	27.1	-0.7	.854
Frequent substance use (age 16+), %	14.0	17.0	-3.0	.141	15.1	15.0	0.1	.977	13.9	15.0	-1.1	.574	14.3	15.0	-0.7	.775
Daily tobacco use, %	17.9	22.1	-4.2	.120	19.1	19.5	-0.4	.888	18.4	20.0	-1.6	.524	19.8	19.1	0.7	.830
Any health insurance, %	70.2	61.5	8.7	.005	62.6	69.5	-3.9	.187	69.7	65.8	3.9	.161	66.7	67.7	-1.0	.795
Any disability, %	6.2	5.5	0.7	.600	4.9	7.8	-2.9	.021	4.4	7.0	-2.6	.042	3.5	7.4	-3.9	.009
If reported any depression symptom, %	12.8	17.4	-4.6	.057	14.5	14.0	0.5	.821	12.4	15.6	-3.2	.138	12.7	15.4	-2.7	.345
Depression symptom scale, mean	3.61	3.84	-.23	.374	3.72	3.64	.08	.738	3.55	3.77	-.22	.358	3.54	3.77	-.23	.471

*Coefficients are from linear, probit, or negative binomial regression analysis transformed to marginal effects, and they are adjusted for earlier/later program participation (preschool or school-age), 8 indicators

of preprogram risk status, sex of child, race/ethnicity, child welfare history, and a dummy-coded variable for missing data on risk status. Coefficients for CPC preschool and school-age intervention were estimated simultaneously. The estimates for Extended Intervention-1 (4-6 years vs. lesser intervention) and Extended Intervention-2 (4-6 years vs. preschool and kindergarten intervention only) contrasts were computed separately and did not include earlier/later program participation. Estimates for CPC Extended-2 added word analysis test scores at the end of kindergarten; they also included a dummy code for other levels of CPC participation (0 to 3 years). The P value is the probability level of the adjusted mean (or percentage) difference. Sample sizes are for the outcomes of educational attainment/employment status (n = 1389) but they varied indicator. x The P Value for income is based on log-income. † Based on adult survey only (ages 22-24)

School-age participation. No group differences were found across measures, including count data.

Extended participation. Relative to fewer years of participation, the effects of extended intervention were limited to multiple incarcerations by age 24 (7.5% vs. 9.7%, $p = .019$), arrests for charges of violence (13.9% vs. 17.9%, $p = .038$), and convictions for violent changes (5.5% vs. 8.0%, $p = .011$). No differences were found using preschool and kindergarten participants as the comparison group (Extended-2).

Economic Status

Preschool participation. The preschool group was more likely than the comparison group to have a stable employment history or to have attended college by age 24 (54.1% vs. 48.7%, $p = .088$). No other indicators showed significant differences, although the pattern of findings favored preschool participants. Analyses using TANF (among females) and Medicaid receipt yielded equivalent findings.

School-age participation. The program group had fewer months receiving any public aid (TANF, Food Stamps, or Medicaid) from age 18-24 (28.4 vs. 33.9, $p = .009$). No other differences were found.

Extended intervention. In addition to lower rates of public aid receipt, extended intervention participants had higher rates of full time employment (42.7% vs. 36.4, $p = .039$) and a stable employment history or college enrollment history (55.5 vs. 50.3, $p = .07$). The employment difference was similar for the Extended-2 contrast.

Health Status and Behavior

Preschool participation. The preschool group had higher rates of health insurance coverage than the comparison group (70.2% vs. 61.5%, $p = .005$). Rates of both private and

public insurance coverage favored the program group. Rates of substance use and smoking were consistently lower for the program group, but differences did not reach the level of statistical significance. Among females, no differences were found for teenage parenthood.

School-age participation. Two differences were found. The school-age group had a lower rate of disability assistance by age 24 (4.9% vs. 7.8%, $p = .021$). Among females, school-age participation was associated with a lower rate of teenage parenthood (27.4 vs. 34.1%, $p = .086$).

Extended program participation. Program participation also was linked to lower teenage parenthood among females (26.7% vs. 32.7%, $p = .10$). The extended program group was less likely to receive disability assistance as young adults (Extended-1; 4.4% vs. 7.0%, $p = .042$). The program group also had a higher rate of private health insurance coverage (41.2% vs. 33.2%, $p = .005$; not shown) even though the overall rate of insurance coverage was similar between groups. The Extended-2 contrast yielded differences only for disability assistance.

Mental health

Preschool participation. Relative to the comparison group, the intervention group was less likely to have depressive symptoms (12.8% vs. 17.4%, $p = .057$), defined as the frequent presence of 1 or more symptoms. No differences were found on the symptom scale.

School-age participation. No group differences were found.

Extended program participation. No differences were found for either program contrast, although levels were generally lower for the program group.

Family and Parent Outcomes

Child maltreatment. As shown in Table 4, preschool was consistently associated with less maltreatment, and by age 17, participants had lower rates of out-of-home placement (4.7%

vs. 8.8%). Extended intervention showed a similar pattern relative to nonextended intervention (Extended-1). Preschool and extended intervention also linked to abuse and neglect prevention measured separately. For example, preschool participants had comparatively lower rates of abuse (6.8% vs. 9.8%) and neglect (5.0% vs. 10.8%).

Parent Well-Being. Similar to child outcomes, preschool participation was associated with higher parental educational attainment, including high school completion (72% vs. 64.8%, $p = .018$), highest grade completed (11.9 vs. 11.6 yrs, $p = .006$), and 1 or more years of postsecondary education (30.4% vs. 22.7%, $p = .006$). Extended intervention was linked to higher rates of school completion (Extended-1; 74.1% vs. 66.6%, $p = .007$) and highest grade completed (extended-1; 11.9 vs. 11.7 yrs, $p = .006$). School-age participation was not associated with parental outcomes.

Although CPC participants had generally higher rates of employment, only for Extended-1 were there significant group differences (56.8% vs. 49.1%, $p = .008$). Apart from long-term Medicaid use (Extended-2 contrast, Table 4), no differences were found for public aid participation, either Food Stamps or AFDC/TANF.

Regarding health status, preschool participation was associated with lower rates of parental disability assistance (4.8% vs. 7.9%, $p = .028$) as measured by receipt of SSDI/SSI or self-reported impairment.

Differential Effects by Subgroups

We found limited evidence of differential intervention effects. Findings are summarized with an emphasis on outcomes showing overall program effects.

Table 4. Adjusted Means and Differences for Child-Parent Center (CPC) Preschool, School-Age, and Extended Intervention Groups for Family and Parent Outcomes*

Outcomes Measures	Preschool				School-Age				Extended-1				Extended-2			
	Interv (n = 931)	Comp (n = 507)	Diff.	P Value	Interv (n = 812)	Comp (n= 626)	Diff.	P Value	Interv (n=537)	Comp (n=901)	Diff.	P Value	Interv (n=537)	Comp, PK + K (n=275)	Diff.	P Value
Child Maltreatment and Welfare from child age 4 to 17																
1 or more substantiated reports, %	9.2	14.3	-5.1	.007	9.6	11.7	-2.1	.350	7.6	13.2	-5.6	.001	8.5	13.3	-3.8	.114
2 or more substantiated reports, %	1.7	3.6	-1.9	.025	2.2	2.2	0.0	.977	1.5	3.0	-1.5	.039	2.0	2.3	-0.3	.815
N of substantiated reports, mean	.14	.24	-.10	.011	.18	.19	-.01	.760	.13	.21	-.08	.005	.15	.19	-.04	.288
Out of home placement, %	4.7	8.8	-4.1	.005	6.0	5.8	0.2	.889	4.4	7.2	-2.8	.030	5.8	5.9	-0.1	.959
Maternal Educational Attainment by child's age 17																
High school completion, %	72.0	64.8	7.2	.018	70.8	67.9	2.9	.324	74.1	66.6	7.5	.007	71.3	68.6	2.7	.483
Highest grade completed, mean	11.86	11.59	0.27	.006	11.75	11.78	-0.03	.739	11.88	11.70	0.18	.046	11.72	11.78	-0.06	.605
1 or more years post secondary, %	30.4	22.7	7.7	.006	26.2	29.4	-3.2	.237	29.4	26.7	2.7	.295	24.5	29.3	-4.8	.162
2 or more years, post secondary, %	5.6	4.1	1.5	.231	4.3	6.0	-1.7	.163	4.8	5.2	-0.4	.753	3.9	5.8	-1.9	.191
Economic Status and Aid by child's age 17																
Part- or full-time employment, %	53.7	48.8	4.9	.128	53.3	50.3	3.0	.325	56.8	49.1	7.7	.008	55.1	50.0	5.0	.203
Medicaid, %	88.1	88.3	-0.2	.922	87.7	88.8	-1.1	.579	87.2	88.7	-1.5	.423	87.6	88.5	-0.9	.723
Medicaid, months	63.19	62.95	0.24	.917	62.50	63.91	-1.41	.526	61.85	63.87	-2.02	.334	61.91	59.98	-1.93	.503
5 years+, %	56.1	54.4	1.7	.603	54.0	57.6	-3.6	.265	53.0	57.2	-4.2	.157	51.3	58.3	-7.0	.095
Food Stamps, %	86.8	87.4	-0.6	.803	86.8	87.4	-0.6	.781	86.1	87.6	-1.5	.455	87.7	86.9	0.8	.769
Food Stamps, months	58.80	56.40	2.40	.292	57.08	59.12	-2.04	.352	57.73	58.08	-0.35	.866	56.83	55.01	-1.82	.522
5 years+, %	49.6	46.0	3.6	.275	47.0	50.0	-3.0	.344	47.5	48.8	-1.3	.653	46.1	49.7	-3.6	.387
AFDC, %	79.0	81.3	-2.3	.397	80.0	79.5	0.5	.848	78.9	80.4	-1.5	.534	79.4	80.2	-0.8	.824
AFDC, months	49.26	48.57	0.69	.761	48.71	49.42	-0.71	.747	49.91	49.08	-0.17	.934	48.55	49.31	-0.76	.791
5 years+, %	36.9	35.6	1.3	.677	35.4	37.9	-2.5	.406	35.9	36.7	-0.8	.787	35.0	37.4	-2.4	.531
Public aid, %	90.4	90.7	-0.3	.869	90.0	91.1	-1.1	.548	89.2	91.2	-2.0	.231	90.0	91.0	-1.0	.656
Public aid, mths	171.25	167.91	3.34	.604	168.29	172.45	-4.16	.501	168.50	171.04	-2.54	.662	167.28	171.78	-4.50	.574
5 years+, %	59.2	56.0	3.2	.339	56.4	60.2	-3.8	.237	55.8	59.4	-3.6	.224	54.0	60.7	-6.7	.107
Health Status																
Parent disability, %	4.8	7.9	-3.1	.028	5.6	6.0	-0.4	.772	5.2	6.4	-1.2	.332	6.8	5.2	1.6	.387
Parent health problem, %	22.6	25.2	-2.6	.366	24.2	22.6	1.6	.546	21.7	24.7	-3.0	.227	22.1	24.4	-2.3	.487

*Coefficients are from linear, probit, or negative binomial regression analysis transformed to marginal effects, and they are adjusted for earlier/later program participation (preschool or school-age), 8 indicators of preprogram risk status, sex of child, race/ethnicity, child welfare history, and a dummy-coded variable for missing data on risk status. Coefficients for CPC preschool and school-age intervention were estimated simultaneously. The estimates for Extended Intervention-1 (4-6 years vs. lesser intervention) and Extended Intervention-2 (4-6 years vs. preschool and kindergarten intervention only) contrasts were computed separately and did not include earlier/later program participation. Estimates for CPC Extended-2 added word analysis test scores at the end of kindergarten; they also included a dummy code for other levels of CPC participation (0 to 3 years). The P value is the probability level of the adjusted mean (or percentage) difference. Sample sizes are for the outcomes of educational attainment (n = 1438) but they varied by indicator.

Program attributes. Children who attended preschool programs rated (a) high in both child-initiated and teacher-directed instructional activities or (b) just high in child-initiated instruction had significantly lower rates of criminal conviction and incarceration compared to children in programs rated high in only teacher-directed instruction and low in both teacher directed and child initiated instruction. Groups high in child-initiated activities also had higher rates of high school completion.

Although 2-year preschool participants had generally higher levels of well-being, only for child maltreatment did they have significantly lower rates than 1-year participants (6.1% vs. 11.4%, $p = .004$). Differences in public aid receipt, two or more arrests, and arrests for violence were significant only at the .10 level.

Family demographics. The effects of intervention were similar by parent education, economic status, age at child's birth, family structure, and family risk status.

Child characteristics. Males experienced a greater preschool effect on high school completion (63.6% vs. 48.2%, $p < .001$) than females (78.2% vs. 79.2%, $p = .787$). No group differences by race/ethnicity and birth weight were detected.

IV. DISCUSSION

This study makes several contributions to early childhood intervention and human development. First, as the most comprehensive investigation of an established large-scale program, participation in intervention was found to have broad effects on health and well-being in adulthood not apparent in previous studies.^{5, 8, 9, 19} Preschool participants had comparatively higher rates of health insurance coverage and educational attainment, lower rates of more severe criminal behaviors, including felony arrests, convictions, and incarceration, and lower rates of

depressive symptoms. They also had higher rates of college enrollment or stable work experience and lower maltreatment. There were no differences in rates of teen parenthood, public aid receipt, and disability. That the impacts of intervention extend beyond educational performance are not surprising given the well documented links between education outcomes and adult health, mental health, and social behavior.^{24, 25, 34} Almost all previous long-term studies have focused on school performance and educational attainment, and have not followed participants into adulthood. Most noteworthy, this is the first study of early intervention linking participation to higher rates of insurance coverage, a byproduct of better school performance and attainment. Links to adult crime prevention have been documented,^{7, 8} but not for large-scale prospective studies or over a wide range of indicators. Since expenditures for the medical care and justice systems comprise roughly 20% of GDP, the potential cost savings to governments and taxpayers of early childhood prevention programs are considerable.

Second, we find continuing effects of intervention on educational attainment into adulthood. In addition to impacts on high school completion and years of completed education, preschool was associated with significantly higher rates of attendance in a 4-year college. This is particularly important given the increasing economic and health benefits experienced by college and postsecondary graduates relative to nongraduates and school dropouts.^{35, 36} Nevertheless, by age 23 only a small fraction of program participants attended a 4-year college, and so far higher levels of education do not result in significant differences in income, although program participants are more likely to be employed or attending college. Additional follow ups will provide a more complete assessment of socioeconomic status.

A third study contribution is that beneficial effects of intervention were found for parents

of program participants. By the child's age 18, parents of preschool participants had significantly higher rates of high school completion and postsecondary education. They also had comparatively lower rates of disability. Intergenerational effects of preschool programs have not been well documented, yet many interventions, including the CPC program, provide family services.^{2-4, 9} The observed effects are consistent with implemented program activities as substantial resources were available for parent training, education and personal development, and utilization of community resources. At the broader family level and extending on earlier studies,^{21, 37} preschool intervention was linked to lower levels of both child abuse and neglect as well as out of home placements, which suggests that school-based early intervention is a promising avenue for maltreatment prevention.

Fourth, we found some evidence that program participation that continued into the primary grades was associated with greater adult well-being. Relative to less extensive intervention, participation for 4-6 years was associated with higher educational attainment, a higher rate of full-time employment, less need for public aid, lower levels of child maltreatment and violent crime, and greater parental well-being. Effect sizes were lower when kindergarten achievement was included as a covariate, but these estimates may be overly conservative since the cognitive effects of preschool participation were removed. Overall, these findings indicate the positive effects of length of intervention, and provide long-term empirical support for efforts to integrate services between preschool and third grade.

A final contribution of the study is that differential effects of intervention were investigated for program, child, and family characteristics. Due to small sample sizes, these effects have not been the focus of previous studies. Although for most outcomes the impact of

intervention was similar for different subgroups, preschool participation was found to be more associated with high school completion for males than females. This is consistent with the 15-year follow-up study.¹⁹ While there were surprisingly few differences by length of preschool participation, children in preschool centers rated high in child-initiated activities had lower rates of incarceration and higher rates of high school completion as compared to children in centers rated low in child-initiated activities. These findings are consistent with previous studies examining school performance and delinquency^{22, 38} and suggest that preschool instructional activities can impact child health and development in adulthood.

Why does the CPC intervention promote enduring effects on health and well-being into adulthood? Four program elements seem paramount. First, a system of intervention is in place beginning at age 3 that continues to the early grades. This school-based system promotes stability in children's learning environment, which can provide smooth transitions to formal schooling.^{4, 21} Today, most preschool programs are not integrated within public schools. A second key feature is that as a public-school program, all teachers have bachelor's degrees and certification in early childhood education. They are compensated well, and turnover is minimal. Well trained and compensated staff are common for programs demonstrating long-term effects^{5, 7, 11, 19} yet are relatively absent in many early education programs. Third, instructional activities are responsive to all of children's learning needs, but special emphasis is given to literacy and school readiness through a diverse set of learning activities. From its inception, the program has emphasized the development of language and communication skills necessary for successful school performance. This is accomplished with a blend of literacy training, play, field trips, and whole-group and individualized activities.^{21, 29} Finally, comprehensive family services provide

many opportunities for positive learning experiences in school and at home. Because each center has a staffed parent resource room and provides school-community outreach in addition to home visits, parental involvement is more intensive than in most other programs. Health services also are provided along with referrals to community clinics and social services. Thus, the intervention shows that literacy education and family services can be integrated successfully.

Given the growing evidence of long-term positive effects of early intervention, the processes through which intervention leads to greater well-being are better understood.^{7, 27, 39} In the CPC program, there is evidence that long-term effects on educational attainment and crime are explained by three sets of factors: increased cognitive-scholastic skills for better school performance, positive family support behaviors, and positive postprogram school support experiences such as enrollment in higher quality schools.^{17, 27} Changes in motivation and socio-emotional adjustment are less associated with long-term effects in this program and others.^{7, 27, 39} These and related factors need to be investigated across a wider range of outcomes and interventions.^{17, 40}

We note two study limitations that may affect the interpretability of findings. First, some outcome measures were not assessed as completely as possible. Indicators of crime were obtained from administrative records of arrest and incarceration, and they represent the most serious and detectable behaviors. Alternatively, depressive symptoms were obtained from a brief self-report checklist and not clinical assessments, suggesting that intervention effects may be underestimated. They are only one indicator of mental health, however. Employment and income were measured prior to the completion of postsecondary education for many study participants and may have led to underestimation of effects on economic well-being. More

stable and predictable economic profiles occur between ages 25 and 30. For example, between ages 19 and 24 the CLS sample increased their rate of high school completion by nearly fifty percent.¹⁹ Finally, outcomes for parents of program participants relied almost exclusively on administrative data with limited coverage of health behavior, crime, and mental health.

Second, although the generalizability of findings to existing state and federally funded early education programs is greater than most previous studies, the intervention effects are most likely to be reproduced in urban contexts serving relatively high concentrations of low-income children. Also, as a school-based intervention, the CPC program may not have the same effects in community-based settings. Recent findings from programs in more diverse contexts and with more diverse samples suggest positive effects can be achieved, thereby increasing the level of generalizability.^{1,11} Moreover, the CPC program has a long record of high-quality implementation and consistent attention to educational enrichment and family services education. Programs without these attributes are less likely to show a similar pattern of results.

This study provides evidence that established early educational interventions can positively influence the adult life course in several domains of functioning. The scope and magnitude of intervention effects reveal not only the benefits to participants' in fundamental indicators of health and well-being but the potential returns to society for investments in early educational programs.

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ACKNOWLEDGEMENTS

Preparation of this paper was supported by grants from the National Institute of Child Health and Human Development (No. R01HD034294-11), Foundation for Child Development, Doris Duke Charitable Foundation (No. 20030035), and the University of Wisconsin-Madison Graduate School. We gratefully acknowledge the following organizations/institutions for invaluable assistance in accessing, collecting, and documenting data: Chapin Hall Center for Children at the University of Chicago, Chicago Public Schools, Circuit Court of Cook County, City Colleges of Chicago, Cook County Juvenile Court, Illinois Board of Higher Education, Illinois Department of Corrections, Illinois Department of Child and Family Services, Illinois Department of Public Health, Illinois Department of Employment Security, Illinois Department of Human Services as well as parallel organizations/institutions in other states. We also thank several organizations for help in administering and managing the adult survey of the project, including the Public Opinion Laboratory at Northern Illinois University and the University of Wisconsin Survey Research Center, Metro Chicago Information Center, and the University of Minnesota Survey Research Center