School-Based Early Intervention and Later Child Maltreatment in the Chicago Longitudinal Study

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Investigated were the effects of participation in the Title I Child-Parent Centers (CPC) on substantiated reports of child maltreatment for 1,408 children (93% of whom are African American) in the Chicago Longitudinal Study. The CPCs provide child education and family support services in high-poverty areas. After adjusting for preprogram maltreatment and background factors, 913 preschool participants had significantly lower rates of court petitions of maltreatment by age 17 than 495 children of the same age who participated in alternative kindergarten interventions (5.0% vs. 10.5%, a 52% reduction). Participation for 4 to 6 years was significantly associated with lower rates of maltreatment (3.6% vs. 6.9%, a 48% reduction). Findings based on child protective service records (as well as combined protective service and court records) were similar. Preschool length, family risk, and school poverty were associated with lower rates of maltreatment. Parental involvement in school and school mobility were significant mediators of intervention effects.

Child maltreatment is a major social problem. In 1999, there were 3 million referrals to protective service agencies for possible maltreatment, of which 826,000 children were found to have experienced child abuse and neglect (CAN; U.S. Department of Health and Human Services, 2001). Although the national rate of CAN declined from 13 per 1,000 children in 1998 to 11.8 per 1,000 children in 1999, CAN exact high costs on children, families, and service agencies that are magnified when examined over many years.

The effects of maltreatment on children are substantial and long lasting. Compared with children without maltreatment, those who suffer abuse or neglect have higher rates of socioemotional and behavioral problems (Egeland & Sroufe, 1981; Erickson & Egeland, 1996; Widom, 2000; Williamson, Borduin, & Howe, 1991), and cognitive and scholastic deficits (''Protecting,'' 1998; Trickett & McBride-Chang, 1995; Wodarski, Kurtz, Gaudin, & Howing, 1990). In the longer term, maltreated children have higher rates of delinquency, substance abuse, and school failure (Daro, 1988; Daro & McCurdy, 1994; Eckenrode, Rowe, Laird, & Brathwaite, 1995; Widom, 1989, 2000), which reduces their social and economic well-being. The effects of CAN also may contribute to an intergenerational cycle of abusive and violent behavior (Belsky, 1993; Cicchetti & Carlson, 1989; Egeland, Jacobvitz, & Sroufe, 1988; Kaufman & Zigler, 1987).

Treatment programs and services for maltreated children are costly. In 2000, federal expenditures for child welfare services such as foster care and adoption assistance exceeded $7 billion (U.S. Department of Health & Human Services, 2002). Expenditures from all government sources are nearly double the federal expenditure (Courtney, 1998). Treatment programs also have shown uneven levels of effectiveness in promoting child well-being and reducing out-of-home placements (Daro & McCurdy, 1994; Melton & Berry, 1994; Rossi, 1992). Although it is widely accepted that preventing maltreatment before it occurs is the most desirable and cost-effective intervention strategy, knowledge about the effectiveness of alternative prevention programs is limited (Daro & McCurdy, 1994; Melton & Berry, 1994; Reppucci, Woolard, & Fried, 1999).

Advancing research on the impact of prevention programs was a major goal of the Child Abuse and Prevention and Treatment Act of 1996. Contemporary programs that target low-income families with young children have only begun to investigate the link between participation and reductions in CAN.

Recent reviews of the effects of programs designed to prevent CAN (Guterman, 1999; Larner, Stevenson, & Behrman, 1998; MacLeod & Nelson, 2000; Reppucci et al., 1999) have found that a variety of interventions can alter some of the major risk factors for maltreatment and out-of-home placement, including unresponsive or harsh parenting practices, poor parenting skills and attitudes, economic hardships, low social support, and social isolation. Very few studies, however, have demonstrated that participation in intervention is independently linked to lower rates of later CAN (Finkelhor, Asdigian, & Dziuba-Leatherman, 1995; Reppucci et al., 1999). The strongest evidence that prevention programs can reduce rates of CAN came from the Prenatal/Early Infancy Project (Olds et al., 1999), a nurse home-visitation program for young, high-risk mothers having their first child. Through frequent home visits during pregnancy to age 2 to promote health practices, parenting skills, and parents' socioeconomic development, program participation in this randomized trial was associated with lower incidence of child maltreatment at the end of the program (Olds, Henderson, Chamberlin, & Tatelbaum, 1986) and through age 15 (Olds et al., 1997). Most other home-visitation programs do not show such long-term effects probably because they are less intensive, shorter in duration, and provided little if any training for staff (Gomby, Culross, & Behrman, 1999; MacLeod & Nelson, 2000).

A less recognized program model for preventing CAN that has shown promising results is comprehensive early childhood intervention (Andrews et al., 1982; MacLeod & Nelson, 2000). Offering child care or preschool education, a constellation of family services, and health and community services, comprehensive programs focus on the total care environment and are administered through social services agencies or schools. Home visitation is only one of many program activities. Although these programs traditionally use a case-management approach for children ages 0 to 3, school-based interventions for preschoolers provide an alternative approach that has not been investigated for the prevention of child maltreatment. Moreover, they are consistent with ecological and transactional models of development (Belsky, 1993; Cicchetti & Lynch, 1993), whereby the causes of child maltreatment are complex and are a function of family, child, and community characteristics. Because early childhood interventions are designed to affect child and parental competencies and to strengthen the school and social supports for families, they provide a good test of the ecological model in preventing child maltreatment.

Early childhood interventions beginning in preschool have demonstrated enduring effects on the life-course development of low-income children, including enhancing their cognitive development and school achievement (Barnett, 1995; Campbell & Ramey, 1995; White, 1985), reducing the need for remedial education services (Barnett, 1995; Campbell & Ramey, 1995; Reynolds, Mann, Miedel, & Smokowski, 1997), reducing rates of delinquency (Schweinhart, Barnes, & Weikart, 1993; Zigler, Taussig, & Black, 1992), and increasing educational attainment and economic well-being (Consortium for Longitudinal Studies, 1983; Schweinhart et al., 1993). Because early childhood interventions have been shown to substantially affect many aspects of children's well-being, they may also provide avenues for reducing CAN.

One promising school-based early childhood intervention is the Chicago Child-Parent Center (CPC) program. Administered by the Chicago public schools since 1967 and funded through the Elementary and Secondary Education Act of 1965, the CPC program provides preschool education for low-income children beginning at age 3, and a variety of family support services inside and outside the centers. Although home visitation is provided, most family-support activities are directed toward enhancing involvement in children's education at home and in school. Through program activities in parent resource rooms and in community contexts, parenting skills, vocational skills, and social supports are strengthened, which are expected to reduce the likelihood of behaviors leading to CAN. The intervention has a longer duration than most other early interventions, because child education and family services also are offered in kindergarten to second or third grade. The provision of environmental support during the transition to school is expected to help the family meet the educational and social needs of their children and thereby reduce the risk of later problem behaviors. More broadly, the CPC program is a family-school partnership model that is increasingly used in prevention programming (Weissberg & Greenberg, 1998).

Previous studies of the CPC program in the Chicago Longitudinal Study, an ongoing investigation of the intervention for more than 1,500 children, have indicated that it is effective in promoting both

family and child-development outcomes and thus may help prevent CAN. Relative to a matched control group of children from low-income families, CPC preschool participation was associated with greater parent involvement in and satisfaction with children's schooling, and higher expectations for children's educational attainment (Reynolds, 1994, 2000). Both preschool participation and preschool plus school-age participation were associated with greater school achievement and lower rates of school remedial services (Reynolds, 2000; Reynolds & Temple, 1998), and preschool participation was consistently associated with higher rates of high school completion and lower rates of official juvenile arrest for violent and nonviolent offenses (Reynolds, Temple, Robertson, & Mann, 2001). The estimated effects of program participation on family and child outcomes were similar among sample subgroups, with three exceptions. Boys experienced greater benefits in educational attainment than girls. Children from the highest poverty neighborhoods experienced greater preschool program benefits in school achievement and educational attainment. Program length (e.g., extended program participation) was associated with lower rates of remedial education services and with higher levels of school achievement (Reynolds, 2000; Reynolds et al., 2001). These findings, especially the links to family-socialization practices and family-school support, suggest that program participation may be associated with reduced child maltreatment. No previous studies in the Chicago Longitudinal Study have investigated child maltreatment.

Further analyses have revealed that one of the hypothesized mechanisms through which program participation leads to beneficial outcomes is family support behavior. The family support hypothesis has indicated that the longer term effects of intervention occur to the extent that participation enhances parenting practices and attitudes as well as family involvement in children's education. Program-related changes in family socialization can directly affect child outcomes by increasing commitment and expectations for learning (Kaufman & Zigler, 1987; Olds et al., 1999; Seitz, 1990). Investigation of causal mechanisms in intervention research has been a key attribute of confirmatory program evaluation (Reynolds, 1998). Identification of these mechanisms, in conjunction with other analyses, can strengthen causal inference. As an indicator of the family support hypothesis, parent involvement in children's education and school has been found to mediate program effects on school remedial services, school achievement, and delinquency (Reynolds,

2000; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996). Given the demonstrated links among economic hardship, social isolation, inattentive parenting, and child maltreatment (Cicchetti & Carlson, 1989; Garbarino, 1989, 1992; Parker, Piotrkowski, & Peay, 1987), the family support hypothesis would also be expected to help explain the effects of CPC participation on lower rates of CAN.

Two other hypotheses, school support and cognitive advantage, also have been found to help explain the relation between program participation and later social competence (Reynolds, 2000; Temple & Reynolds, 1999). Their contribution to child maltreatment has rarely been tested but to the extent they reinforce a positive home environment, each could help protect against family dysfunction. In the school support hypothesis, the effects of program participation would be expected to derive, in part, from attendance in schools of sufficient quality and support to promote children's social and scholastic adjustment. Children's school mobility, for example, has been associated with academic and social behavioral problems (Eckenrode et al., 1995; Mehana, 1997; Reynolds, 2000) and, as an ecological transition, may increase stress within the family that may increase the risk of CAN. Previous studies have indicated that school mobility disrupts the link between preschool participation and children's competence behavior (Mehana, 1997; Reynolds, 1991). The promotion of a school-stable learning environment is a primary goal of the CPC program and has been found to mediate the effects of program participation on school performance and need for remedial education (Reynolds, 2000). These impacts may carry over to reductions in CAN.

The third hypothesis is the cognitive advantage hypothesis. It indicates that the effects of intervention are explained by improvements in children's developed abilities. This cognitive advantage at school entry initiates a positive cycle of performance that culminates in improved competence and reduced problem behavior. Support for the cognitive advantage hypothesis as a mechanism of intervention effects has been substantial (Campbell & Ramey, 1995; Consortium for Longitudinal Studies, 1983; Schweinhart et al., 1993) and has been confirmed in studies of the CPCs (Reynolds, 2000; Reynolds et al., 1996; Reynolds, 1995). As illustrated by the person-process-context model of ecological theory (Belsky, 1993; Cicchetti & Lynch, 1993), higher levels of children's developed abilities would be expected to reduce the risk of experiencing child maltreatment by reducing negative parent–child interactions and

by increasing parent expectations and satisfaction with children's education.

In this study, we investigated the relation between participation in the CPCs for different lengths of time and child maltreatment for low-income, predominantly African American children in the Chicago Longitudinal Study. It was the first study in the project to investigate child maltreatment. Our measures of CAN were referrals to child protective services and to the juvenile court from ages 4 to 17 that have been substantiated. We use the terms CAN and child maltreatment interchangeably throughout this article. Three questions are addressed: (a) Are measures of CPC program participation from ages 3 to 9 associated with lower rates of reported CAN? (b) Are estimated program effects similar among subgroups of children and families? (c) Do the family support, school support, and cognitive advantage hypotheses mediate the effects of program participation on later rates of CAN?

Method

Sample and Design

The Chicago Longitudinal Study (CLS; 1999) is a prospective investigation of the educational and social development of a cohort of 1,539 low-income minority children (93% African American, 7% Hispanic) born in 1980 who attended early childhood programs in 25 sites in 1985–1986. The original sample included the entire cohort of 989 children who completed preschool and kindergarten in all 20 CPCs with these programs. They further participated for up to 3 years in the school-age component of the CPCs. The comparison group of 550 children in this quasi-experimental design participated in alternative full-day kindergarten programs for low-income children emphasizing educational enrichment but they did not enroll in CPC preschool. They included all kindergartners from five randomly selected schools participating in another intervention project and from elementary schools serving the CPCs. In the comparison group, 14.8% participated in Head Start preschool. They were eligible to participate in the CPC school-age program. The comparison group matched the program group on age, participation in government-funded programs, and family poverty.

Table 1 displays the patterns of program participation for the study sample (see the Appendix for a flowchart of program participation through age 17). The sample included 1,408 children (91.5% of original sample) who resided in the Chicago area

at age 10 or older since 1990. This represented 92.3% of the original sample for the intervention group and 90% for the comparison group. There was no evidence that the relatively small number of children in the attrition sample differed from the study sample on child and family background characteristics (e.g., family, socioeconomic status, early school performance). Similarly, the family and child characteristics of attrition sample did not differ between groups.

We investigated the effects of three measures of CPC participation. For preschool participation, children entering the program at ages 3 or 4 ($n = 913$) were compared with all other children in the study who did not participate in CPC preschool but who attended the "treatments as usual" at the time, including full-day kindergarten and Head Start ($n = 495$). The children who attended kindergarten programs in the CPCs were included in the comparison group because they did not attend during preschool and thus participated in treatment as usual.[1]

The effects of school-age intervention were estimated by comparing children participating for at least 1 year from first to third grades (regardless of whether they participated in preschool; $n = 813$) with those not participating in the school-age program ($n = 595$). To control for each other's influence, the effects of preschool and school-age participation were estimated jointly. The effects of participation in extended intervention were estimated by comparing children who entered the CPCs in preschool and continued their participation through second or third grade (for 4 to 6 years; $n = 540$) with all other children with less participation in either preschool or first to third grades (nonextended intervention group, 1 to 4 years; $n = 530$).

Comparability of Intervention Groups

As shown in Table 2, the program and comparison groups in the follow-up study were similar on many child and family characteristics measured at the beginning of the project. These included rates of

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[1]They also were enrolled in separate classrooms and did not receive the breadth and intensity of services reserved for other children. Estimates of program effects were unchanged when these 176 children attending the CPCs without preschool participation were excluded. For example, relative to the comparison group, preschool participation was associated with significantly lower rates of maltreatment from ages 4 to 17 for court reports (4.5% vs. 11.9%, $p < 0.001$), Department of Child and Family Services (DCFS) reports (6.9% vs. 16.9%, $p < 0.001$), and court plus DCFS reports (9.3% vs. 19.0%, $p < 0.002$).

Table 1

Rates of Participation in the Child-Parent Centers (CPCs) for the Study Sample Intervention and Comparison Groups

Sample characteristic	CPC intervention group	Comparison group
Rate of sample recovery, %	92.3	90.0
Study sample size	913	495
Preschool participation, %	100	14.8 (Head Start)
No. of cases, 1 year	414	33
No. of cases, 2 years	499	40
Mean no. of years	1.55	.23
Kindergarten participation, %	100	100
Full-day program, %	59.9	100
School-age participation, %	71.8	31.7
No. of cases, 1 year	114	31
No. of cases, 2 or 3 years	542	126
Extended participation, %	59.2	0
No. of cases, 4 years	150	0
No. of cases, 5 years	307	0
No. of cases, 6 years	83	0
Total no. of years of CPC program participation	4.03	.73

Note. Participation occurred from ages 3 to 9. The school-age program is open to all children who attend a program school. Levels of participation for the original sample of 1,539 children followed a similar pattern (also see Appendix).

CAN before program participation, eligibility for the subsidized lunch program, teenage parenthood, single-parent family status, and the family risk index. The family risk index was a sum of six dichotomous factors that are negatively associated with child health and development (e.g., low parent education, low family income as measured by eligibility for the subsidized lunch program). Relative to the comparison group, the program group had greater proportions of girls and parents who completed high school at the age 17 follow-up and resided in families with fewer siblings. Alternatively, the program group resided in higher poverty neighborhoods at the beginning of the study and parents of the children had marginally lower rates of employment. Estimates of program effects included as covariates the family risk index, preprogram child maltreatment, race or ethnicity, gender, the program sites, and earlier or later program participation. Also shown in the last column of Table 2, differences between the program and comparison groups in the original study sample largely mirrored those of the follow-up sample.

Between-group differences in the incidence of later CAN provided good estimates of intervention effects for several reasons. First, we included an extensive set of covariates in the model to account for measured differences between groups. Estimates of program effects were unaffected by alternative model specifications, including those with additional covariates and with smaller sample sizes. Second, most children in the preschool and school-age comparison groups did not enroll in the program because they did not live in the attendance area of the CPCs. Thus, home residency rather than parent interest determined their participation. Third, by comparing groups that received different intervention services, findings in this report estimated the value added by the CPC program beyond participation in an alternative intervention that provided educational and family support services (Reynolds, 2000; Reynolds et al., 2001). This attribute may lead to conservative estimates of effects. Finally, previous studies in this project supported the equivalence of the program groups and showed no evidence of selection bias as assessed by simultaneous equation models (Reynolds & Temple, 1995, 1998) that would alter estimates of effects. A major contributor to these findings was that program staff made significant efforts to enroll children most in need of intervention through extensive outreach activities and door-to-door canvassing.

Table 2

Equivalence of Intervention and Comparison Groups on Selected Attributes for the Age-17 Maltreatment Sample and Original Sample

Child/family attribute	Preschool group ($n = 913$)	Comparison group ($n = 495$)	p value	Original sample p value
Female child, %	52.0	46.5	.05	.12
African American, %	93.1	93.1	.57	.95
High school-poverty (> 59%), %	77.5	73.9	.13	.04
School stability (> 5 years in Chicago schools), %	90.4	88.3	.22	.08
Risk index (0–6), mean (*SD*)	3.1 (1.5)	3.0 (1.6)	.60	.18
Child eligible for subsidized meals or Medicaid (MC), %	73.0	69.5	.16	.08
Parent(s) completed high school, %	58.7	52.3	.04	.03
Single-parent status, %	56.9	59.6	.40	.39
Parent(s) not employed full or part time, %	59.5	53.0	.04	.04
Missing parent education, subsidized meals, or MC %	15.9	20.4	.03	.01
Four or more children in household, %	33.3	41.5	.01	.01
Parent(s) <age 20 years at child's birth, %	25.2	22.8	.35	.44
Child abuse or neglect by age 0–3 years (indicated court report), %	1.4	1.2	.74	.70
Census-track of parent unemployment, age 4 years, mean (*SD*)	46.0 (6.0)	40.5 (5.0)	<.001	<.001
Census-track poverty, age 4 years, mean (*SD*)	24.3 (13.8)	22.9 (12.1)	<.001	<.001

Note. The p value is the probability level of the difference in means or proportions of program and comparison groups. The p value for the original sample is the difference between program and comparison groups at the beginning of the study. Variables included in the risk index were high school-poverty ($n = 1,408$), child eligible for subsidized meals ($n = 1,398$), parent did not complete high school ($n = 1,162$), single-parent status ($n = 1,077$), parent not employed full or part time ($n = 1,075$), and four or more children in family ($n = 1,358$). Sample sizes for all other variables were 1,408.

Intervention

The CPC program provides educational and family support services to children from ages 3 to 9 (preschool to third grade). Located in the poorest neighborhoods in Chicago, the centers served 100 to 150 three- to five-year-olds in separate facilities or in wings of neighborhood schools. Each center is directed by a head teacher and two coordinators: the parent-resource teacher and the school-community representative. The college-trained parent-resource teacher implements the family-support component. The school-community representative provides outreach services to families, including resource mobilization, home visitation, and enrollment of children. Ongoing staff development and health and nutrition services also are provided, including health screening, speech therapy, and nursing and meal services (see Reynolds, 2000; Sullivan, 1971). The eligibility criteria for the program are as follows: (a) residence in a high-poverty school area eligible for federal Title I funding, (b) demonstration of educational need due to poverty and associated factors as assessed by a screening interview, and (c) parents' agreement to participate. More than 80% of eligible children from the community participate in the program. Nonparticipation is likely to be due to family conflicts with work schedules, participation in alternative programs, and lack of available space.

The program model is displayed in Figure 1. The child-curriculum component emphasizes the acquisition of basic skills in language arts and math through relatively structured but diverse learning experiences (e.g., whole class, small groups). Recommended instructional activities are provided (Chicago Board of Education, 1988) and are supplemented with other literacy materials. The child-to-staff ratio is 17:2 in preschool and 25:2 in kindergarten, although parent volunteers reduce these numbers further. After full-day or part-day kindergarten, continuing services are provided in the affiliated schools under the direction of the curriculum parent-resource teacher. Comprehensive school-age services are provided, including reduced class sizes (25, 35–40 children), the addition of teacher aides in each class, activities in the parent resource room of the elementary school, and coordinated instructional activities. All teachers have a bachelors degree and certification in early childhood.

The parent component includes participating in parent room activities, reinforcing learning at home, volunteering in the classroom, attending school events and field trips, participating in vocational and educational training, and receiving home visits from the school-community representative. The central operating principle is that parent involvement is the critical socializing force in children's development. Direct parent involvement in the program is expected to enhance parent–child
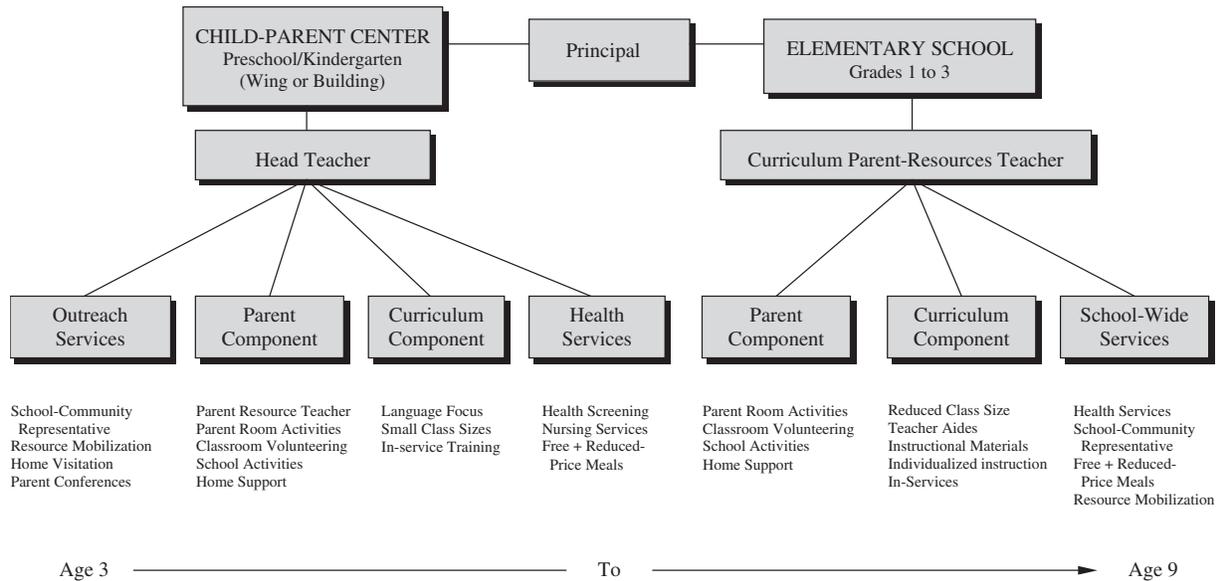
Child-Parent Center Program

Figure 1. Child-Parent Centers program model.

interactions, parent and child attachment to school, and social support among parents, and consequently promote children's school competence and social adjustment. The CPCs make substantial efforts to involve parents in the education of their children. At least one half day per week of parent involvement in the program is required. A unique feature of the parent program is the parent resource room, which is physically located in the center adjacent to the classrooms. The full-time parent-resource teacher organizes the parent room to implement parent educational activities, initiate interactions among parents, and foster parent–child interactions. With funds for materials, supplies, and speakers, areas of training include consumer education, nutrition, personal development, health and safety, and home-making arts. Parents may also attend GED classes at the centers. Moreover, parents serve on the School Advisory Council, assisting staff in educational planning.

The diversity of family support activities are designed to accommodate parents' daily schedules and different needs. They help parents (a) understand themselves, (b) understand the importance of teaching their children at home, (c) feel comfortable in the role as volunteer, and (d) learn more about child development. Among the commercial programs used were Exploring Parenting, Parent Effectiveness Training, and Parents as Partners in Reading (see Miedel & Reynolds, 1999; Reynolds, 2000).

Outcome Measures

Our measures were indicated (substantiated) reports of child maltreatment from two official sources: petitions to the county juvenile court and referrals to the Child Protection Division of the Illinois DCFS. Reports are indicated if credible evidence is obtained that the child was maltreated. We measured the cumulative incidence of reports of abuse or neglect from ages 4 to 17, which corresponds to the beginning of preschool to the end of adolescence (1984–1998). Substantiated reports from the child's birth to age 3 were coded separately as a pretest measure of child maltreatment. We further divided the petitions into three age intervals corresponding to (a) ages 4 to 9 (short-term outcomes), (b) ages 10 to 17 (long-term outcomes), and (c) ages 4 to 17 (overall). Rates from birth to age 17 were reported only for description.

Petitions to the juvenile court are indicated (substantiated) reports of CAN and thus reflect victimization. They may be from a variety of sources including police officers, teachers, or neighbors. Petitions become the subject of a judicial inquiry and a case investigation to determine the circumstances of the incident, assess the home environment, and seek treatment options. They may be documented independently of the state DCFS. Petitions are often the most serious cases of maltreatment in which immediate out-of-home placement may be needed and the state's attorney

determines whether the evidence is sufficient to warrant a conviction. Data were collected through manual searches of juvenile court records in the spring and summer of 1999 for 1980 to 1998 without knowledge of children's program participation. Searches were repeated twice for 5% random samples and verified against computer records. To be included in the analysis, youth had to reside in Chicago at age 10 or older. Among children with petitions of CAN, nearly all had one indicated report; 10 children had more than one. The ratio of neglect to abuse was 51% to 49%. In Illinois and across the nation, a slight majority of referred and substantiated cases are for child neglect. A broader measure of participation in child welfare services that combined court petitions with receipt of other child welfare services would have added 20 cases that did not have court reports.

Referrals to the state DCFS agency are indicated (substantiated) reports of CAN. The Child Protection Division of DCFS is the main investigatory agency for child maltreatment in cooperation with the juvenile court. Referrals are determined to be substantiated at the conclusion of case investigations by agency social workers. After an assessment of the home environment and total circumstances of the child, treatment options are planned, including in-home services or out-of-home placement. Data were obtained in the summer of 2001 from the integrated database of DCFS records maintained by the Chapin Hall Center for Children at the University of Chicago. Individual case matches of CLS children were verified by manual searches of computer records on-site in the summer and fall of 2001. Among children with substantiated reports, the frequency of CAN ranged from 1 to 8; 90 children had one report, 30 children had two reports, and 24 had three or more reports. The majority of children with court petitions had a substantiated DCFS report. Based on children's first substantiated report, the ratio of neglect to abuse was 58% to 42%. Among children in the study sample, 5.9% were for neglect and 4.3% were for abuse. One limitation of DCFS records is that reports of maltreatment before 1987 may be underrepresented in the administrative database, although our manual searches and use of court data likely corrected for this problem.

Although many incidents of CAN go unreported or are unsubstantiated because of lack of evidence, official reports provide a good indicator of child maltreatment and are a key gauge of utilization of child protective services ("Protecting," 1998; Reppucci et al., 1999).

To determine the robustness of findings, we also analyzed a measure that combined court petitions and DCFS referrals. For this measure, children with a substantiated report for either measure were coded as experiencing maltreatment.

Program Measures, Covariates, and Moderators

CPC program participation. Three dichotomous measures of participation were obtained and verified from school records. Preschool participation was defined as enrollment at ages 3 or 4 versus no CPC preschool participation. School-age participation was measured as enrollment for 1 to 3 years from first to third grades versus no school-age participation. Extended program participation was defined as enrollment for 4 to 6 years beginning in preschool and continuing to second or third grade. The comparison group included participation from 1 to 4 years and included children who enrolled at age 3 and continued through first grade.

Sex and race or ethnicity of child. Girls were coded 1 and boys were coded 0 as obtained from school records. African American children were coded 1 and Hispanic children were coded 0.

Family risk index. This multiple-risk index measured socioeconomic disadvantage and was included in the model as a covariate. The index provides a cumulative summary of the co-occurrence or 'pile-up' of risk factors that are frequently associated with child and family functioning (Bendersky & Lewis, 1994; Rutter, 1987). The risk indicators were selected based on their well-known associations with child and family well-being (Bendersky & Lewis, 1994). It was the sum of six dichotomously coded risk factors measured from family surveys or school records from preschool to age 8 as follows: (a) parent did not complete high school, (b) family was eligible for a fully subsidized lunch defined as a family income at or below 130% of the federal poverty line, (c) family resided in a school neighborhood in which 60% or more of children are in low-income families, (d) child resided in a single-parent family, (e) parent was not employed full or part time, and (f) four or more children were in the family. The number of cases ranged from 1,075 (parent not employed) to 1,408 (high school, poverty). Sample sizes for parent education and eligibility for subsidized lunch were, respectively, 1,162 and 1,398. Cases with missing data were assigned values based on their overall risk level. The distribution of missing data was unrelated

to program participation.[2] The risk index, several of its indicators, and school poverty also were used as moderators of program effects.

Program sites. Twenty dichotomous variables for the sites of CPC program participation were used to measure the local unobserved influences associated with attending a particular site.

Preprogram child maltreatment. Children with any substantiated report of child maltreatment from birth to age 3 were coded 1 and were coded 0 otherwise. These reports came from petitions to the juvenile court and DCFS records. Each preprogram measure was matched to its respective outcome measure. The combined-source measure was used for its respective outcome. No child had more than one preprogram report.

Mediators

Three mediators were tested to account for the hypothesized main effects of program participation on CAN. They were associated with the family support, school support, and cognitive advantage hypotheses.

Parental involvement in school. As an indicator of the family support hypothesis, this measure was operationalized as the number of years from first to sixth grades that teachers rated parent involvement in school average or better. In the spring of each year, classroom teachers responded to the item: [Rate for this child] ''parent's participation in school activities.'' Responses to the 5-point scale were coded dichotomously (1 = average/satisfactory or higher, 0 = otherwise). The sum of these six items was used in the analysis. Children with missing data for any of the items were assigned a score of 0 (lower than average). Teacher ratings of parent involvement have demonstrated adequate levels of construct validity as determined by factor analysis and measurement reliability (alphas >.90), and have been shown to mediate the effects of program participation on a variety of child and family outcomes (Reynolds, 2000; Reynolds et al., 1996).

They also were a key component of the theory of the program (Sullivan, 1971).

School mobility. This indicator was the number of times children changed schools from third to seventh grades (ages 9–13). It was measured through centralized school records. Although the causes of mobility vary, school transitions affect continuity in the school, instructional, and peer environments, all of which define the quality of the school experiences. Thus, it is an important ecological transition in children's lives. School mobility has been found to be negatively associated with child outcomes in many prior studies, especially if frequent (Mehana, 1997; Temple & Reynolds, 1999). We interpreted the avoidance of school mobility as an indicator of school support. Based on the theory of the CPC program, participation would be expected to reduce the likelihood of school transitions because of increased commitment to education and the importance of school and family stability, which in turn may lower stress and the risk of child maltreatment. The number of cases with mobility data was 1,352.

Word-analysis skills. As an indicator of the cognitive advantage hypothesis for the effects of preschool participation, scores on the Iowa Tests of Basic Skills (ITBS) word-analysis subtest were obtained at the end of kindergarten. The untimed and orally presented subtest had 33 pictorial items assessing letter–sound correspondence and word-attack skills (Hieronymus, Lindquist, & Hoover, 1980). The internal consistency reliability was .82 and the predictive validity of the scale was moderately strong, given its significant contribution to later school achievement, classroom adjustment, and need for school remedial services (Reynolds, 1991; Reynolds et al., 1996). For investigating the mediation of extended intervention, we used ITBS reading comprehension test scores at age 9 (third grade) as the indicator of cognitive advantage. This subtest included 47 items and has had high reliability and validity (Hieronymus & Hoover, 1990).

Data Analysis

Because the outcome measures were dichotomous, program effects were estimated by probit regression analysis in LIMDEP (Greene, 1995). Although probit and logit regressions are similar, an assumption of the former technique is that the distribution of the error term is normal. Because probit (and logit) coefficients are not directly interpretable, they were transformed in LIMDEP to marginal effects, which are similar to metric regres-

[2]Among the study sample, 70% were missing no data for the risk indicators, 9.2% were missing values for one or two risk indicators, and 20.7% were missing three or more indicators. Program participation was unassociated with the number of missing values on the risk index ($r = -.05$, $p = .174$). Following Cohen and Cohen (1983), the propensity for missing data on the risk index did not contribute to the prediction of CAN beyond other predictors. Thus, this finding indicates that these data were missing at random. Results were unaffected by the age of assessment of the risk indicators and by alternative calculations of the risk index.

sion coefficients in ordinary regression analysis. These marginal effects represented the percentage-point difference between intervention groups after adjusting for the covariates. They were derived from the partial derivative evaluated at the mean of the explanatory variable and were more readily interpretable (Greene, 1995). To further index effect sizes, we reported Cohen's d using the probit transformation for dichotomous data (Cohen & Cohen, 1983). Values of .20 and higher are typically considered practically significant.

Three sets of analyses were conducted corresponding to the study questions. Together they defined confirmatory program evaluation (Reynolds, 1998). The first set of analyses assessed the impact of different measures of CPC program participation beyond the influence of family risk status, CAN before program participation, earlier or later participation, race or ethnicity, gender, and program sites represented by 20 dummy variables. Program sites measured the influences associated with attendance in a particular center. In most of these analyses, the comparison group was children who participated in an all-day kindergarten program without preschool. For investigating the effects of extended program participation, the comparison group participated in the program for 1 to 4 years regardless of when this occurred. As reported previously (Reynolds & Temple, 1995, 1998), we have found no evidence of selection bias in the study that would significantly alter effect sizes of program participation. The equivalence of preprogram rates of CAN reinforced this finding.

The second set of analyses examined whether the estimated effects varied as a function of levels of program participation (e.g., 1 vs. 2 years of preschool, 1 vs. 2 or 3 years of school-age intervention) and subgroup characteristics including sex of child, parent education, family risk status, single-parent status, and neighborhood poverty. Program × Subgroup interaction terms were added to the model after the main effects.

Finally, a mediational analysis was conducted to investigate whether the family support hypothesis explained the relation between program participation and CAN. School support and cognitive advantage hypotheses also were investigated. Parent involvement, for example, would be a mediator of the effects of CPC participation if it was a significant predictor of CAN and if, after its inclusion, the effect of CPC participation was substantially reduced. The proportional decline in the program coefficient after the inclusion of the mediator defined the extent of mediation (Cohen & Cohen, 1983). We reported

exact probability levels for significance tests using an alpha level of .05.

Results

Overall Trends in Child Maltreatment

Table 3 shows the ages in which the study sample experienced child maltreatment. Overall, 114 study children (8.1%) had court petitions of CAN from birth to age 17; 61% of the maltreatment incidents occurred before age 10. The mean age of occurrence was 8.4 years. By age 17, the CPC preschool group had a rate of CAN that was 2.5 percentage points lower than the comparison group (7.2% vs. 9.7%). Using DCFS substantiated reports, the cumulative rate of CAN by age 17 was 10.2% (7.9% vs. 14.6% for respective intervention groups). The pattern of rates was similar for combined reports of CAN.[3]

Also shown in Table 3 are percentages of children who experienced maltreatment from ages 4 to 17, the age interval for investigating the effect of the CPC program. Based on court petitions, 6.9% of the children experienced maltreatment. Children in each of the CPC intervention groups had lower rates of maltreatment than children in the comparison group (8.7%). Children who participated in the CPC extended intervention from preschool to third grade had the lowest rate of maltreatment (5.0%), followed by preschool (5.9%) and school-age (6.5%) participants.

Rates based on DCFS reports (10.2%) and combined reports (12.5%) were higher than for court petitions but the differences between the groups followed the same pattern (see Table 3). For example, 7.8% of preschool participants had a DCFS report over ages 4 to 17, compared with 14.6 for the comparison group.

The cumulative rate of CAN for the study sample was similar to the 8.3% cumulative rate reported for children ages 0 to 19 in Chicago during 1990 to 1994

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[3]Using the original sample of 1,539 children, the rates of CAN from birth to age 17 were 7.4% for court petitions, 9.4% for DCFS reports, and 12.5% for combined reports. Over ages 4 to 17, respective rates of CAN were 6.3%, 9.4%, and 11.5%. Moreover, effect sizes of program participation based on the original sample of 1,539 were nearly identical to those based on the study sample. Over ages 4 to 17, adjusted group rates of CAN for court petitions were 4.5% versus 9.4% (preschool), 5.9% versus 6.9% (school age), and 3.6% versus 6.2% (extended intervention); for DCFS reports were 3.7% versus 7.7% (preschool), 10.0% versus 8.6% (school age), and 6.4% versus 10.9% (extended intervention); and combined reports were 9.1% versus 15.8% (preschool), 10.9% versus 12.3% (school age), and 8.3% versus 12.9% (extended intervention).

Table 3
Indicated Reports of Abuse or Neglect for Selected Groups by Age 17

Indicated abuse, or neglect	Total sample	CPC preschool		Gender		CPC extended intervention		
		Any	None	Boys	Girls	4–6 years	1–4 years	0 years
Court								
Any indicated report of abuse or neglect, %								
Age 0–3	1.3	1.4	1.2	1.4	1.3	1.5	1.3	1.2
Age 4–9	3.8	3.6	4.2	3.8	3.8	3.0	4.7	3.8
Age 10–17	3.3	2.5	4.6	2.8	3.7	2.0	3.8	4.4
Age 4–17	6.9	5.9	8.7	6.4	7.4	5.0	7.9	8.3
Age 0–17	8.1	7.2	9.7	7.5	8.7	6.5	9.1	9.2
DCFS								
Any indicated report of abuse or neglect, %								
Age 0–3	.8	.3	1.6	0.6	1.0	0	1.0	1.8
Age 4–9	5.5	4.4	7.5	4.6	6.4	2.4	7.7	6.8
Age 10–17	5.6	4.3	8.1	5.0	6.2	4.8	5.1	7.7
Age 4–17	10.2	7.8	14.6	9.1	11.2	6.3	12.1	13.3
Age 0–17	10.2	7.9	14.6	9.3	11.2	6.3	12.3	13.3
Court+DCFS								
Any indicated report of abuse or neglect, %								
Age 0–3	2.1	1.6	2.8	1.9	2.3	1.5	2.1	3.0
Age 4–9	6.8	5.8	8.5	6.1	7.4	4.3	8.5	8.0
Age 10–17	7.6	5.8	10.9	7.1	8.1	5.7	7.9	10.1
Age 4–17	12.5	10.3	16.6	11.5	13.5	8.7	14.5	15.4
Age 0–17	13.6	11.5	17.4	12.7	14.5	10.2	15.3	16.3

Note. CPC is Child-Parent Center. Rates are unadjusted. There were 114 children with one or more indicated report of abuse or neglect based on data from the Cook County Juvenile Court. There were 144 children with one or more indicated reports of abuse or neglect based on data from the Illinois Department of Children and Family Services (DCFS). Combining both data sources, there were 191 children with one or more indicated reports of abuse or neglect. Sample size for CPC preschool was any CPC preschool ($n = 913$) and no CPC preschool ($n = 495$). Sample size for gender was boys ($n = 703$) and girls ($n = 705$). Sample size for extended intervention was 4 to 6 years of participation ($n = 540$), 1 to 4 years ($n = 530$), and 0 years ($n = 338$).

(Goerge, Voorhis, Sanfilippo, & Hardin, 1997). The rate for children in Illinois was 5.0% (Goerge et al., 1997). National rates of CAN were reported yearly but not cumulatively over time. Given their low socioeconomic status, it would be expected that CLS children would experience a higher rate of maltreatment than children nationally. In 1997, 1.5% of children in the United States (15 in 1,000) were victims of CAN (Peddle & Wang, 2001). The rate for African American children was 2.5%.

Program Participation and Child Maltreatment

We estimated the effects of CPC participation on child maltreatment from ages 4 to 9, ages 10 to 17, and ages 4 to 17 for both court petitions and DCFS referrals. To conserve space, we focus on findings based on court petitions (see Table 4 for results using DCFS reports and combined reports). The covariates included to estimate adjusted rates of child maltreatment were sex of child, race or ethnicity, the

family risk index, program sites, participation in preschool or school-age intervention, and preprogram child maltreatment (ages 0 to 3). Findings are organized by measure of program participation.[4]

Preschool participation. Preschool enrollment at ages 3 or 4 was associated with significantly lower rates of CAN by age 17. Controlling for the influence of preprogram maltreatment, family risk, and other explanatory factors, preschool participants had a 5.5-percentage-point lower rate of child maltreatment than the comparison group (5.0% vs. 10.5%; see

[4]Findings based on the number of indicated reports of child abuse and neglect as the outcome measure were consistent with those reported for the dichotomous measure. For DCFS reports, preschool participation was associated with 0.33 ($p < 0.001$) fewer substantiated reports, and school-age participation was associated with 0.07 ($p = 0.31$) fewer substantiated reports. For the combined measure of DCFS plus court reports, the mean difference in maltreatment reports between groups was 0.32 ($p < 0.001$) for preschool participation and 0.06 ($p = 0.43$) for school-age participation.

Table 4 and Figure 2). This translates into a 52% reduction in the rate of child maltreatment associated with participation.[5]

As shown in Table 4, most of this difference occurred between ages 10 and 17, as the adjusted rate of CAN for the preschool group was more than half the rate for the comparison group (2.3% vs. 5.1%). The incidence of CAN from ages 4 to 9 favored the program group only slightly (3.3% vs. 4.8%; $p = .20$; d statistic = .18). The differential estimated effects by age group indicated a longer interval is needed to detect a link between program participation and child maltreatment.

The estimated effects of preschool participation were nearly the same using DCFS reports. After accounting for the covariates, participation was associated with a 7.3-percentage-point reduction in CAN (6.9% vs. 14.2%; $p = .001$; d statistic = .40). The only notable difference was that the group difference over ages 4 to 9 was significant (4.5% vs. 7.3%, respectively, for the intervention groups). Based on combined DCFS reports and court petitions, the adjusted cumulative rate of maltreatment was 9.9% for the preschool group and 17.4% for the comparison group (see Table 4). We also found that program participation was significantly associated with separate measures of neglect and abuse. Over ages of 4 to 17, preschool participants had significantly lower adjusted rates of neglect (3.4% vs. 8.5%; $p = .002$) and abuse (2.3% vs. 5.7%; $p = .01$).

School-age participation. Controlling for preschool participation, family risk, and other explanatory variables, participation in the CPC school-age program was not associated with lower rates of child maltreatment for any of the age intervals. As shown in Figure 2, the cumulative rate of maltreatment from ages 4 to 17 was slightly lower for the program group than for the comparison group (6.1% vs. 7.9%; $p = .169$; d statistic = .13). Group differences based on DCFS reports and combined reports yielded similar results as did differences based on utilization of child welfare services. Participation in the school-age program was not associated with separate measures of child neglect (4.4% vs. 5.3%; $p = .54$) or abuse (3.7% vs. 2.6%; $p = .29$).

[5]The estimates for preschool participation were unchanged when a broader measure of use of child welfare services was used (child maltreatment plus participation in foster care and other services). Over ages 4 to 17, a significantly lower percentage of the preschool group received these services than the comparison group (6.5% vs. 12.7%; $p < 0.001$). Again, most of the program effect was attributable to reductions in service utilization during ages 10 to 17 (3.6% vs. 8.1%; $p < 0.001$). The effect size in standard deviations was 0.39 (d statistic by probit transformation).

Extended participation. Relative to less extensive participation, 4 to 6 years of CPC participation (preschool to second or third grade) was associated with significantly lower cumulative rates of CAN from ages 4 to 17 ($p = .028$). As shown in Table 4 and Figure 2, the adjusted rate of maltreatment was 3.6% for the extended intervention group and 6.9% for the comparison group, a 48% difference in the rate of maltreatment (d statistic = .32). Group differences also were detected for ages 10 to 17 but not for ages 4 to 9. Using DCFS reports, extended participation also was associated with a significantly lower rate of CAN by age 17 (5.8% vs. 11.3%; $p = .003$; d statistic = .38). The pattern of findings was consistent using a broader measure of child welfare services.

In addition, participation in extended intervention for 4 to 6 years was associated with significantly lower rates of child neglect than participation for 1 to 4 years (2.5% vs. 6.7%; $p = .01$). Participation was not associated with significantly lower rates of child abuse relative to less extensive participation (2.5% vs. 4.0%; $p = .208$).

Relative to children with no CPC program participation, the extended program group had lower adjusted rates of CAN from ages 4 to 17 using court petitions (3.6% vs. 12.1%; $p < .001$; d statistic = .63) and DCFS reports (5.8% vs. 12.2%; $p = .022$; d statistic = .50). As with preschool, most of the estimated effect, based on court petitions, was attributed to the ages of 10 to 17 years. Most of the effects on DCFS reports were due to reduction in neglect rather than abuse. These findings indicate that children with 4 to 6 years of intervention had the lowest rates of child maltreatment.

Subgroup Effects

We also investigated differential program effects by length of CPC participation and other sample characteristics. We found limited evidence that length of participation was associated with CAN. Relative to 1 year of preschool and adjusting for the covariates, children with 2 years of preschool had a marginally lower rate of court petitions over ages 4 to 17 (3.5% vs. 6.4%; $p = .08$), although the group difference was significant using DCFS reports (5.3% vs. 10.1%; $p = .02$) as well as a broader measure of utilization of child welfare services (5.9% vs. 10.2%; $p = .02$). Length of participation in extended intervention (5 or 6 years = 5.1% vs. 4 years = 5.0%; $p = .99$) and length of participation in school-age intervention (2 or 3 years = 5.6% vs. 1 year = 7.7%; $p = .32$) were not associated lower rates of CAN.

Table 4

Adjusted Means and Differences for Child-Parent Center (CPC) Preschool, CPC School-Age, and CPC Extended Groups

Outcome measure	Preschool group				School-age group				Extended versus some intervention				Extended versus no intervention			
	Preschool group	Comparison group	Difference	p value	School-age group	Comparison group	Difference	p value	4-to-6-year group	0-year group	Difference	p value	4-to-6-year group	1-to-4-year group	Difference	p value
Any indicated report of abuse or neglect, %								Court								
Age 0–3	1.3	1.5	−.2	.765	1.7	1.1	.6	.387	1.5	1.4	.1	.823	1.5	1.2	.3	.708
Age 4–9	3.3	4.8	−1.5	.200	3.9	3.7	0.2	.865	2.8	4.3	−1.5	.195	2.8	4.8	−2.0	.195
Age 10–17	2.3	5.1	−2.8	.008	2.8	4.0	−1.2	.214	1.5	3.6	−2.1	.041	1.5	5.6	−4.1	.003
Age 4–17	5.0	10.5	−5.5	.001	6.1	7.9	−1.8	.169	3.6	6.9	−3.3	.028	3.6	12.1	−8.5	.000
Any indicated report of abuse or neglect, %								DCFS								
Age 0–3	.6	1.3	−.7	.054	.6	1.1	−.5	.230	0	0.9	−.9	.078	0	1.8	−1.8	.003
Age 4–9	4.5	7.3	−2.8	.046	5.1	6.0	−0.9	.474	2.9	7.3	−4.4	.001	2.9	6.8	−3.9	.023
Age 10–17	4.0	8.5	−4.5	.002	6.4	4.4	2.0	.141	5.1	5.5	−0.4	.761	5.1	6.5	−1.4	.426
Age 4–17	6.9	14.2	−7.3	.001	9.7	8.9	0.8	.676	5.8	11.3	−5.5	.003	5.8	12.2	−6.4	.022
Any indicated report of abuse or neglect, %								Court+DCFS								
Age 0–3	1.7	2.8	−1.1	.196	2.1	2.2	−.1	.905	1.5	2.1	−.6	0.456	1.5	2.9	−1.4	.125
Age 4–9	5.8	8.7	−2.9	.070	6.4	7.4	−1.0	.493	4.5	8.0	−3.5	0.018	4.5	8.7	−4.2	.031
Age 10–17	4.0	8.5	−4.5	.002	6.4	4.4	2.0	.142	5.6	8.3	−2.7	0.100	5.6	9.7	−4.1	.065
Age 4–17	9.9	17.4	−7.5	.001	12.0	13.3	−1.3	.530	8.4	14.4	−6.0	0.004	8.4	15.9	−7.5	.016

Note. DCFS is Illinois Department of Children and Family Services. All coefficients are from probit regression analysis transformed to marginal effects. Age 4 and above models were adjusted for sex of child, family risk, program sites, race or ethnicity, earlier or later program participation, and indicated abuse or neglect reports before CPC preschool participation (age 0–3). Age 0–3 models were adjusted for sex of child and race or ethnicity. Any neglect or abuse represented the percentage of the overall sample with one or more reports in a particular age category. Children may have had reports in more than one age category. The p value is the probability level of the adjusted mean (percentage) difference. Preschool group was CPC preschool ($n = 913$) and no CPC preschool comparison ($n = 495$). School-age group was CPC school-age ($n = 813$) and no CPC school-age comparison ($n = 595$). Extended group was 4–6 years of CPC participation ($n = 540$), 1 to 4 years of CPC participation ($n = 530$), and 0 years of CPC participation ($n = 338$).
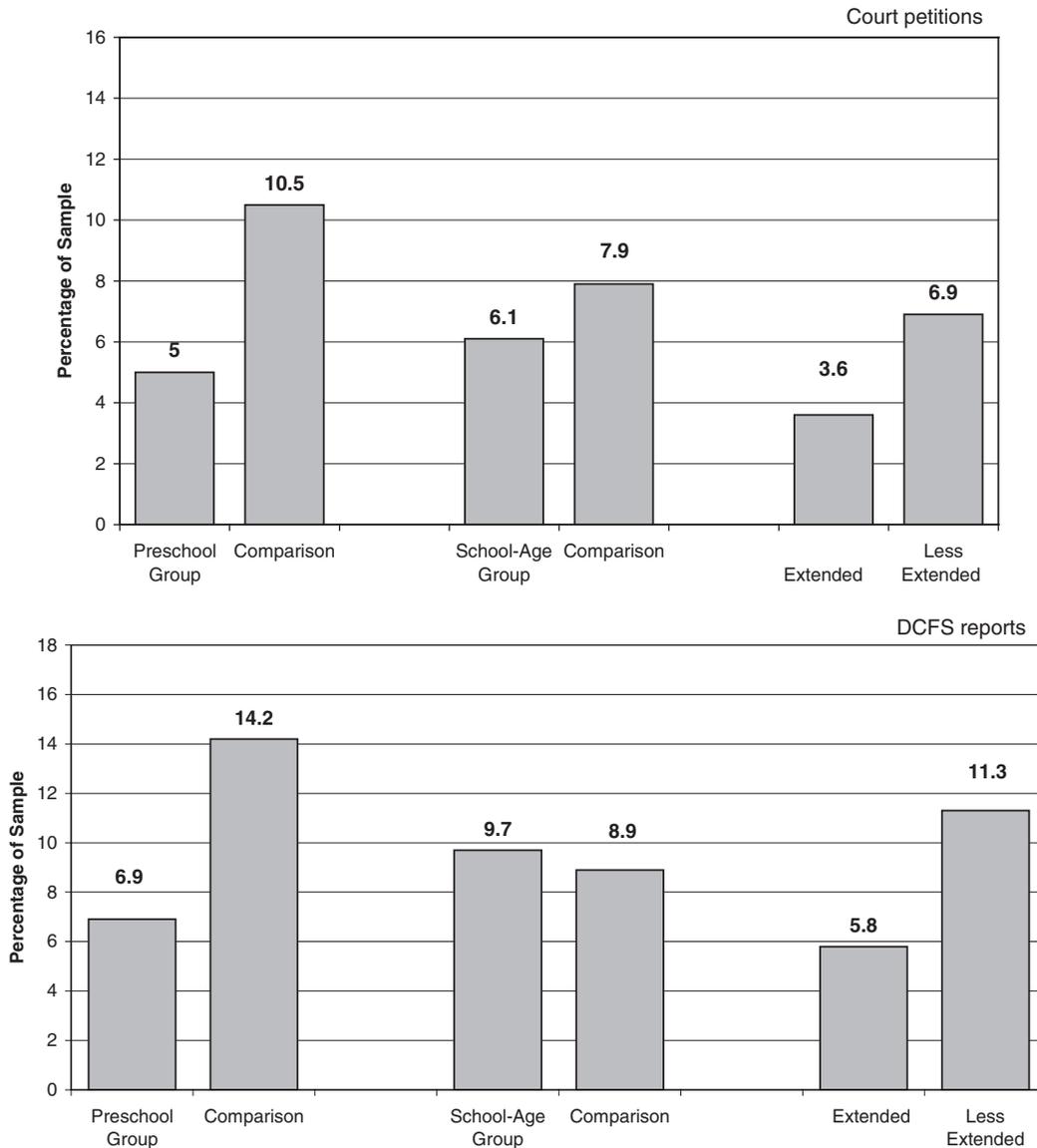
Figure 2. Adjusted cumulative rates of abuse and neglect from ages 4 to 17 for court petitions and Department of Child and Family Services indicated reports.

Combined reports of CAN yielded a similar pattern of findings for the program measures.

We found some evidence that the effects of measures of program participation on court petitions of CAN varied by family risk status, parent education, and neighborhood poverty but effects did not vary by sex of child, teenage parenthood, and single-parent status. Controlling for the covariates and main effects, preschool participants who experienced four or more family risks had a significantly lower rate of CAN than participants who experienced fewer family risks (3.2% vs. 9.3%; $p = .03$). Alternatively, preschool participants of parents who graduated from high school experienced a significantly lower rate of CAN than participants of parents who did not graduate from high school (4.6% vs. 9.8%; $p = .04$).

Children who attended preschool programs in the highest poverty neighborhoods, in which 60% or more of children resided in low-income families, experienced significantly lower rates of CAN by age 17 than children from lower poverty neighborhoods (2.9% vs. 11%; $p = .01$). Perhaps the higher levels of risk in these settings can be significantly offset by positive intervention experiences. This compensatory effect of preschool has also been found for school dropout and school remedial education (Reynolds, 2000; Reynolds et al., 2001).

Although the direction of influence for the subgroup effects based on DCFS reports and

combined reports was the same as for court petitions, only the interaction effect for family risk status was reasonably robust across outcomes. Thus, findings should be regarded as more tentative than for the main effects of program participation.

Irrespective of program by subgroup effects, the main predictors of court petitions of child maltreatment were parent educational attainment, family risk status, and neighborhood poverty in early childhood. Children whose parents completed high school experienced lower rates of maltreatment by age 17 than those whose parents did not complete high school (4.4% vs. 9.1%; $p = .001$). Children with fewer than four family risk factors experienced lower rates of maltreatment than those with a higher number of risks (5.0% vs. 8.1; $p = .028$). Children growing up in the highest poverty neighborhoods experienced lower rates of maltreatment than children growing up in lower poverty neighborhoods (5.4% vs. 11.7; $p = .017$). The latter result may reflect the greater concentration of CPCs in high-poverty neighborhoods. Rates of CAN for girls and boys were similar (girls = 9.2%, boys = 7.7%; $p = .219$).

Mediators of Program Effects

After demonstrating that program participation is associated with significantly lower rates of child maltreatment, we need to identify the factors that mediate or explain this association. This strategy is a major component of confirmatory program evaluation (Reynolds, 1998), a systematic approach for probing the association between program participation and outcomes, thereby strengthening causal inference. The theory of the CPC program and previous research has hypothesized that parent involvement in children's education and schooling mediates the effect of program participation on later outcomes. Following Cohen and Cohen (1983), hierarchical regression analysis was used to determine the extent of mediation. Mediation is present when the inclusion of the hypothesized intervening variable reduces the significance ($p < .05$) of the program coefficient in the main-effects model to the level of nonsignificance. At a minimum, the addition of the mediator would be expected to reduce the magnitude of the program coefficient by a substantial amount, although reductions approaching 100% in the magnitude of effects rarely occurs in practice. Because tests of mediation are valid only in the presence of a main effect of program participation, we limited our analysis to preschool participation and extended participation for CAN from ages 4

to 17. We focus on findings for court petitions. The mean rating of average or better parent participation in school was 2 years. Parent participation was significantly associated with court-reported CAN, $r = -.13$) and with preschool and extended program participation (rs = .15 and .29). Hierarchical regression analysis provided evidence that teacher ratings of parent involvement partially mediated the effect of preschool participation on CAN and substantially mediated the effect of extended program participation.

As shown in Table 5, the inclusion of parent involvement in school was associated with a 20% reduction in the main effect of preschool on CAN (change from -5.5 to -4.4 percentage points = $-1.1/5.5$). This is evidence of partial mediation because the preschool coefficient remained significant even with parent involvement in the model ($p = .004$). As a measure of the family support hypothesis, parent involvement in school was associated with a 52% reduction in the main effect of extended program participation on CAN (from a program coefficient of -3.3 to -1.6 percentage points = $-1.7/3.3$). Moreover, the statistical significance of the extended intervention coefficient was reduced to nonsignificance ($p = .29$) after parent involvement was included in the model. This corroborates the family support hypothesis of intervention effectiveness. Using standardized path coefficients and adjusting for the influence of covariates, preschool participation was a significant predictor of parent participation in school ($b = .13$) and school mobility ($b = -.16$). Parent participation in school and school mobility were then significant predictors of CAN (bs = $-.11$ and .10, respectively). Paths from extended program participation to parent participation in school and school mobility also were significant (bs = .28 and -18, respectively). These two hypothesized mediators were independent predictors of CAN (bs = -10 and .10, respectively).

As shown in Table 5, we also tested the school support hypothesis as a mediator of the effects of CPC participation. This hypothesis postulated that program participation would lead to lower rates of problem behavior, including reduced child maltreatment, by enhancing the quality of children's post-program school experiences (Currie & Thomas, 2000; Reynolds, 2000). Our measure of school support was the number of times children changed schools between third and seventh grades. Children experienced an average of one school move. School mobility was significantly associated with later child maltreatment ($r = .15$) and with participation in

Table 5

Contributions of Family Support and School Support Mediators to Estimated Program Effects on Child Abuse and Neglect by Age 17 (N = 1,408)

Cumulative model	Preschool group		Extended group	
	Coeff. in percentage points	Pct. decrease associated with mediator	Coeff. in percentage points	Pct. decrease associated with mediator
		Court		
Program effect, no mediation	− 5.5***	—	− 3.3*	—
Family support	− 4.4**	20.0	− 1.6	51.5
School support	− 4.5**	18.2	− 2.5	24.2
Family plus school support	− 3.7**	32.7	− 1.1	66.7
		DCFS		
Program effect, no mediation	− 7.3***	—	− 5.5**	—
Family support	− 6.0**	17.8	− 3.4	38.2
School support	− 6.3**	13.7	− 4.4*	20.0
Family plus school support	− 5.4**	26.0	− 2.8	49.1
		Court+DCFS		
Program effect, no mediation	− 7.5***	—	− 6.0**	—
Family support	− 5.8**	22.7	− 3.1	48.3
School support	− 6.2**	17.3	− 4.6*	23.3
Family plus school support	− 5.0*	33.3	− 2.3	61.7

Note. DCFS is Illinois Department of Children and Family Services. Coefficients are marginal effects interpretable as the adjusted rate of child abuse and neglect for the program group minus the adjusted rate for the comparison group. Values for extended participation was 4 to 6 years of participation relative to 1 to 4 years of participation. Family support was measured by teacher ratings of parental involvement. School support was measured by children's school mobility.
*$p < .05$.
**$p < .01$.
***$p < .001$.

preschool and extended intervention ($rs = − .17$ and $− .22$).

In the regression analysis, school mobility alone was associated with a reduction of 18% in the main effect of preschool participation and 24% in the main effect of extended program participation. Together, the family support and school support hypotheses explained 33% of the preschool main effect and 67% of the extended program effect on child maltreatment (see Table 5). As further shown in Table 5, the pattern of mediation was similar using both DCFS reports and combined reports of CAN.

In an additional model, an indicator of the cognitive advantage hypothesis—ITBS word-analysis scores at the end of kindergarten—did not contribute to the explanation of the main effects for either program measure with or without the other mediators. Word analysis scores did, however, contribute to the link between preschool participation and CAN in a complex process whereby preschool participation affected word-analysis skills (standardized $b = .45$); word-analysis skills then predicted parental involvement ($b = .21$), which in turn reduced the likelihood of CAN ($b = − .11$).

A similar process was found for participation in extended intervention. Findings were based on hierarchical regression analysis in which the covariates were sex and race or ethnicity of child, the risk index, prior reports of CAN and program sites. The standardized regression coefficient for parental involvement was based on a model that included extended participation, the covariates, and school mobility. The respective standardized path coefficients from extended program participation to cognitive development (Grade 3 reading test scores), parent involvement, and child maltreatment were .38, .24, and − 13. Thus children's early school competence contributed only indirectly to lower rates of child maltreatment.

Discussion

This study investigated the effects of participation in the federally financed Chicago Child Parent Centers on the incidence of later child abuse and neglect. Few preventive interventions have demonstrated they can reduce child maltreatment, especially many years after program participation. As a school-based educational intervention beginning in preschool, the CPC program provides comprehensive child development and family support services to low-income children to enhance educational and social adjust-

ment. Using data from the Chicago Longitudinal Study, we found that participation in the CPC preschool program and in the extended program from preschool to second or third grade was associated with significantly lower rates of CAN through adolescence for both court and DCFS reports. The magnitude of estimated effects also were practically significant. We found limited evidence of differential effects by subgroups. Two years of preschool, higher family risk status, and program participation in the highest poverty neighborhoods were associated with greater reductions in child maltreatment relative to 1 year of preschool, lower family risk status, and enrollment in relatively lower poverty schools. The family support hypothesis, as measured through parental involvement in children's schooling, mediated, at least in part, the effects of CPC preschool and extended participation. Program-related reductions in school mobility also contributed to the explanation of program effects. Children's early school achievement contributed indirectly through parent involvement.

Unique Contributions

Findings of this study advance understanding on the prevention of child maltreatment in three significant ways. First, our results demonstrate that comprehensive, school-based early childhood programs can be effective in preventing child maltreatment. Because most of the evidence for reducing CAN is limited to home-visitation programs (Olds et al., 1986, 1997), our findings show that early childhood education with intensive parent involvement emphasizing school participation can help reduce child maltreatment. The strongest evidence for the benefits of early childhood programs is that they promote school readiness and academic achievement, and reduce rates of grade retention and special education (Barnett, 1995; Gurlanick, 1997; Karoly et al., 1998). Our findings indicate that positive effects can carry over to family behavior. Although preventing child maltreatment is not an explicit program goal, the CPC's focus on family socialization, parenting practices, and personal and educational development is similar to the Parent Child Development Centers (Andrews et al., 1982), Family Resource Centers, and Head Start (Larner et al., 1998; Parker et al., 1987). Thus, our findings indicate that ecological, multicomponent programs can be a viable approach for reducing child maltreatment.

Our findings also extend on previous reports in the Chicago Longitudinal Study that linked program participation beginning in preschool to greater school achievement and performance (Reynolds, 1994; Reynolds & Temple, 1998; Temple, Reynolds, & Miedel, 2000), reduced need for school remedial services (Reynolds et al., 2001; Reynolds & Temple, 1998), and reduced rates of delinquency (Reynolds, 2000; Reynolds et al., 2001). Previous studies on family socialization effects have been limited to parent involvement in school, parent expectations for children's educational attainment, and parents' satisfaction with children's education (Miedel & Reynolds, 1999; Reynolds, 2000).

A second major contribution of this study is that results demonstrate that established, large-scale programs can significantly contribute to protecting children from harm. After Head Start, the CPC program is the oldest federally funded preschool program and since 1967 has been run through public schools in Chicago's highest poverty neighborhoods. Most studies that have examined CAN have been of model programs implemented at one site rather than large-scale established programs (Gomby et al., 1999; MacLeod & Nelson, 2000; Reppucci et al., 1999). Our findings indicate that large-scale early-education programs can be effective in counteracting demographic and family risk factors that lead to child maltreatment and victimization. As a consequence, findings are more generalizable to established early childhood programs and contemporary programs that provide comprehensive services.

The third contribution of this study that advances understanding of the prevention of child maltreatment is the identification of moderators and mediators of the effects of intervention. These foci have been hallmarks of theory-driven prevention and intervention research (Chen, 1990; Lipsey, 1993). Regarding moderation, we found that length of intervention provided protection against CAN. Program participation that extended into the early school grades yielded benefits beyond less extensive participation. A second year of preschool also was independently associated with a lower rate of CAN beyond 1 year. Length of intervention has been underinvestigated in early childhood research (Barnett, 1995; Karoly et al., 1998), especially for child maltreatment prevention (Guterman, 1999). In support of the compensatory effects of intervention, family risk status and neighborhood poverty moderated the effects of preschool enrollment on child maltreatment. Given the economic and environmental risks associated with growing up in

high-poverty neighborhoods, comprehensive child development programs appeared to buffer some of these risks.

Moreover, our findings corroborated the family support hypothesis as a mechanism by which preschool and extended-program participation are associated with lower rates of later maltreatment. A central theory of the CPC program is that parents' participation in children's education and schooling, through a variety of activities with or on behalf of their child, will reduce stress, enhance parents' own personal and educational development, and thus promote social competence and prevent dysfunctional behavior (Reynolds et al., 1996). Our findings also corroborated the school support hypothesis as one explanation of the link between program participation and child maltreatment. Given the program goal of increasing stability in children's learning environments as well as reducing stress and family disruptions, program children had fewer school moves, which led to lower rates of child maltreatment. Support for the family and school support hypotheses are consistent with previous studies (Currie & Thomas, 2000; Reynolds et al., 1996) and, given their central role in the program theory, strengthen confidence that the observed reductions in child maltreatment are the result of CPC participation. The cognitive advantage hypothesis also contributed to the reductions in maltreatment through the significant positive association between early school achievement and parent involvement. Nevertheless, the contribution of the cognitive advantage hypothesis has been found to be greater for children's educational and social development (Consortium for Longitudinal Studies, 1983; Reynolds, 2000; Schweinhart et al., 1993).

Preventing Problem Behaviors Over Time

One distinctive finding of the study was that the program measures were not generally associated with reductions in CAN by age 9. Most of the preventive effects of the preschool participation and extended intervention participation came during children's second decade. This pattern of findings suggests that the effects of prevention programs may take many years to detect and that caution is needed when investigating outcomes over a limited number of years. The identification of the optimal interval for evaluating the effects of intervention should be based on the length and intensity of the program, the incidence of child maltreatment over time, and the process in which behavior change occurs. For example, the life course of child maltreatment is

through the end of adolescence, as nearly 40% of the total number of incidents of CAN in our sample occurred after age 9. Thus, assessing the impact of intervention within a single stage of development may underestimate the effect of intervention. Moreover, changes in parent attitudes and behaviors that lead to reduced child maltreatment may require a substantial amount of time before actual changes in child maltreatment are manifested. In the Prenatal/ Early Infancy Project, Olds et al. (1997) found that although no differences were detected between the home-visitation group and control group in CAN at age 4 (Olds et al., 1999), they became substantial over time as the home-visitation group had 46% fewer reports of CAN by age 15. This pattern of increasing effects of intervention over time also has been reported in previous reports in the Chicago Longitudinal Study. The insignificant difference of 3 percentage points in special education placement between preschool and comparison-group children at age 7 (Reynolds, 1995) grew to 4.4 points by age 9 and to 10.2 points by age 18 (Reynolds et al., 2001). The pattern of results for grade retention followed a similar pattern. These findings underscore the fact that the effects of early intervention for some child and family outcomes increase rather than fade over time.

Why don't more early childhood and family support programs prevent CAN? Among the reasons, as indicated in recent reviews (Gomby et al., 1999; MacLeod & Nelson, 2000), are the short length of interventions (e.g., less than 10 home visits), low intensity of services, low quality of implementation as a consequence of insufficiently trained staff, and the limited breadth of services. Through the provision of comprehensive and intensive services to children and families over an average length of time of 18 to 50 months, the CPCs avoid many of these problems. In addition to home visits by the school-community representative, for example, the parent resource teacher in each center sponsors and directs parent workshops on child development and child rearing, and coordinates a host of other activities including vocational and educational training, classroom volunteering, class field trips, arts and craft projects, and parent social support groups. Parents also assist in governance of the centers. The wide variety of activities has been responsible for the high rates of parent participation in the program relative to many other early childhood programs (Reynolds, 2000). The fact that all classroom teachers have bachelor's degrees and certificates in early childhood certainly has contributed to these high rates of participation.

Methodological problems also have contributed to the dearth of effective child abuse prevention programs. Besides the common problems of low statistical power and high rates of attrition, intervention studies have rarely assessed outcomes beyond a few years. As noted earlier, because of low base rates of maltreatment and the age periods over which they can occur, short-term studies over 1 or 2 years may underestimate effectiveness. In the Hawaii Healthy Start Program (Duggan et al., 1999), for example, rates of verified CAN at the 1-year follow-up were 1% for the program group and 2% for the comparison group. As our study attests, longer follow-up periods and larger sample sizes are needed to provide stronger tests of intervention effects.

Limitations

The findings of this study should be interpreted in the context of four limitations. First, our measures of CAN—substantiated reports from juvenile courts and child protective services—are only two of many indicators of CAN. As frequently documented (Cicchetti & Carlson, 1989; Miller-Perrin & Perrin, 1999), these measures are subject to reporting biases that reduce reliability. Many incidents of maltreatment go unreported and among those that are reported the determination of substantiated report is affected by the amount of tangible evidence and the human and financial resources available to investigate maltreatment allegations. None of these factors would be expected to be a source of bias operating in the present study because program and comparison groups were served by the same service agencies. Any bias in reporting would most likely work against demonstrating program effects because children in centered-based preschool education are more likely, as a result of early screening, to be identified by school personnel as victims of child maltreatment than their mostly home-based comparison cohort. Collecting alternative measures of home environment and parenting practices that lead to child maltreatment would provide a more comprehensive assessment of the prevalence of CAN. It also should be noted that because our data on child maltreatment date to 1980, some of the administrative records may be incomplete, especially in the early 1980s when records were not routinely available for research. This potential measurement problem could have contributed to the lack of effects from ages 4 to 9 for some indicators.

The second limitation is that our measure of the family support hypothesis, though strongly linked to the program theory, was relatively global. Not addressed in the study was what aspects of parent involvement in education and schooling led to the reductions in CAN. Is it increased knowledge of child development and improved parenting attitudes and skills that link parental involvement to lower rates of CAN? Or does this link come about through increasing social support and affiliation with schools that this involvement inspires? These and other micromediating mechanisms warrant further research. Previous studies in the Chicago project (Miedel & Reynolds, 1999; Reynolds, 2000; Reynolds & Gill, 1994) and in Head Start (Parker et al., 1987) suggest that the social support and attitudinal benefits may play the major roles, as the impact of program participation has been greater on parental school involvement, psychological functioning, and educational expectations than on parenting skills. Micromediating mechanisms for school mobility also deserve further investigation to determine the extent to which the effects of mobility are due to economic hardship and environmental instability. We viewed school instability as a discontinuity in learning environments that cause stress within the family. As noted in previous studies (Eckenrode et al., 1995; Temple et al., 1999), the direction of causality between mobility and maltreatment also deserves further investigation. Other measures of school support deserve to be investigated, such as the quality of schools and mechanisms related to social adjustment. The contributions of child characteristics other than early achievement also are warranted and may reveal a more complex process linking program participation and maltreatment than was identified in our study.

The third limitation is that the evidence reported in this quasi-experimental study was correlational. Although the groups were reasonably well matched on a variety of characteristics, including preprogram child maltreatment, it remains possible that unmeasured factors could have contributed to the results. Consequently, our findings should be interpreted cautiously. On the positive side, confidence that our findings are due to CPC program participation is strengthened by two study features. First, our findings may be conservative because the comparison group enrolled in an alternative intervention in kindergarten and some members participated in Head Start. This is unlike the common situation in which the comparison group receives no intervention. Group differences may have been even larger if a typical comparison group was included. A second supporting factor is that we found some support for

at least two mediators of intervention effects. Identification of mediators of intervention effects is a key feature of confirmatory program evaluation (Reynolds, 1998). Causal inference is strengthened if the mechanisms that contribute to intervention effects are consistent with the theory of the program (Chen, 1990; Lipsey, 1993). Our findings followed this pattern and further increased our confidence in results, although the level of mediation of the effects of preschool participation was not strong.

Finally, although our findings are more generalizable to large-scale, government-funded early childhood interventions than many previous studies, several sample characteristics limit broader generalizability. First, nearly the entire sample is African American children who attended schools in high-poverty neighborhoods in one large urban school district. Because of these characteristics, children in the study were at high risk of CAN. Our findings may not extend to children with other sample characteristics. Nevertheless, we found no evidence of differential program effects for many child and family characteristics. Second, the CPC intervention has a long history of successful implementation in public schools. Thus, programs of more recent origin and programs implemented by staff without college degrees and similar levels of experience may result in a different pattern of findings.

Implications

Our findings contribute substantially to knowledge about the benefits of early childhood programs for low-income children. They indicate that large-scale contemporary programs implemented by school districts can meaningfully contribute to the reduction of CAN. Combined with the positive effects of the program on other domains of children's well-being (Reynolds, 2000; Reynolds et al., 2001), comprehensive early childhood programs such as the CPC warrant expansion. Several elements of the program, based on the intervention theory and findings, appear to be key in promoting effectiveness. First, a system of intervention is in place beginning at age 3 and continuing to the early school grades. Such a system fosters stability in children's learning environments. As public school teachers, all classroom teachers have bachelors degrees with certification in early childhood. Consistent with ecological perspectives of human development, comprehensive services are provided that provide many avenues for affecting child and family outcomes from school achievement and family socialization to delinquency and child maltreatment.
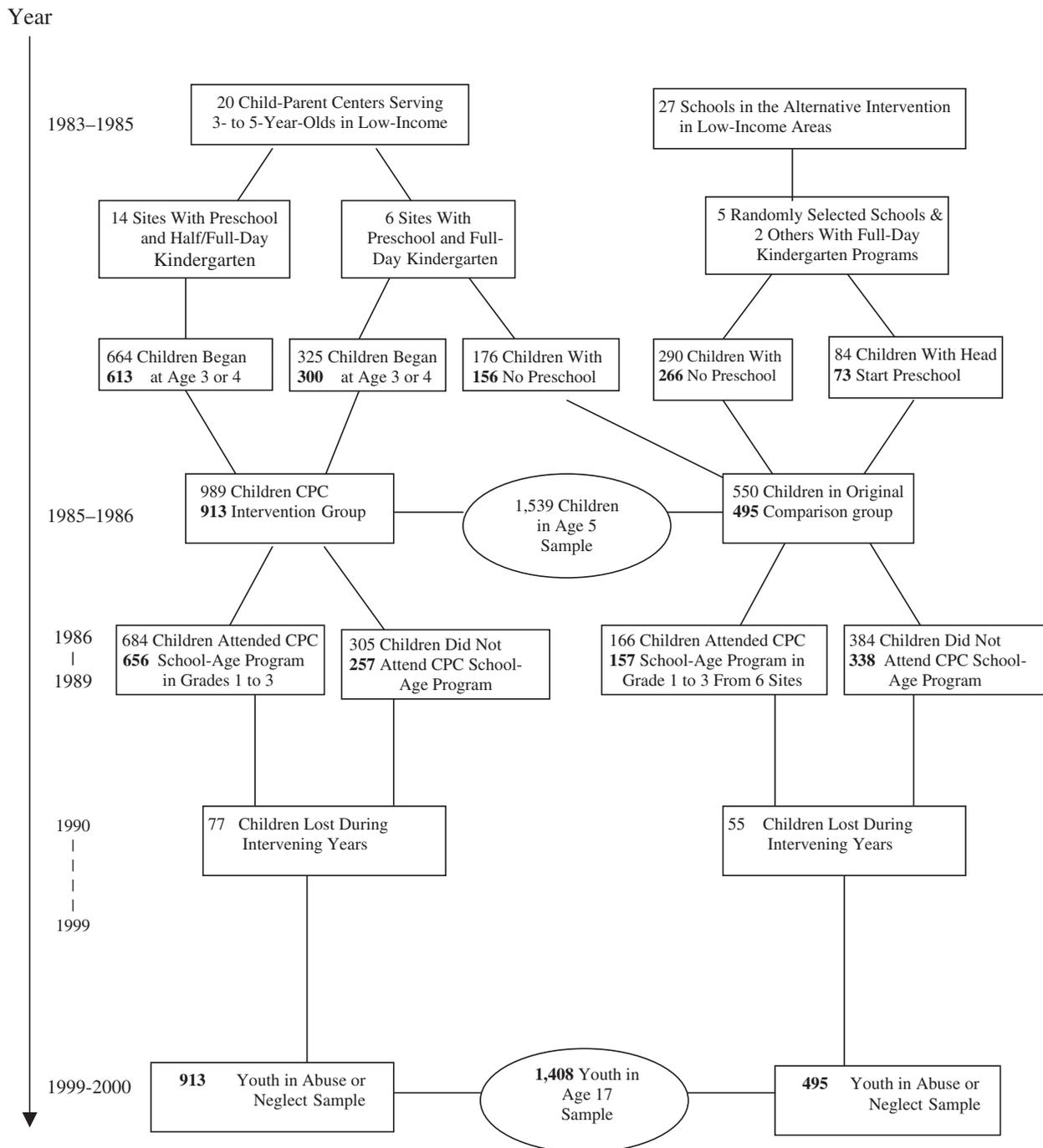
Within these comprehensive services, a basic skills philosophy and intensive parental involvement are the core of the program and provide many opportunities for positive learning experiences at home and in school. One impediment to program expansion to other locations is that the centers require more physical space and financial resources than typical early childhood programs funded by the states.

The prevention of CAN can not only improve the quality of life for many children at risk but can also benefit society at large. First, greater investments in effective programs such as the CPCs can substantially reduce government expenditures that go to child welfare services. It is estimated that state and federal annual expenditures for the child welfare system exceed $11 billion (Courtney, 1998; U.S. Department of Health and Human Services, 2002). The government costs per child of 1 year of foster care exceed $22,000, and nearly 30% of children who are victims of CAN are placed in foster care (Courtney, 1998). We estimated that the weighted average cost for 1 year of child welfare services in our sample is $9,492 per child (1998 dollars). This is more than twice the cost per child of 1 year of part-day preschool in the CPCs. Combined with the demonstrated impact of the program in reducing costs associated with remedial education and juvenile arrest and in increasing educational attainment (Reynolds et al., 2001; Temple et al., 2000), the program's cost effectiveness is high (Reynolds, Temple, Robertson, & Mann, 2002).

A second benefit of preventing child maltreatment is the reduction of administrative costs of investigating reports of child maltreatment. With more than 3 million reports of child maltreatment investigated yearly, the increased efficiency to an overburdened child welfare system probably would be greater than the savings in reduced administrative costs. Finally, comprehensive prevention programs such as the CPCs could help avert tangible victim costs associated with child abuse, including medical care, mental health services, and lost productivity of victims and their families. Continued investigation of the benefits of a variety of early childhood programs will provide a more complete understanding of the most effective ways to protect children from harm.

Appendix

Flowchart of study sites and participants in the Chicago Longitudinal Study (preschool to age 17). Study sample sizes are in bold.

Year

1983–1985

20 Child-Parent Centers Serving
3- to 5-Year-Olds in Low-Income

27 Schools in the Alternative Intervention
in Low-Income Areas

14 Sites With Preschool
and Half/Full-Day
Kindergarten

6 Sites With
Preschool and Full-
Day Kindergarten

5 Randomly Selected Schools &
2 Others With Full-Day
Kindergarten Programs

664 Children Began
613 at Age 3 or 4

325 Children Began
300 at Age 3 or 4

176 Children With
156 No Preschool

290 Children With
266 No Preschool

84 Children With Head
73 Start Preschool

1985–1986

989 Children CPC
913 Intervention Group

1,539 Children
in Age 5
Sample

550 Children in Original
495 Comparison group

1986
|
1989

684 Children Attended CPC
656 School-Age Program
in Grades 1 to 3

305 Children Did Not
257 Attend CPC School-
Age Program

166 Children Attended CPC
157 School-Age Program in
Grade 1 to 3 From 6 Sites

384 Children Did Not
338 Attend CPC School-
Age Program

1990
|
|
|
|
1999

77 Children Lost During
Intervening Years

55 Children Lost During
Intervening Years

1999-2000

913 Youth in Abuse or
Neglect Sample

1,408 Youth in
Age 17
Sample

495 Youth in Abuse or
Neglect Sample

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