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Child Care Quality Matters: How Conclusions May Vary With Context

*John M. Love, Linda Harrison, Abraham Sagi-Schwartz, Marinus H. van IJzendoorn, Christine Ross, Judy A. Ungerer, Helen Raikes, Christy Brady-Smith, Kimberly Boller, Jeanne Brooks-Gunn, Jill Constantine, Ellen Eliason Kisker, Diane Paulsell, and Rachel Chazan-Cohen**

Three studies examined associations between early child care and child outcomes among families different from those in the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network study. Results suggest that quality is an important influence on children’s development and may be an important moderator of the amount of time in care. Thus, the generalizability of the NICHD findings may hinge on the context in which those results were obtained. These studies, conducted in three national contexts, with different regulatory climates, ranges of child care quality, and a diversity of family characteristics, suggest a need for more complete estimates of how both quality and quantity of child care may influence a range of young children’s developmental outcomes.

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Accumulated evidence suggests that for children in child care, the quality of that care is important for their development (Lamb, 1998; Love, Schochet, & Meckstroth, 1996), but findings differ with respect to the nature of the relationship of quality and quantity of care with various developmental outcomes. Although higher quality care has been associated with improved cognitive and language skills across a range of studies (e.g., see Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2000b, 2003b), associations between care quality and social-emotional development have been more mixed. The latest report from the NICHD Early Child Care Research Network (2003b), consistent with its previous reports, concludes that more time spent in "any of a variety of nonmaternal care arrangements" leads children to display more externalizing behavior problems, and that this relationship holds regardless of quality and other factors (NICHD Early Child Care Research Network, 2003a). Given the potential implications of such findings for understanding children's social-emotional development and contributing to child care policy, it is critical to assess the extent to which the NICHD findings might generalize to other child care contexts.

In this article, we bring together research on this issue from three perspectives: (a) the Sydney Family Development Project (SFDP), (b) the Haifa-NICHD merged data, and (c) the Early Head Start program evaluation in the United States. These perspectives contribute to the child care debate by extending the levels of observed child care quality beyond the more restricted range of the NICHD study, expanding the diversity of families included in the research and breaking the correlation between quality of care and socioeconomic status (SES) found in the NICHD study. The Haifa study adds a sample of families using much lower quality child care across all SES groups; the Australian study adds a sample of families from different SES groups using generally higher quality government-regulated care relative to the average quality of care in the United States; and the Early Head Start study adds a sample of low-income families experimentally offered care of higher quality than is generally available to families with infants and toddlers in the United States, and who are more diverse than the NICHD study families.

The child care settings of the three studies also exist within different regulatory contexts: both regulated (moderately high quality) and nonregulated settings in Sydney, homogenous but lower standards in Haifa, and homogenous and high standards in Early Head Start. The three studies include diverse measures of child care quality as well as a range of outcome measures that span children's cognitive and social-emotional domains (from attachment security to language to aggressive behavior problems).

Together our three perspectives capitalize on this diversity, and together they investigate how quantity and quality of child care may relate to children's development. We begin with the Sydney study, move to the merged Haifa-NICHD data, and then turn to the United States to look at child care in the federal Early Head Start program.

An Australian Perspective on Quality, Quantity, and Stability in Child Care

The first perspective is based on a 6-year longitudinal study of the use and effects of child care in an Australian sample of 147 primiparous mothers. Like the study conducted by the NICHD Early Child Care Research Network, the SFDP used a correlational design to assess the relationships of type, amount, and stability of children's child care experiences to developmental outcomes at key points: infant-mother attachment at 12 months, behavior problems at 30 months and 5 years, and teacher-rated adjustment to school at 6 years. The results, however, indicate a different relationship between child care and development than that reported by the NICHD study. We believe this is due, in part, to differing levels of child care quality in the Australian and U.S. contexts.

Like the United States, Australia has achieved a high level of workforce participation among women of child-bearing age (46% with children under 5 years, Australian Bureau of Statistics, 1998; 65% within 18 months after giving birth, Glezer, 1988); however, unlike the United States, this has been linked to government child care policies that have actively encouraged mothers to return to the workforce. Significant funds at both state and federal levels are directed to child care services for children from birth to 12 years, and to preschool programs for children aged 3 to 5 years. State regulations require child care centers to meet minimum child-staff ratios (e.g., New South Wales, 5:1 for children under 2 years, 8:1 for

2-to 3-year-olds, 10:1 for 3-to 5-year-olds) and to employ specialist staff with early childhood qualifications (e.g., 3-to 4-year university degree, 2-to 3-year technical college diploma). Similar standards operate in Australian Family Day Care services, where the child-adult ratio is 5:1 for children under 5 years, and caregivers receive regular training and supervision by qualified early childhood staff. At the federal level, the Quality Improvement and Accreditation System requires centers to meet criterion-based standards of care for families to receive government subsidies for the cost of care (National Childcare Accreditation Council [NCAC], 1993). Fee reductions apply to most families, on an income-to-needs basis, and provide a major incentive for child care operators to become accredited. Australia's national system of formal, government-regulated child care services arguably achieves a uniformly higher level of quality than is found in the United States (e.g., Wangmann, 1995) and, accordingly, could be expected to show a different relationship with children's development than has been reported in studies in the United States.

Despite these provisions, however, not all child care is provided through the formal system, especially during the first 2 years of life, when informal care with relatives, friends, babysitters, or nannies is more typical (e.g., from birth to 1 year, 37% informal vs. 8.5% formal; age 1 to 2 years, 46% informal vs. 24% formal; Australian Bureau of Statistics, 1999). Although similar informal arrangements have been noted in U.S. studies (NICHD Early Child Care Research Network, 1997a), the reasons may not be the same, perhaps because American parents do not receive government financial support for the full cost of child care and may choose informal care as a cheaper option (Scarr & Eisenberg, 1993). Australian families are eligible for financial assistance, which suggests that the decision to use informal care arrangements may be based on personal preference rather than cost. In regard to quality, Australia requires informal child care providers to be registered but as yet has no regulatory systems to support or supervise caregivers. As a result, child-adult ratios, caregiver qualifications, and other factors potentially influencing quality are determined solely by the caregivers themselves. Without regulatory standards, informal settings are likely to be more variable in quality than are formal services and, therefore, less predictive of outcomes for children.

The informal and formal sectors of Australia's child care system provide a useful dichotomy for describing child care quality and comparing the effects of home-based care of variable quality with centers and Family Day Care homes of uniformly moderate to high quality. As such, Australian research has the capacity to extend what has been reported for quality versus quantity of child care in the NICHD study.

Commonalities and Differences Between the SFDP and the NICHD Study

Participants in the SFDP differed from those in the NICHD study in that all the SFDP children were first-born, and mothers were selected to be representative of a larger community sample ($n = 453$) on broad indexes of personality functioning (see Harrison & Ungerer, 2002a). The range of mothers' educational levels (less than high school to postgraduate) was comparable to the range in the NICHD sample (NICHD Early Child Care Research Network, 1997b).

Families' use of child care was similar to that of the NICHD families. By age 12 months, 72% of children were receiving regular nonmaternal care, 18% attended fewer than 10 hr per week, 32% attended part-time (11–30 hr per week), and 22% attended full-time (> 30 hr per week). At 30 months, 86% were in regular care (24% informal, 62% formal). By 3 years, 97% of children were in care, and many (46%) had entered preschool. Cross-age correlations showed that average weekly hours during the first 12 months were consistent with weekly hours at 30 months, 3 years, and 4 years, $r_s = .50$ to $.63$, $p < .001$.

Assessments of children's developmental outcomes matched those in the NICHD longitudinal study. We included security of infant–mother attachment at 12 months (Strange Situation; Ainsworth, Blehar, Waters, & Wall, 1978), mother-reported behavior problems at 30 months and 5 years (Child Behavior Checklist [CBCL]; Achenbach, 1991), and teacher ratings of adjustment to school at 6 years. Teacher–child conflict was assessed (Student–Teacher Relationship Scale; Pianta, 1990) along with other measures of behavioral and social competence (Teacher–Child Rating Scale; Hightower et al., 1989; Classroom Behavior Inventory; Schaefer, Edgerton, & Aaronson, 1978; Teacher Rating Form: Prosocial Behavior Scale; Klein & Abu Taleb, 1993).

The SFDP research questions focused on quality (formal vs. informal care) and quantity of early child care (i.e., from birth to 30 months of age), and sta-

bility of care over time (i.e., from birth to 6 years). Changes in care arrangements at three periods (birth to 12 months, 12 to 30 months, 30 months to 6 years) were used to construct a measure describing consistent patterns of more or less stable care. To assess the predictive relationships between child care factors and child outcomes, effects were assessed after controlling for family SES, maternal psychological well-being, marital relationship quality, social support, and child gender and temperament characteristics. For attachment security, maternal sensitivity also was included as a predictor (see Harrison & Ungerer, 2002a). As the questions related to the experience of nonmaternal care, children who were in exclusive maternal care were not included in the analyses.

Longitudinal Findings From the SFDP: Effects of Quality, Quantity, and Stability of Care

Infant–mother attachment security at 12 months. Secure versus insecure attachment outcomes were compared for the 85 infants who received regular child care during the first year—52 in informal settings versus 33 in formal care. (Sixty children in maternal care were not included in these analyses.) Security was associated with formal care (Family Day Care: 100% secure; center care: 63% secure) rather than informal care (56% secure). Of the children in part-time or full-time care, 70% had secure attachments, whereas only 39% of children attending care for fewer than 10 hr per week were secure (Harrison & Ungerer, 1997). The association between security and formal care was confirmed by logistic regression tests, controlling for hours of care, maternal education, social support, and child difficult temperament (Wald coefficient = 5.24, $p = .02$; model $\chi^2 = 19.69$, $N = 85$, $df = 5$, $p = .001$; with maternal sensitivity, Wald coefficient = 3.53, $p = .06$; model $\chi^2 = 23.87$, $N = 78$, $df = 6$, $p = .001$). Quantity of care was not a significant predictor in these analyses.

Behavior problems at 30 months and 5 years. Mothers' scores for the child's internalizing, externalizing, and total behavior problems at age 30 months and 5 years showed no associations with type or quantity of early care, $r_s(115) = -.01$ to $.08$, *ns*.

Adjustment to school at 6 years. Teacher ratings provided a measure of teacher–child relationship conflict and summary ratings of children's social-emotional development (acting out, hostility, considerateness, prosocial behavior), personal adjustment (outgoing with peers, extrovert, shy or anxious, introvert), and

adjustment to the learning demands of school (task orientation, creativity, intelligent behavior, distractibility). Relationships between child care factors and child outcomes were tested using hierarchical regression analyses, controlling for family and child characteristics (Harrison & Ungerer, 2002b). Results showed that teacher–child conflict was associated with patterns of more unstable care over time ($\Delta R^2 = .039$, $p < .05$), but that it was not related to quantity or type of early care. Ratings of social-emotional adjustment were also related to stability of care ($\Delta R^2 = .031$, $p < .05$), being lowest in the group of children whose care had been consistently more unstable and highest in the group whose care had a more stable pattern. Personal adjustment ratings were higher when children had attended formal in contrast to informal care during the first 30 months ($\Delta R^2 = .061$, $p < .01$). Competence in learning was predicted by type of care (higher ratings for formal vs. informal care) and by quantity of care (lower ratings for longer hours of care), together explaining 6.3% of the variance (overall $R^2 = .199$, $p < .01$).

How and Why SFDP and NICHD Early Child Care Research Findings Differ

Longitudinal results from the SFDP, based on teachers' and mothers' reports, provide a useful comparison with findings reported by the NICHD Early Child Care Research Network. Although there are many similarities between SFDP and NICHD children's experiences of care over time, the relationships of dimensions of care with developmental outcomes differ. We attribute this to different systems of child care provision and regulation. The present report from NICHD attributes poorer outcomes for social-emotional development to longer hours of care in general and, in particular, to more time in center-based care. In contrast, the SFDP study found no relationship between quantity of care and mother-reported problem behavior, social adjustment to school, or teacher–child conflict. Rather, it was stability of care over time that contributed to social-emotional aspects of development. Children who had experienced a consistent pattern of more changes in care were rated by teachers as having more conduct problems and less effective social skills. From an attachment perspective (Bowlby, 1969/1978), repeated changes of care, which place additional demands on children to form new relationships and create the stress of losing existing relationships, are a poor basis for developing emotional resourcefulness or so-

cial competence. This may be especially salient as children make the transition to school, where they are required to adapt to large numbers of children and proportionally fewer adults than they experienced in child care.

Quality of care, described by formal, regulated care versus informal, unregulated care, was found to be an important predictor of child outcomes in the SFDP. Children who had attended formal settings before age 30 months (85% of whom had received some center care) were rated by their school teachers as more outgoing and extroverted and less shy and anxious than children whose care had been in informal, non-regulated arrangements. Formal care was also associated with teachers' higher ratings for competencies in learning. These findings support a theoretical position that higher quality care (i.e., care programs that meet required standards for equipment, space, and programming, and are provided by appropriately qualified staff) will support children's learning and development (e.g., see National Association for the Education of Young Children, 1987; NCAC, 1993).

The SFDP results provided some evidence for the negative effects of longer hours of child care and, in this sense, were consistent with the NICHD report. Quantity of care was negatively associated with teachers' ratings for competence in learning, regardless of care type. (Note, however, that competence scores were highest for children who had attended formal care for fewer hours, and lowest for children receiving more hours of informal care.) Our results do not support the suggestion that behavior problems (linked to quantity of care) interfere with readiness to learn, but they indicate that problems of attention (task orientation, distractibility) and interest (creativity, intelligent behavior) were linked to longer hours of care.

Quality of Child Center Care Is Important: A Mega-Analysis of the NICHD and the Haifa Study of Early Child Care

How Generalizable Is the NICHD Study?

The present report by the NICHD Early Child Care Research Network (this issue) states that amount of early nonmaternal care—not quality of care—is the crucial predictor of later social-emotional adjustment. The main question is whether this finding pertains to the restricted quality range of nonmaternal care provisions in the United States, and to how generalizable it is to settings with much lower or much

higher standards of care. Because the Haifa Study of Early Child Care was developed in parallel to the NICHD project and covered non-maternal care of much lower quality standards (Sagi, Koren-Karie, Gini, Ziv, & Joels, 2002), we can now test the generalizability of some of the earlier NICHD findings in a broader range of quality standards by comparing and combining the two data sets.

Commonalities and Differences Between the Haifa and the NICHD Studies

Both the Haifa and the NICHD studies addressed questions concerning ecologically relevant predictors of social-emotional adjustment among infants who experienced various types and quality of early care, and in both studies, all SES groups were included. Because public child care centers in Israel are part of a nationwide network, however, infants from both lower- and middle-class families are placed in the same centers, whereas SES tends to be confounded with quality of group care in the United States. In both studies the investigators focused on mother characteristics, infant characteristics and development, mother-child interaction, mother-father relationship, the environment, and the structure and quality of various types of group care. Moreover, the samples are very large ($N = 1,153$, United States; $N = 758$, Israel), with a low attrition rate and recruited in two different developed Western cultures, both of which place a high premium on education. A major outcome variable studied was quality of the infant-mother attachment (for more details on the U.S. study, see NICHD Early Child Care Research Network, 1997a; for more details on the Israeli study, see Sagi et al., 2002).

Various child care correlates were found in the NICHD study to neither adversely affect nor promote the security of infants' attachment to their mothers at the 15-month age point. However, certain child care conditions, in combination with certain home environments, did increase the probability that infants would be insecurely attached to their mothers. More specifically, infants who received poor quality of care, received more than 10 hr of care per week, or were in more than one child care setting during the first 15 months of life were more likely to be insecurely attached only if their mothers were lower in sensitivity (NICHD Early Child Care Research Network, 1997a).

In the Haifa study, child care, especially center care, increased the likelihood of the infants' attachment insecurity to their mothers (Sagi et al., 2002).

More specifically, a significantly larger proportion of insecure-ambivalent infants was found in center care (46%) than in each of the following groups: family child care (28%), paid individual care (27%), individual care with a relative (19%), and maternal care (26%). Furthermore, the data clearly showed that it is the very high infant:caregiver ratio (average of 8:1) that accounted for this increased level of attachment insecurity among center care infants when compared with other professional care (viz., family or paid individual care). Because of the large sample size, it was possible to examine the sole effects of type and quality of care by controlling for a vast array of potentially intervening maternal and child characteristics in parallel with the NICHD study. None of these variables was found to mediate or to minimize the negative effects that were discovered only for center care. Thus, early infant center care in Israel, with its very high infant:caregiver ratio, challenged infants' security of attachment to their mothers.

In an additional analysis of the Haifa data (Aviezer, Sagi, & Koren-Karie, in press), the expected link between maternal sensitivity and infant attachment security was found only for infants in individual care but not for infants in center care, despite the fact that mothers of children in individual care arrangements and mothers of children in center care were equally sensitive. This analysis suggests that the lack of associations between maternal sensitivity and infant attachment security might contribute to the lower security rates found for center care children. Thus, childrearing context may override the expected influence of maternal sensitivity. Indeed, in center care, the proportion of sensitive mothers with insecurely attached infants was similar to the proportion of insensitive mothers with insecurely attached infants, whereas the proportion of sensitive mothers with secure infants in individual care settings was significantly higher than the proportion of sensitive mothers with insecure infants. Hence, maternal sensitivity did not predict attachment security for center care children.

It should be noted that the moderating influence of center care on the formation of attachment relations in the Haifa study is different from the moderating effect of center care that was found in the NICHD study (NICHD Early Child Care Research Network, 1997a). In the NICHD study, maternal behavior was more salient for children in low-quality facilities of nonmaternal care, and the expected associations between maternal sensitivity and infant attachment were more

emphasized. The Israeli data for children in low-quality nonmaternal care suggest that maternal behavior was less salient for these infants, who might be so overwhelmed by the low quality of the center care setting that they may no longer experience their mothers' child-rearing behavior as good enough.

Based on the structural characteristics of center care in the two studies (e.g., child-caregiver ratio), it is safe to conclude that center care in the Haifa study represented considerably lower quality of care (which was confirmed by direct observations) relative to center care in the NICHD Early Child Care Research Network (1997a; Sagi et al., 2002). In the NICHD study, the social structure as well as more defined state restrictions concerning certification of center care facilities may have prevented the researchers from investigating facilities with extremely low quality. Some child care facilities in deprived and dangerous inner-city areas may have been inaccessible to the researchers, and noncertified centers may have been hesitant to make themselves available for government-subsidized research. Although Israel is a developed Western country with a high education level, the early care system has received inappropriate public attention, resulting in a very-low-quality system of center care for infants. Thus, in combining the two studies for the purpose of secondary analyses, we create a broader continuum of quality of center care and thus make it less likely that restriction of range will influence the generalizability of the findings.

A "Mega-Analysis" on Combined Data from the Haifa and NICHD Studies

Combining data from the two studies, we focused on amount of care and child-caregiver ratio as important indicators of early care. Amount of care and child-caregiver ratio were defined identically in both studies (for details, see NICHD Early Child Care Research Network, 1997a; Sagi et al., 2002). Child-adult ratio is a distal index of quality of care. We were not able to use a more proximal assessment of quality of care here because the measure used in the NICHD study for assessing qualitative aspects in caregiver-infant interaction (Observational Record of the Caregiving Environment; ORCE) was a unique tool developed by the NICHD Early Child Care Research Network, which became accessible to the scientific community only at a later stage. The Haifa study had to develop its own quality assessments. In the Hai-

Haifa study, however, child-caregiver ratio is strongly linked to quality of care (Koren-Karie, Sagi, & Egoz-Mizrachi, 1998; Sagi et al., 2002). Also, the NICHD Early Child Care Research Network (2000a) has recently found that positive caregiving was associated with smaller child-caregiver ratios. The NICHD study assessed positive caregiving in five types of care: centers, child care homes, and care provided by in-home sitters, grandparents, and fathers (it should be noted that in most publications the NICHD network presents paternal care as another type of non-maternal care, in the same league as professional caregiving arrangements). Thus, child-caregiver ratio, which is a standard index in both the Haifa and the NICHD studies, is a useful index of quality of care in our secondary analysis. Our analyses on the combined Haifa and NICHD studies are restricted to infant-mother attachment as an outcome variable, and no data are available to conduct a longitudinal secondary data analysis with the combined sample.

Summary of Major Findings

The present analysis is based on a combined sample ($n = 294$) of all center care cases in both studies ($n = 143$, United States; $n = 151$, Israel). From Table 1 it can be derived that the child-caregiver ratio in the Haifa study was twice as large as the ratio in the NICHD study. In both studies, most infants were involved in center child care full time, with an average of about 5.5 hr per week longer involvement in the Israeli case. In Israeli center child care, the percentage of securely attached infants was significantly lower (54%) than in the NICHD centers (67%). In the NICHD study as well as in the Haifa study, child-caregiver ratio and

amount of care did not correlate significantly with attachment security (secure vs. nonsecure as a dichotomous variable). Only in the combined sample did we find a significant correlation between child-caregiver ratio and attachment security ($r = -.13$, $p < .05$), indicating that a larger ratio was associated with less infant attachment security. Because amount of care was also significantly related to child-caregiver ratio, we included both predictors in a logistic regression on attachment security. In the combined sample, this regression proved to be significant ($\chi^2 = 6.02$, $n = 267$, $df = 2$, $p = .049$). Only child-caregiver ratio contributed significantly to this regression equation (Wald coefficient = 4.09, $df = 1$, $p = .043$). Amount of care did not significantly contribute to the logistic regression. In the separate NICHD and Haifa samples, the logistic regressions with amount of care and child-caregiver ratio did not significantly explain the variance in attachment security.

In a broader range of center care quality, we found that a higher child-caregiver ratio was indeed associated with less attachment security, whereas amount of care was not a significant predictor. In the separate NICHD and Haifa samples, a similar result failed to emerge. We suggest that the generalizability of the NICHD findings hinges on the specific context in which these results have been obtained, and on the resulting restriction of range for crucial variables. The NICHD finding of a small association between center care quality and child outcomes should be limited to the specific population of centers from which the NICHD study sample was derived—until empirically demonstrated otherwise. Although our findings in the combined sample are limited in time

Table 1
Description of the Separate NICHD and Haifa Center Care Samples, and the Combined Sample

Variable	NICHD			Haifa			Combined			
	M	SD	N	M	SD	N	M	SD	N	T
Child-caregiver ratio	4.00	1.38	124	8.00	1.96	151	6.20	2.64	275	19.17***
Amount of care	37.24	11.24	141	42.73	6.15	150	40.07	9.38	291	5.21***
Attachment security	0.67	0.47	137	0.54	0.50	151	0.60	0.49	288	-2.35*
	Amount		Security	Amount		Security	Amount		Security	
Child-caregiver ratio	-.01		.04	-.02		-.06	.16*		-.13*	
Amount of care			.07			-.03			-.01	
	123 < n < 137			150 < n < 151			269 < n < 285			

Note. NICHD is the National Institute of Child Health and Human Development.

* $p < .05$.
*** $p < .001$.

(infancy) and in number and type of variables (child-caregiver ratio, amount of care, security of attachment), our case illustrates the risks of premature generalizations to other contexts, in particular when the causal processes leading to a significant association between quantity of care and child outcomes, such as security or aggression, still are obscure. Counter-intuitive findings that are not based on a priori predictions from a theoretical framework should be interpreted with caution, although such findings may turn out to be among the most important and exciting in our field of inquiry. But let us first establish their truth value in other contexts and construct an adequate theoretical framework to account for them, before jumping to (policy) conclusions. The absence of evidence for a significant contribution of child care quality to children's social development, especially aggression, should be considered a finding in search of replication and explanation.

Infant and Toddler Child Care in the Context of Early Head Start: Quantity, Quality, and Children's Development

The third perspective on the effects of child care on children's development comes from the national evaluation of the federal Early Head Start program in the United States. Like the NICHD study, the Early Head Start evaluation examined the developmental progress of children during the first 3 years of life. Many of the children were in nonparental child care during those early years. In contrast to the NICHD study, however, the Early Head Start study focused exclusively on children from low-income families. Moreover, because of the Early Head Start intervention, many of the children received good-quality, center-based child care, which few of the NICHD children from low-income families experienced. Early Head Start was launched in 1995 by the Administration for Children and Families (ACF), in the U.S. Department of Health and Human Services and was designed as a two-generation program serving low-income pregnant women and families with infants and toddlers up to the age of 3. Early Head Start grantees design programs to achieve benefits for both children and their parents by providing home- or center-based child development services, combining these approaches, or implementing other locally designed options. Detailed findings about the programs' implementation (Administration for Children and Families [ACF], 2002b) and effects through age 3 (ACF, 2002a) can be found in the project's tech-

nical reports, which also include detailed descriptions of the study design, instruments, data collection procedures, and analytic methods.

Important for the context of this research are the high standards the federal Head Start Bureau sets for child care quality. The Head Start Program Performance Standards established a clear set of expectations for the quality of center-based child development services. The standards require (a) a child-staff ratio of 4:1 and a maximum group size of eight infants and toddlers in center-based child care settings, and (b) child care staff to have a Child Development Associate credential within 1 year of being hired as an infant-toddler teacher (U.S. Department of Health and Human Services, 1996). These standards exceed those reported for the settings of the Australian and Israeli studies, as well as for standards set by most states within the United States, which is the context for the NICHD research.

Method

ACF selected 17 programs to participate in the national evaluation; these sites span all regions of the country and are in both urban and rural settings. A total of 3,001 families applying to these Early Head Start programs between July 1996 and September 1998 were randomly assigned either to the program or to a control group, which could access all services in the community except Early Head Start. Early Head Start families were diverse: 63% were Hispanic, African American, or other non-White groups; 48% had not earned a high school diploma; 38% were teenage parents; and 23% were neither employed nor in school. Parent interviews and assessments of children's development were conducted when the children were approximately 14, 24, and 36 months old. Assessments when children were 24 months old included measures of cognitive development (the Bayley Scales of Infant Development Mental Development Index, BSID-MDI; Bayley, 1993), language development (the MacArthur Communicative Development Inventory language production scale, CDI; Fenson et al., 1993), and aggressive behavior (the Child Behavior Checklist, CBCL; Achenbach, 1992); see Administration on Children, Youth, and Families (2001, chap. 4) for details. At 36 months of age, child assessments included the BSID-MDI, the Peabody Picture-Vocabulary Test-Third Edition (PPVT-III; Dunn & Dunn, 1997), and the CBCL aggressive behavior scale (Achenbach & Rescorla, 2000; see ACF, 2002a, chap. 5).

We asked parents about their use of child care (along with other services) at several points after program enrollment. Child care quality was assessed by trained observers in 2-to 3-hr visits to the child care settings children were in around the time that the 14-, 24-, and 36-month interviews were completed with the children's parents. Settings observed were those that children were in for at least 10 hr per week for at least the 2 weeks preceding the interview and that were not in the child's own home (unless that in-home care was provided by a nonrelative). When children were 14 and 24 months old, observations of center-based care were conducted using the Infant-Toddler Environment Rating Scale (ITERS; Harms, Cryer, & Clifford, 1990). When children were 36 months old, we used the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998). These scales consist of 35 items that assess the quality of care. (The shortened version of the ITERS we used excluded three items from the adult needs category—opportunities for professional growth, adult meeting area, and provisions for parents.) Item scores range from 1 to 7, in which 1 is described as *inadequate care*, 3 as *minimal care*, 5 as *good care*, and 7 as *excellent care*. Child-teacher ratios and group sizes were also recorded.

Findings: The Overall Impacts of Early Head Start on Children

The national evaluation found that the program had favorable impacts on a wide range of outcomes for children (as well as their families). Early Head Start improved cognitive and language development of children at 24 and 36 months of age, with program children scoring significantly higher than control children on the BSID-MDI and the CDI or PPVT-III. (We are reporting only those program-control differences that were statistically significant in the regression-adjusted impact analyses that controlled for a large number of family background characteristics; see ACF, 2002a.) Early Head Start also produced favorable impacts on aspects of social-emotional development at 36 months, broadening the range of impacts on these behaviors that were found at 24 months. At both 24 and 36 months, levels of aggressive behavior were significantly lower for Early Head Start children than for control-group children.

At the time these positive program impacts were becoming manifest, most Early Head Start children were in regular child care arrangements, and child care use increased as the children got older. In the

four center-based programs, for example, the percentage in some type of child care for at least 30 hr per week increased from 66% at 14 months to 74% at 36 months. Moreover, Early Head Start increased the use of child care relative to the control group at all three ages by 7 to 10 percentage points (all differences significant at $p < .01$) and increased the percentage of children in good-quality care even more (see Table 2). Thus, the overall positive impacts of Early Head Start on children's development occurred while substantial numbers of children were enrolled in child care. (Details of the child care analyses described here can be found in a special policy report prepared by the authors; see ACF, 2003.)

The favorable impacts across a variety of dimensions of children's development cannot be attributed solely to the children's child care experiences, however, because not all children in Early Head Start were in child care settings. Furthermore, the Early Head Start intervention included family- and child-development services, as described earlier, and the favorable overall impacts of this random-assignment study must be attributed to the full package of services received. Nevertheless, good-quality child care was an important aspect of the services received and thus is responsible for a share of the favorable impacts of the program.

Findings: The Contribution of Good-Quality Child Care to the Early Head Start Impacts on Children

We took two approaches to identifying the effects of good-quality child care on the development of Early Head Start children. Neither approach has the methodological strength of the overall random assignment design, but both suggest that, rather than doing harm, experience in good-quality child care can play a role in improving outcomes for children from economically disadvantaged families.

First, we focus on the four Early Head Start programs that offered full-day, full-year, center-based child development programs. Children typically attended these centers operated by Early Head Start for substantial periods each week, ranging from 51% at 24 months to 68% at 36 months attending for 30 hr or more per week. (The children experienced even greater amounts of time in all types of nonparental care.)

The quality of child care in the four Early Head Start center-based programs was higher than is typical for center-based infant-toddler care in the United States, and for low-income children more specifically. Observational ratings showed that Early Head Start

children at these sites were in classrooms that scored an average of 4.8 on the ITERS for 14-month-olds and 4.9 for 24-month-olds. The classrooms scored 4.7 on the ECERS-R for 36-month-olds. (Note that these averages for Early Head Start children include some children who, for a variety of reasons, were in community centers not operated by the program. Observations of all classrooms operated by Early Head Start centers across all sites showed a mean ITERS or ECERS-R rating of 5.0, 5.2, and 5.1 for 14-, 24-, and 36-month-old children, respectively.) The Early Head Start program quality was significantly higher than the quality that control group children experienced in the same communities. Control group children using center care in these communities were in classrooms rated significantly lower—an average of 3.8 to 3.9 for 14- and 24-month-olds on the ITERS, and 4.1 for 36-month-olds on the ECERS-R (see Table 2). In addition, as Table 2 shows, child-adult ratios were 2.8 at 14 months, 3.2 at 24 months, and 5.6 at 36 months, again significantly better than ratios in classrooms attended by control group children. Early Head Start children in the four Early Head Start sites offering center-based child development services clearly received higher quality care as a result of their enrollment in the program.

Because of different measures, we cannot compare these quality ratings directly with the NICHD study classrooms, but national studies typically have found substantially lower ITERS scores than we observed in Early Head Start centers. The scores have ranged from 3.2 to 3.6 in infant and toddler classrooms in several sites across the United States (Cost, Quality, and Child Outcomes Study Team, 1995; Whitebook, Howes, & Phillips, 1989).

The evaluation found that, when impacts on children's development were estimated separately by the program's approach to child development services, center-based programs were as effective as programs offering home-based or mixed-approach services (ACF, 2002a). This evidence certainly suggests that the large amount of good-quality center-based child care offered by Early Head Start was not detrimental to children and, indeed, contributed to positive outcomes found for the program as a whole.

Our second approach to the child care-child development link focuses on children in the Early Head Start program group who received center care. All children in this sample received the full Early Head Start intervention and were in center care during at least one of the three periods (14, 24, or 36 months of age). The analyses relate child care quality and inten-

Table 2
Early Head Start Program and Control Group Differences in Child Care Use and Quality, by Age

Analysis	14 months		24 months		36 months	
	Program	Control	Program	Control	Program	Control
Percentage of all children in any child care arrangement	66.4	56.5**	60.5	51.3**	84.4	77.7**
N	997	916	820	749	715	608
Percentage of children in good-quality classrooms ^a	23	8**	34	12**	33	21**
N	533	512	505	474	573	521
Percentage of children in good-quality classrooms in 4 center-based sites ^a	26	9**	37	12**	35	16**
N	268	252	256	224	254	211
Percentage of children in classrooms that met Head Start performance standards for child-adult ratios in 4 center-based sites ^b	72	29**	62	15**	28	7**
N	268	252	256	224	254	211
Mean quality rating of centers used, at center-based sites ^c	4.8	3.9**	4.9	3.8**	4.7	4.1**
SD	1.0	1.3	1.0	1.2	1.0	1.3
N	168	52	162	48	153	72
Mean child-adult ratio in 4 center-based sites	2.8	3.9**	3.2	5.5**	5.6	6.8**
SD	1.0	1.7	1.1	2.6	3.0	2.7
N	102	45	159	47	152	72

Note. From analyses conducted by Mathematica Policy Research and reported in *The Role of Early Head Start Programs in Addressing the Child Care Needs of Low-Income Families With Infants and Toddlers: Influences on Child Care Use and Quality* (Administration for Children and Families, 2003).

^aGood quality is defined as Infant-Toddler Environment Rating Scale (ITERS) or Early Childhood Environment Rating Scale-Revised (ECERS-R) rating ≥ 5.0 at all sites with sufficient observations. ^bHead Start performance standards specify a child:staff ratio of 4:1 in groups no larger than 8 between birth and age 3. ^cQuality is defined by ratings on the ITERS at 14 and 24 months of age and ECERS-R at 36 months. **Program-control difference significantly different, $p < .01$.

sity at 14, 24, and 36 months to three key child outcomes at 24 and 36 months of age. Child care quality was measured by the ITERS or ECERS–R and by the child-adult ratio. Intensity was measured by average hours in center child care. We relate these measures of child care to children's cognitive development (BSID–MDI scores), language development (CDI at 24 months or PPVT–III at 36), and aggressive behavior (CBCL aggressive behavior problem scores). Using ordinary least squares regression analyses, mean child care quality and intensity scores at 14 and 24 months were used to predict 24-month outcomes, and mean quality and intensity scores at 14, 24, and 36 months were used to predict 36-month outcomes. All regression analyses controlled for child gender, child age at time of assessment, mother's race or ethnicity, mother's education and marital status, whether mother was teenage (under 19 years of age) at the time of the child's birth, and whether the site was urban.

Among the Early Head Start children who attended child care centers, those in higher quality center-based care showed enhanced developmental outcomes. Mean child care quality over time predicted higher scores on the 24-month BSID–MDI and 36-month PPVT–III. Mean child-adult ratio over time did not significantly predict child outcomes. Mean hours in center care over time predicted higher scores on the 24- and 36-month BSID–MDI and the 36-month PPVT–III. Neither the quality nor the amount of child care predicted child aggressive behavior at 24 or 36 months.

Consistent with previous research, these findings demonstrate that the quality of the child care centers that Early Head Start children attended was positively associated with children's cognitive and language development. Moreover, spending more time in center-based child care was associated with higher cognitive and language scores at 24 and 36 months. We found no evidence that more time in child care was associated with lower child wellbeing or higher rates of aggressive behavior (ACF, 2003).

Summary and Conclusions

This article has described three recent studies that examine associations between early child care and child outcomes among families who are different from those profiled in the NICHD Study of Early Child Care. The three studies suggest that quality of child care is an important factor influencing

children's development and that quality may be an important moderator of the amount of time in care, particularly when the child care contexts differ from those of the NICHD research. Taken together, these studies point to a limited generalizability of the NICHD Early Child Care Research Network's findings. Although some of our results corroborate the NICHD study findings, other outcomes raise questions as to whether the associations between early child care quality and social-emotional development reported by the NICHD network would hold in a more diverse sample of children and families, and in a wider range of child care settings.

In the SFDP, children in care for longer periods before 30 months of age were rated lower by their teachers on adjustment to the learning demands of school at age 6, which appears consistent with the current NICHD finding that extensive early experience in child care may be associated with later behavior problems. In the SFDP, however, being in formal (i.e., higher quality) care was associated with higher ratings on learning competencies, suggesting that quality of care may balance the risk associated with time in care. In contrast to the NICHD report, social-emotional problems were related to stability rather than quantity of care. We suggest that, in a context in which standards for good-quality care are enforced through government regulatory mechanisms, the risk for behavior problems may be explained by factors other than time in care.

In the Haifa study, child care, especially center care, increased the likelihood of the infants' attachment insecurity to their mothers. We suggest that this is because early infant child care, with its very high infant-caregiver ratio, interfered with the traditional link often reported in the literature between maternal sensitivity and infants' security of attachment to their mothers. Analyses of the combined Haifa–NICHD data showed a significant association between child-caregiver ratio (as an index of quality) and children's attachment security but no relation between amount of care and attachment security. Contrary to the suggestion that, in the case of social-emotional development, only child care quantity matters, evidence was found for the significance of child care quality. We suggest that, when the range of quality of care is broadened—either upward or downward, as was the case in the combined Haifa–NICHD data set—quality of child care becomes more salient than time in care in influencing children's development.

Finally, in the Early Head Start study, with its experimental design, children from low-income families (who would be expected to be at higher risk for behavior problems than those in the NICHD sample) experienced a wide range of positive impacts, including reduced aggressive behavior problems. These positive gains in cognitive, language, and social-emotional development occurred for children enrolled in a program that provided high levels of good-quality center child care. The experimental evidence raises serious questions about concluding that an increased amount of child care is detrimental for children's development, at least in the first 3 years of life. In addition, for the sample of Early Head Start children in center-based child care, spending more time in center-based child care was associated with higher cognitive and language scores at 24 and 36 months. We found no evidence that more time in child care was associated with higher rates of aggressive behavior problems. We suggest that this may be a function of both the sample characteristics (100% low income) and the generally good levels of quality care the children experienced.

In summary, the three perspectives provided by our research provide strikingly consistent evidence for the importance of child care quality in the development of young children. We suggest that the generalizability of the NICHD study findings hinges on the specific context in which these results have been obtained. Our data stress the need to take into account the potentially restricted range for child care quality in each investigation. The NICHD Study of Early Child Care is the most impressive investigation on child care to date, and the consortium members should be highly commended for their careful, creative, and painstaking work on one of the most crucial issues in child development. Naturally, such seminal research triggers scientific debate, which underlines the importance of this unprecedented collaborative effort. We hope that the cumulative effect of the data reported here—collected in different countries, with different ranges of child care quality, in different regulatory contexts, and with a diversity of family characteristics—is to provide more complete estimates of the manner in which both quality and quantity of child care may influence a range of young children's developmental outcomes.

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