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## Effects of Day-Care on Cognitive and Socioemotional Competence of Thirteen-Year-Old Swedish Schoolchildren

**Bengt-Erik Andersson**

*Stockholm Institute of Education, Sweden*

ANDERSSON, BENGT-ERIK. *Effects of Day-Care on Cognitive and Socioemotional Competence of Thirteen-Year-Old Swedish Schoolchildren*. CHILD DEVELOPMENT, 1992, 63, 20–36. This is a follow-up study of an earlier one in which positive effects of early day-care experience were found on children's cognitive and socioemotional competence at age 8. 128 children were followed from their first year of life. At 8 and 13 years of age, 92% and 89% of the children, respectively, remained in the study. Most children could be classified according to age at first entry into day-care. Cognitive and socioemotional competence was rated by the children's classroom teachers. Hierarchical regression and path analyses were used in the statistical treatment of the data. It was possible to trace independent positive effects of age of entry into day-care as far as age 13. Children entering center care or family day-care before age 1 generally performed better in school when 8 and 13 years old and received more positive ratings from their teachers on several socioemotional variables. The path analyses indicated the following causal model: family characteristics, such as type of family, family's socioemotional status, and mother's educational level, influence the time of first entry into day-care. This variable, in turn, has consequences for children's competence at 8 and/or 13 years of age even after controlling for home background, child gender, and intelligence, which, of course, have their own effects. The effect of socioeconomic status was often mediated through age of entry into day-care.

In a previous paper, Andersson (1989) showed that in a Swedish sample, age of entry into public out-of-home day-care, as well as type of day-care, can be important variables in predicting children's cognitive and socioemotional competence at 8 years of age. In that study, children entering day-care during the second half of their first year of life performed better in school and on aptitude tests than children entering day-care at a later stage and children remaining at home. Children who entered day-care during the first year of life were rated as more persistent and independent and more verbally facile than other children, and they were less anxious and more socially confi-

dent. Their transition from preschool to school was also less problematic. These effects remained after statistical control of home background and gender. On other socioemotional measures, such as short temper and impulsivity, attentiveness versus distractibility, assertiveness, and peer contacts, no differences were found related to the children's day-care experiences. No measures indicated negative effects of day-care during infancy—which in this case means day-care beginning during the second half year of life.

These data are in contradiction to the warnings concerning early day-care ex-

This study is part of a major research project (The FAST project) carried out at the Department of Educational Research, Stockholm Institute of Education and at the Department of Educational Research, University of Gothenburg (Andersson & Sandqvist, 1982). Support for the project has been provided by grants from the National Board of Education, the Bank of Sweden Tercentenary Foundation, and the Delegation for Social Research. The follow-up to age 13 was made possible by a grant from the Bank of Sweden Tercentenary Foundation. I wish to thank my colleagues in the FAST project—Lars Gunnarsson, Solveig Hägglund, Ulla Kihlblom, Göran Lassbo, and Karin Sandqvist—for their contributions. I also thank Urie Bronfenbrenner for his advice and stimulating discussions. Requests for reprints should be sent to the Department of Educational Research, Stockholm Institute of Education, Box 34103, S-10026 Stockholm, Sweden.

pressed by some American researchers (e.g., Belsky, 1984, 1986, 1987, 1988, 1989, in press; Gamble & Zigler, 1986). Belsky, for instance, has claimed that low-quality day-care during infancy for more than 20 hours per week in contrast to high-quality day-care may be harmful to children's emotional relationships with their parents, although it does not always, or even in the majority of cases, have to be detrimental. Others have taken the opposite stand and maintained that it is premature to interpret the research data the way Belsky does. According to these investigators, no substantive data at present indicate that early day-care should in general be harmful for children (Clarke-Stewart, 1988, 1989; Clarke-Stewart & Fein, 1983; Phillips, McCartney, Scarr, & Howes, 1987; Scarr, Lande, & McCartney, 1989).

One of the most commonly used instruments in the evaluation of young children's emotional development is the Strange Situation procedure (Ainsworth, Blehar, Waters, & Wall, 1978; Ainsworth & Wittig, 1969). Since this procedure is not standardized for children above 2 years of age, most of the relevant studies on day-care that have been conducted are with very young children. At present, only very few studies are available where children have been followed after starting school (e.g., Hartmann, 1989; Ispa, Gray, & Thornburg, 1987; Moore, 1975). Clarke-Stewart (1989), in fact, concludes that we know little about both the short- and long-term effects of early day-care. However, in the same review of available American research she also concludes that cognitive effects seem to be temporary and that infancy does not appear to be a critical period for stimulating intellectual development. And Scarr, Phillips, and McCartney (1990) conclude in their review that longitudinal studies are needed to determine which effects of child care are transitory and which are enduring.

It is important to note, however, that the debate has been based mostly on American studies that examine American day-care arrangements. That means that we lack comparisons with other cultural contexts. The present study can contribute to and illuminate the current debate since it was performed in a country with a different approach to child and family policy and day-care (see Andersson, 1989, for a detailed description).

A recent American study is of special interest in this connection since its design is

very close to our own and the assessment of developmental effects was made at the age of 8. In that study (Vandell, in press; Vandell & Corasaniti, 1990), day-care effects were examined in the state of Texas, a state with low child-care standards. Except for the facts that the Vandell and Corasaniti study is a retrospective one and the Andersson study is prospective from age 3 but retrospective for the first years of life, the designs of the studies are very similar. Another difference between the two studies is the choice of statistical analyses. We used hierarchical regression analyses with background data entered first in the regression model while the American study used stepwise regression. These differences may complicate comparisons between the investigations.

Nevertheless, Vandell and Corasaniti found that children with extensive child care experiences since infancy were rated by teachers and parents as having poorer peer relationships, work habits, and emotional health, and as being more difficult to discipline, which was exactly the opposite of our own results (Andersson, 1989). Our data are consistent with other Swedish research (see Andersson, 1989, for an overview). No other Swedish study has found differences between children in various types of day-care and home care. No study, however, has included children entering day-care as early as during infancy. If we had not included such children in our study we would not have found many differences, either.

One may wonder what is so special about day-care during infancy in Sweden that it should result in long-term positive effects. Our study, conducted in a different cultural context than the American one, may highlight the potential importance of certain types of stimulation in infancy. We know today that infants have a much higher capability to interact with their environment and to respond to stimulation than was known a decade ago. To experience several settings instead of one and to meet and interact with many caring adults and peers in a friendly, high-quality setting may be a form of stimulation with positive, not negative, effects. This may be especially true if parents and children are given ample time to be together during a substantial part of the infant's first year, as is the case in Sweden with its generous parental leave system.

Thus the purpose of the present study is to relate children's cognitive and socio-emotional competence at ages 8 and 13 to

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various family variables, child characteristics, and children's day-care experiences. An important question is whether effects associated with early day-care are of a lasting or transitory nature.

### Method

#### Sample

The sample of children and their families was drawn from eight neighborhoods representing low- and middle-resource areas in Stockholm and Göteborg (Sweden's two largest cities) (Andersson & Rydén, 1979). Families with a child between the age of 3 and 4 were contacted in a random order and asked to participate in a longitudinal study. The first 128 families, or 16 per neighborhood, who accepted were included in the study (two-thirds two-parent families and one-third one-parent families). One-parent families were oversampled in order to allow comparisons with two-parent families. Severely handicapped children were excluded (Sandqvist, 1982). Although the sample is not intended to be a representative sample of Swedish families, a comparison with population statistics for Göteborg and Stockholm showed rather small deviations from population frequencies (Sandqvist, 1982).

Data about the care arrangements were collected for each year from the child's first year of life. For the first 3 years the data collection was retrospective. When children were 8 years old, 119 families (92%) remained in the study, and when 13 years old 114 (89%). In each neighborhood several day-care centers were available. The same was true for family day-care. Thus, day-care in this study represents a cross-section of Swedish day-care. (For more details, see Andersson & Sandqvist, 1982.)

About one-third of the children were placed in day-care outside the home during their first year of life. The number in day-care increased up to their fourth year of life, where it stabilized at around 70%. From the start, center care was the most common alternative to home care. Private day mothers became less common with increasing age. Center care was the most stable type of outside-home care. If placed at a center, the child stayed in center care until school began at age 7, although children occasionally changed centers if the family moved. Family day-care was less stable. Half the group starting in family day-care later changed to center care (Andersson, 1989). Early day-care was more prevalent among highly edu-

cated mothers, families from higher socioeconomic groups, and single mothers.

The infants' exact age in months when entering day-care for the first time is unknown. However, at the time the children were born, one of their parents could stay home for 6–7 months with 90% of their salary paid by the social insurance system. (This period is now extended to 12 months.) With almost no exceptions, Swedish mothers took advantage of this opportunity. Thus, it is highly unlikely that children below 6 months of age had any day-care outside the home. Parents also have the right to shorten their working hours to 6 hours per day at their own expense when children are young. Mothers commonly use this opportunity to work part-time. Daily transportation time to and from work can easily involve an additional hour or more. In this study, day-care, therefore, refers to full-time or almost full-time care of at least 5–6 hours a day, and usually more. Day-care centers do not accept children for only half the day.

#### Instruments and Variables

*Background variables.*—By mapping each child's day-care experiences through the preschool period, we were able to create a variable called *age of entry*, indicating the child's age at first entry into day-care. The variable had four categories (0–1, 1–2, 2–6, and no day-care). In a previous study (Andersson, 1990a, 1990b), we also created three dummy variables describing type of care, but since these variables showed rather low predictive power in comparison to age of entry they are not used in this study.

The child's home background was measured by several variables: mother's education (four levels: from 9 years or less of schooling to more than 12 years); family's occupational status (four levels: from unqualified manual work to academic professions); family type (one or two parents in the family); and change in family type (no change or one or more changes). The two variables "mother's education" and "family's occupational status" were grouped together to form one measure of family's socioeconomic status. The change variable was constructed after mapping all changes during the entire preschool period. Data about these conditions were collected each year. In the present analyses we have chosen to use data from the earliest available time period, assuming that the home situation when children are very young is of special importance for their later development.

To determine if the day-care variables were confounded with family background factors, Pearson correlations were performed. "Family's socioeconomic status" and "family type" were significantly correlated with age of entry ( $r = .26$ ,  $p = .003$  and  $r = .21$ ,  $p = .02$ , respectively) and are used in the analyses. The correlations imply that children with highly educated mothers and children from white-collar families tend to enter day-care at an earlier age than other children. The same is true for children from one-parent families.

To control for children's intelligence, two verbal subtests from the Swedish version of the WISC and two nonverbal subtests from a Swedish group test measuring perceptual cognition and cognitive reasoning (see Andersson, 1989, for details) were used. The tests were collected in the children's home when they were around 8 years old.

*Outcome measures.*—The instruments and variables used when children were 8 years old are presented in Andersson (1989) and the reader is referred to that paper. When the children were 13 years old, socioemotional and cognitive competence was assessed by classroom teachers. In Sweden, sixth-grade teachers are in an excellent position to evaluate the children. From fourth to sixth grade, children are taught by the same teacher for most subjects. Classes are heterogeneous with respect to school performance, as classifying and segregating children at this stage is prohibited. Children with difficulties receive extra help by remedial teachers, but remain in their classes. The Swedish school system is public and rather centralized, and basically the same curriculum applies in all schools.

The assessments were made with an 85-item questionnaire with behavior descriptions. The teachers were asked to rate how well each description fit the child using a five-point scale from "does fit very well" to "does not fit at all."

To validate the preliminary classification of items into dimensions, principal factor analyses with varimax rotation were calculated. Only items that fit the conceptual scheme were included, and less than 20% of the items had factor loadings below .50. No weighting was done in adding together the items in a factor, but negatively formulated items were reversed. Table 1 presents the socioemotional factors at age 13 together with examples of items and Cronbach's

alpha for each factor. The alpha coefficients vary from .96 to .64, median value .84.

The means and standard deviations for all the measures used in the analyses are shown in Table 2. Although the factor analyses were designed to minimize intercorrelations between the factors, most of the intercorrelations between the socioemotional variables were significant. At age 13, around 20% were insignificant and 25% were higher than .50; the rest were only of moderate size. In order to reduce the number of dependent variables and to minimize possible halo effects, a further grouping of the variables was made after a new factor analysis was conducted based on the variables found in the first factor analysis. This procedure resulted in two main factors for each year—one dealing with the children's adjustment to and handling of the school situation (note *a* in Table 2) and one characterizing the children's social competence (note *b* in Table 2).

The teachers also assessed the children's school performance in Swedish, mathematics, English, and general subjects. Three aspects of each subject were rated, and the three ratings were added to form a composite score for each subject. Furthermore, a total score for academic achievement was formed from combining the assessments of all subject areas (Cronbach's alpha = .98), and it is this summary variable that is used here. These ratings were used because school marks are not given until grade 8.

#### *Preliminary Analyses*

In the previous paper (Andersson, 1989), we used hierarchical regression analyses to determine the variance accounted for by age of entry and type of care in the outcome measures at age 8. This method was also used in the preliminary analyses to determine the variance accounted for by age of entry in the outcome measures at age 13. When age of entry was entered after the home background measures and sex of child, we found significant increases in explained variance at the .05 level for five variables: creative and social confident, popular, verbal facility, open-reserved, and independent. For four additional variables the increases in explained variance approached significance ( $p < .10$ ) (Andersson, 1990a, 1990b).

#### *Analysis Model*

The method used here is similar to the one used in the previous paper (Andersson,

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TABLE 1

EXAMPLES OF ITEMS IN THE SOCIOEMOTIONAL FACTORS USED IN THE TEACHER'S RATINGS IN GRADE 6

	No. of Items	Alpha	
Concentrated, persistent, and ambitious.....	15	.96	He works in a concentrated way on difficult problems He is ambitious and works hard to pass the tests
Verbal facility.....	6	.90	He is easy to understand when he speaks He has difficulty in expressing himself, finding the right words, has a poor vocabulary
Controlled—short tempered.....	5	.84	He gets upset or angry when he is criticized
Empathetic.....	3	.71	He defends others
Quiet—disturbing.....	5	.86	He is often disturbing during the lessons
Cooperative.....	6	.82	He functions well in group work
Creative, socially confident.....	8	.91	His essays give proof of originality and narrative skills He likes to stand in front of the class and tell stories
Confident—anxious.....	9	.90	He gives an anxious and fearful impression He is very self-critical
Popular.....	7	.95	He is very popular in class
Open—reserved.....	7	.95	He is happy and positive to almost everything He is reserved and difficult to get in contact with
Assertive, others.....	2	.70	He holds his own if he thinks others are wrong
Leader.....	4	.80	He usually is the one who decides
Autonomous.....	2	.64	He prefers to do things his own way
Self-confident.....	3	.82	He has strong feelings of self-confidence
Independent.....	3	.82	He has independent views and opinions

1989), but here we analyze in detail the standardized regression coefficients. The analysis model is shown in Figure 1. The sequence is hierarchical, moving from a less to a more inclusive list of explanatory variables. We have followed the analytic approach of Alexander and Entwisle (1988).

At each age level we follow the same procedure. Since we have shown that there is a relation between age of entry and socioeconomic status and family type, our first step in the analyses will be to regress age of entry into day-care onto socioeconomic status and family type. Thus, in this step age of entry is treated as a dependent variable, but in the following steps as an independent variable.

In the next set of steps (steps 2 and 3) we regress the outcome measures at age 8 onto possible causal factors. Among those, of course, are the family variables. But the children's characteristics, like gender and

intellectual capacity, may also influence their development. It is obvious, for example, that intellectual capacity is associated with school performance and probably also with some of the socioemotional variables we have measured. In addition, sex differences are often found in studies of children's development. There are, however, no theoretical reasons to assume that children's gender or intellectual capacity will influence when they are placed in day-care, especially not at the young ages, which, according to our previous paper (Andersson, 1989), appear to be crucial. Therefore family and child variables are introduced in the second step. These will include the family's socioeconomic background, type of family, sex of child, and the child's intellectual capacity as predictors of the outcome measures at age 8. In a third step we include age of entry into the regression equation to predict outcome at age 8.

In the next set of steps (steps 4, 5, and

TABLE 2  
MEANS AND STANDARD DEVIATIONS FOR VARIABLES USED IN THE ANALYSES

	Means	Standard Deviations
Family variables:		
Socioeconomic status.....	5.29	2.05
Family type.....	1.66	.48
Child variables:		
Sex of child.....	1.55	.50
Perceptual and logical ability.....	100.00	15.06
Verbal ability.....	100.00	15.26
Cognitive competence:		
School performance, age 8.....	9.92	2.08
School performance, age 13.....	39.70	9.18
Day-care variable:		
Age of entry.....	1.40	1.19
Socioemotional competence:		
Teacher ratings, grade 1:		
Persistent and independent <sup>a</sup> .....	44.83	11.39
Verbal facility <sup>a</sup> .....	12.65	2.59
Attentive vs. distractible <sup>a</sup> .....	12.82	2.87
Anxious <sup>a</sup> .....	13.29	2.10
Transition preschool-school <sup>a</sup> .....	25.51	4.35
Assertive <sup>b</sup> .....	6.27	2.07
Social confident <sup>b</sup> .....	19.05	6.16
Short temper and impulsive <sup>b</sup> .....	19.65	5.34
Peer contacts <sup>b</sup> .....	17.27	2.93
School adjustment.....	15.00	3.86
Social competence.....	12.00	2.17
Teacher ratings, grade 6:		
Concentrated, persistent, and ambitious <sup>a</sup> .....	55.37	14.29
Verbal facility <sup>a</sup> .....	21.26	5.47
Controlled—short tempered <sup>a</sup> .....	18.35	4.49
Empathetic <sup>a</sup> .....	10.00	2.52
Quiet—disturbing <sup>a</sup> .....	20.56	4.45
Cooperative <sup>a</sup> .....	6.92	2.17
Creative, social confident <sup>b</sup> .....	25.19	7.56
Confident—anxious <sup>b</sup> .....	32.78	6.90
Popular <sup>b</sup> .....	26.95	5.87
Open—reserved <sup>b</sup> .....	25.81	5.68
Assertive <sup>b</sup> .....	6.46	1.73
Leader <sup>b</sup> .....	9.34	3.49
Autonomous <sup>b</sup> .....	6.00	1.97
Self-confident <sup>b</sup> .....	9.10	2.53
Independent <sup>b</sup> .....	10.64	2.77
School adjustment.....	18.00	4.84
Social competence.....	27.00	5.78

<sup>a</sup> The variable is included in the main factor "school adjustment."

<sup>b</sup> The variable is included in the main factor "social competence."

6), we repeat this general procedure to predict outcome at age 13. In step 4 we include family variables and children's characteristics, in step 5 we add age of entry to the regression equation, and finally in step 6 we include competence at age 8 to complete the prediction model.

Since our measures of intelligence were collected at the same time that we measured the children's school performance and socio-

emotional competence at age 8, we can only regard them as a proxy for children's early intelligence. That means that when we enter intelligence into the model before age of entry we may underestimate the indirect effects of age of entry. It is well known that performance on intelligence tests not only is an expression of innate intelligence but also is influenced by the various experiences a person has during one's life, for instance, the kind of education one has (Härmqvist, 1968a,

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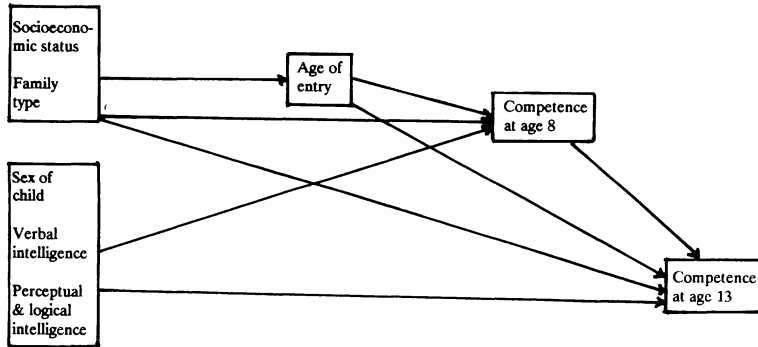


FIG. 1.—A causal model for hierarchical analysis

1968b). If the test variables are introduced after age of entry in the regression model we will, for instance, get a significant path from age of entry toward verbal intelligence (Andersson, 1989, 1990a, 1990b). However, in order not to overestimate the effect of day-care on children's cognitive and socioemotional development, we chose to introduce the intelligence measures before age of entry.

### Results

#### School Performance

Due to missing data on some of the variables, especially teacher ratings, the analyses at age 8 are based on approximately 110 subjects and at age 13 on approximately 100 subjects.

The results for school performance are displayed in Table 3. The table gives both standardized and unstandardized (in parentheses) regression coefficients together with  $R^2$ s for each step in the analysis. As can be seen, the family variables together explain around 18% of the variance in the age-of-entry variable (col. 1). Both socioeconomic status and family type yield highly significant betas. The minus sign indicates that higher socioeconomic status as well as single parenthood result in an earlier placement in day-care.

When school achievement at age 8 is regressed on family and child variables, 29% of the variance is explained (col. 2). Strongest effects are, of course, found for the intelligence variables, but socioeconomic background also shows a significant beta value in the expected direction. However, type of family and child gender show only small and insignificant coefficients.

When in the third step age of entry is added to the model, the explained variance

increases to almost 33% (col. 3). The intelligence variables still have significant direct effects on school performance, but socioeconomic status no longer has. Instead, age of entry yields a significant path, indicating that much of the effect of socioeconomic status is mediated through age of entry. The total effect of socioeconomic status is of about the same size (.191) as the direct effect of age of entry (.209).

Turning to school performance at age 13, we find that family and child variables explain some 35% of the variance (col. 4), which is 6% more than at age 8. With time it seems that socioeconomic status increases its effect. The verbal tests lose their predictive power, while the perceptual and logical tests increase theirs. No other variables in this step show any significant effects.

Adding age of entry to the model results in an explained variance of 42%—an increase of 7% (col. 5). After intelligence, age of entry has the strongest effect, with a beta of  $-.300$ . No other variables were significant. Socioeconomic status shows a decrease from .269 to .156, suggesting again that its effects are mediated through age of entry.

In the sixth step, school performance at age 8 is added to the regression equation. This results in an additional 15% in explained variance, totaling 57% (col. 6). Besides school achievement at age 8, perceptual and logical intelligence and age of entry contribute significantly to achievement at age 13.

In summary, children's home situation, defined as socioeconomic status and type of family, affects when children enter day-care. Only socioeconomic status, however, shows any significant effects on children's school performance at age 8 and age 13. These effects are largely indirect, however, mediated

TABLE 3  
 BACKGROUND AND PERSONAL VARIABLES TOGETHER WITH AGE OF ENTRY AS PREDICTORS OF CHILDREN'S SCHOOL PERFORMANCE AT AGES 8 AND 13

	Age of Entry			School Performance, Age 8			School Performance, Age 13		
	(1)	(2)	(3)	(2)	(3)	(4)	(5)	(6)	
Socioeconomic status.....	-.390*** (-.229)	.191* (.195)	.115 (.118)	.156 (.696)	.269** (1.202)	.057 (.257)			
Family type.....	.351*** (.884)	.055 (.247)	.136 (.611)	.130 (2.614)	.035 (.701)	.101 (2.025)			
Sex of child.....	...	.094 (.397)	.119 (.506)	.155+ (2.912)	.129 (2.417)	.121 (2.286)			
Perceptual and logical ability.....	...	.300*** (.042)	.307*** (.043)	.434*** (.278)	.434*** (.247)	.263** (.164)			
Verbal ability.....	...	.242** (.034)	.195* (.027)	.063 (.038)	.001 (.000)	-.083 (-.051)			
Age of entry.....	...	...	-.209* (-.365)	-.300*** (-2.344)	...	-.168* (-1.313)			
School performance, age 8.....	...	...	...	...	...	.510*** (2.215)			
Intercept.....	3.795	.994	2.802	10.358	-.716	6.094			
R <sup>2</sup> .....	.176	.292	.326	.424	.353	.571			

NOTE.—Standardized regression coefficients appear first in each pair. Metric coefficients are in parentheses.

+  $p \leq .10$ .

\*  $p \leq .05$ .

\*\*  $p \leq .01$ .

\*\*\*  $p \leq .001$ .

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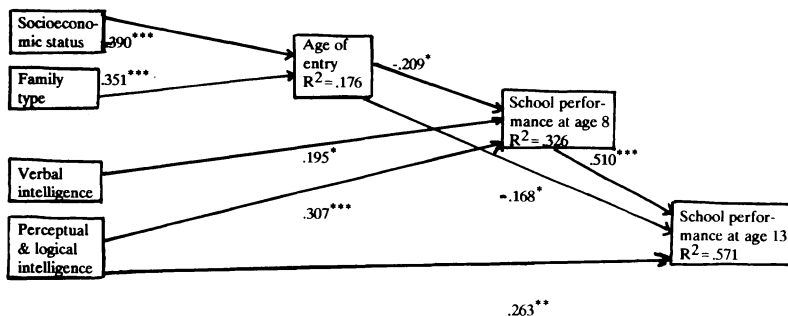


FIG. 2.—Path diagram for school performance. Only significant paths are shown

through age of entry, which has significant direct effects on school performance at both ages even after controlling for children's intelligence and earlier school performance. This is noteworthy, since we probably have underestimated the effects of age of entry by not allowing any part of the variance in intelligence test performance to be explained by age of entry. In Figure 2 the results are presented in the form of a path diagram. To simplify the diagram, only significant paths are drawn. A complete diagram with all paths can be reconstructed from the values in Table 3.

What does it mean that age of entry affects school performance? The easiest way to illustrate this is to perform an ANCOVA and calculate adjusted means for each age-of-entry group. We used this technique to control for socioeconomic status and intelligence; age of entry, sex of child, and family type served as class variables. The results of this analysis are shown in Table 4. The table also indicates which pairs of groups differed significantly from each other. Children who

entered day-care during the second half of their first year of life performed significantly better in school subjects when 8 years old than children who entered day-care later or stayed home. Not only is the overall effect significant, but each group comparison between the earliest entry group and the other groups is significant as well. The differences between the other three groups are small and not significant.

At age 13 there was a gradual decrease in school performance as a function of age at entry, with early-entry children performing best. The overall effect of age at entry is significant, as are the differences between entry before age 1 and entry after age 2 and home care. There is also a tendency toward significant differences between those who entered between ages 1 and 2 and the home group. It is interesting to note that the results at ages 8 and 13 differ. At age 8, the drop in performance is between the group who entered before age 1 and the groups who entered after that age; at age 13 the drop is more gradual.

TABLE 4  
ANCOVA FOR SCHOOL PERFORMANCE AT AGES 8 AND 13

AGE AT FIRST ENTRY	AGE 8		AGE 13	
	Adjusted Means	SE	Adjusted Means	SE
1. 0-1.....	10.60 <sup>a</sup>	.30	42.66 <sup>b</sup>	1.32
2. 1-2.....	9.53	.40	39.85	1.79
3. 2+ .....	9.15	.40	36.96	1.77
4. Home care .....	9.62	.39	35.87	1.79
<i>F</i> .....	3.33		3.71	
<i>p</i> .....	.023		.015	

NOTE.—Effects of age of entry, sex of child, and family type as class variables and socioeconomic status and intelligence as covariates. Adjusted means and standard error of measurements.

<sup>a</sup> 1 > 2 *p* = .03, 1 > 3 *p* = .005, 1 > 4 *p* = .05.

<sup>b</sup> 1 > 3 *p* = .01, 1 > 4 *p* = .003, 2 > 4 *p* = .10.

TABLE 5  
BACKGROUND AND PERSONAL VARIABLES TOGETHER WITH AGE OF ENTRY AS PREDICTORS OF CHILDREN'S SCHOOL ADJUSTMENT AT AGES 8 AND 13

	Age of Entry		School Adjustment, Age 8		School Adjustment, Age 13	
	(1)	(2)	(3)	(4)	(5)	(6)
Socioeconomic status .....	-.390*** (-.229)	.245** (.463)	.147 (.279)	.300** (.670)	.302** (.673)	.245* (.552)
Family type .....	.351*** (.884)	-.005 (-.039)	.100 (.823)	-.012 (-.117)	-.013 (-.131)	-.009 (-.098)
Sex of child.....	...	.243** (1.903)	.277** (2.161)	.288** (2.706)	.287** (2.702)	.213* (2.071)
Perceptual and logical ability .....	...	.200* (.052)	.209* (.054)	.193* (.061)	.193* (.061)	.109 (.035)
Verbal ability .....	...	.153+ (.040)	.093 (.024)	.076 (.023)	.077 (.024)	.054 (.016)
Age of entry .....	...	...	-.269** (-.864)	...	.004 (.017)	.116 (.459)
School adjustment, age 8 .....	...	...	...	...	...	.333** (.403)
Intercept.....	3.795	.323	4.608	1.703	1.622	.260
R <sup>2</sup> .....	.176	.241	.296	.256	.256	.331

NOTE.—Standardized regression coefficients appear first in each pair. Metric coefficients are in parentheses.

+  $p \leq .10$ .

\*  $p \leq .05$ .

\*\*  $p \leq .01$ .

\*\*\*  $p \leq .001$ .

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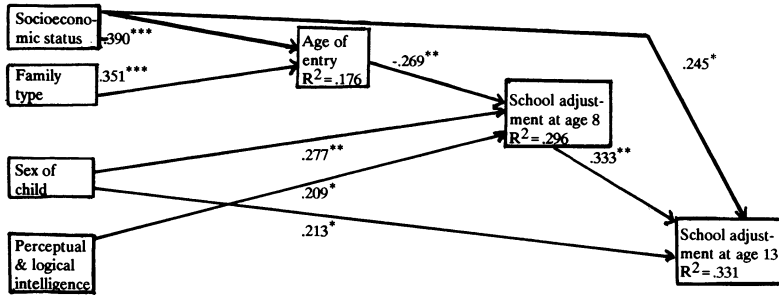


FIG. 3.—Path diagram for school adjustment. Only significant paths are shown

#### Socioemotional Competence

*School adjustment.*—The results from the regression analyses are shown in Table 5. Family background, child gender, and intelligence together explain 24% of the variance in school adjustment at age 8 (col. 2). Variables that have significant effects are socioeconomic status, child gender, perceptual/logical intelligence, and verbal intelligence, but the latter at only the .10 level. Girls, more intelligent children, and children with higher socioeconomic background are rated as better adjusted than other children. When age of entry is added to the model, the explained variance increases to almost 30% (col. 3). Socioeconomic status loses much of its direct effect, as does verbal intelligence. Instead, age of entry shows a strong direct effect on school adjustment.

Turning to teacher ratings at age 13, the background variables and child variables together explain one-fourth of the total variance (col. 4). As at age 8, socioeconomic status, child gender, and perceptual and logical intelligence have significant beta values. At age 13, age of entry does not seem to have

any direct effect at all (col. 5), while school adjustment at age 8 seems to mediate previous effects of intelligence and age of entry (col. 6). School adjustment at age 8 shows the strongest direct effect on school adjustment at age 13.

Overall, the complete model explains one-third of the total variance at age 13. In contrast to the data from age 8, the data at age 13 indicate that the direct effects of socioeconomic status remain after controlling for all the other variables. These findings suggest that whereas home background plays a vital role for children's school adjustment in the later school years, age of entry is more important for school adjustment during the early school years. Figure 3 shows the results presented in the form of a path diagram with only significant paths drawn.

In Table 6 are shown the adjusted means from the ANCOVAs for school adjustment at ages 8 and 13. At age 8, the means gradually decrease in value as a function of age at entry group, indicating that those entering day-care early are better adjusted than

TABLE 6  
ANCOVA FOR SCHOOL ADJUSTMENT AT AGES 8 AND 13

AGE AT FIRST ENTRY	AGE 8		AGE 13	
	Adjusted Means	SE	Adjusted Means	SE
1. 0-1.....	16.04 <sup>a</sup>	.57	18.18	.74
2. 1-2.....	14.77	.77	17.69	.97
3. 2+ .....	14.16	.76	18.03	1.00
4. Home care .....	13.42	.74	18.21	1.01
F.....	2.69		.07	
p.....	.050		.976	

NOTE.—Effects of age of entry, sex of child, and family type as class variables and socioeconomic status and intelligence as covariates. Adjusted means and standard error of measurements.

<sup>a</sup> 1 > 3 p = .05, 1 > 4 p = .007.

TABLE 7  
 BACKGROUND AND PERSONAL VARIABLES TOGETHER WITH AGE OF ENTRY AS PREDICTORS OF CHILDREN'S SOCIAL COMPETENCE AT AGES 8 AND 13

	Age of Entry		Social Competence,			
	(1)	(2)	Age 8	(4)	(5)	(6)
Socioeconomic status.....	-.390*** (-.229)	.248** (.261)	.195+ (.205)	.361*** (1.014)	.270** (.758)	.241* (.683)
Family type.....	.351*** (.884)	-.088 (-.406)	-.031 (-.146)	-.144 (-1.805)	-.059 (-.741)	-.045 (-.573)
Sex of child.....	...	.262** (1.141)	.280** (1.219)	.196* (2.323)	.217* (2.569)	.171+ (2.025)
Perceptual and logical ability.....	...	.130 (.019)	.134 (.019)	.209* (.084)	.211* (.084)	.185* (.073)
Verbal ability.....	...	.214* (.031)	.181+ (.026)	.062 (.024)	.009 (.004)	-.011 (-.004)
Age of entry.....	...	...	-.145 (-.260)	...	-.251** (-1.243)	-.207* (-1.027)
Social competence, age 8.....	...	...	...	...	...	.176+ (.472)
Intercept.....	3.795	3.3374	4.627	4.730	10.778	8.284
R <sup>2</sup> .....	.176	.246	.262	.258	.307	.324

NOTE.—Standardized regression coefficients appear first in each pair. Metric coefficients are in parentheses.

+  $p \leq .10$ .

\*\*  $p \leq .05$ .

\*\*\*  $p \leq .01$ .

\*\*\*\*  $p \leq .001$ .

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those entering later on or not at all. This indicates that early entrance into Swedish center care or family day-care predicts high persistence and independence, verbal facility, an easy transfer from preschool to school, and less anxiety in the school situation. The overall *F* value is significant, as well as the differences between entrance before age 1 and entrance after age 2 or no day-care at all.

At age 13, however, the mean differences across the four groups are not significant. Thus early entrance into day-care does not seem to play an important role for school adjustment in the early teenage period.

*Social competence.*—Table 7 presents the regression analyses for the second main socioemotional factor—social competence. Family background and child characteristics explain about 25% of the total variance in the dependent factor at age 8 (col. 2). Socioeconomic status, child gender, and verbal intelligence have significant direct beta values, indicating that children from middle-class families with educated mothers, girls, and more verbally talented children are rated as more socially competent than other children. It is interesting to note here that verbal intelligence seems to play a stronger role in social competence than perceptual and logical intelligence, while the opposite was true for school adjustment.

When age of entry is added to the model, the explained variance increases by only 1.5% (col. 3)—not enough to conclude that age of entry has an independent effect of its own ( $p = .14$ ).

At age 13, the family and child variables explain around 25% of the variance in the social competence factor (col. 4). The pattern is similar to the one for the school adjust-

ment factor in that socioeconomic status, child gender, and perceptual and logical intelligence have significant beta values.

When age of entry enters the regression equation, the explained variance is increased to almost 31% (col. 5). The beta value for age of entry is significant; the same background and child characteristic variables also remain significant. The beta value for socioeconomic status decreases from .361 to .270, indicating that some of its effect is mediated through age of entry.

Finally, adding social competence at age 8 to the model (col. 6) does not result in any substantial increase in explained variance (1.6%). Social competence at age 8 does not have a significant effect of its own, although the effect approaches significance ( $p = .08$ ). Also, child gender seems to lose some of its direct effect ( $p = .08$ ). Of special interest here, however, is that age of entry significantly predicts social competence at age 13, while it did not do so at age 8. In Figure 4 the significant paths are drawn.

Table 8 gives the results from the ANCOVAs performed on social competence with age of entry, sex of child, and family type as class variables and socioeconomic status and intelligence as covariates. At both ages, early entry into day-care results in higher adjusted means than later entry or no entry at all. As would be expected from the regression analyses, the differences are stronger at age 13 than at age 8. At age 13 there is a significant difference between entry before age 1 and home care, although the overall effect of age of entry for social competence only approaches significance. The results indicate that early entrance into day-care tends to predict a creative, socially com-

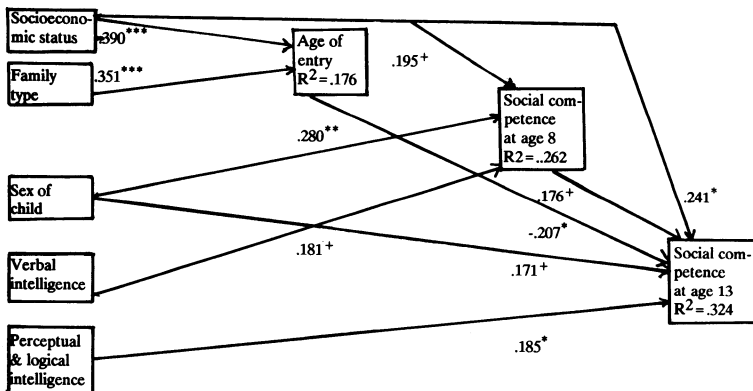


FIG. 4.—Path diagram for social competence. Only significant paths are shown

TABLE 8  
ANCOVA FOR SOCIAL COMPETENCE AT AGES 8 AND 13

AGE AT FIRST ENTRY	AGE 8		AGE 13	
	Adjusted Means	SE	Adjusted Means	SE
1. 0-1.....	12.28	.33	28.66 <sup>a</sup>	.90
2. 1-2.....	12.28	.44	27.23	1.19
3. 2+ .....	11.67	.44	26.37	1.21
4. Home care .....	11.58	.42	24.82	1.23
<i>F</i> .....	.85		2.17	
<i>p</i> .....	.470		.097	

NOTE.—Effects of age of entry, sex of child, and family type as class variables and socioeconomic status and intelligence as covariates. Adjusted means and standard error of measurements.  
<sup>a</sup> 1 > 4, *p* = .01.

fidant, popular, open, and independent adolescent.

## Discussion

The purpose of the present study was to relate cognitive and socioemotional competence at ages 8 and 13 to children's day-care experiences. An important question is whether previously found effects of early day-care (Andersson, 1989) are of a lasting or transitory nature. The results indicate rather long-lasting effects of early day-care experiences, at least in terms of predictive power. At ages 8 and 13, school performance is rated highest among those children who entered day-care before the age of 1; at age 13 school performance is rated lowest among those without out-of-home care. Similar results were found for some of the socioemotional variables. School adjustment at age 8 is rated highest for children who entered day-care before the age of 1 and lowest among those without out-of-home care. The same is true for social competence at age 13. In no instances were any signs of adverse effects of early entry into day-care found.

In an attempt to test a hierarchical, causal model using data from the preschool period and outcome measures at ages 8 and 13, the following paths for cognitive and socioemotional competence were obtained. Family characteristics such as socioeconomic status and type of family influence the time when children are first placed in day-care. Socioeconomic status (but not type of family) together with children's intelligence influence ratings of socioemotional competence at both ages 8 and 13. Also, age of entry seems to have a significant direct effect

on children's social and cognitive competence, even when background variables and intelligence are controlled. Interestingly, some of the effects of socioeconomic status are mediated through the day-care experiences.

Thus it seems as if early day-care together with home background, intelligence, and gender can have effects on children's development right up to the teen years. There is also the possibility that we have uncovered a sleeper effect of age of entry on social competence. We cannot, however, eliminate the possibility that the difference in beta values at ages 8 and 13 is associated with the different items defining social competence at the two ages.

One may always question whether we have been able to exclude all confounding family characteristics when studying day-care effects. We have, for instance, no measure of family income. But income in Sweden is not as salient a variable as it is in the United States. The Swedish taxation system, a heavily progressive one, tends to even out income differences. Additionally, Sweden has a general child allowance system and a system for housing allowances from which most families with children can benefit. Furthermore, single mothers are guaranteed their alimonies from the state, which the state then claims from the fathers. All of this means that it is very difficult to define and measure the economic standard in a single family, and we have refrained from trying to do so. We should also add that day-care in Sweden is highly subsidized. Parents pay only somewhere between 10%–15% of the real costs, and the rest is paid by the state.

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Other variables that we have not directly assessed include the parents' attitudes and values toward child rearing and their children as well as their behavior toward their children. Nevertheless, we know from interviews with the mothers that single mothers work more and complain about having too little time left over for their children (Andersson, 1985). But this condition would in effect go against our hypotheses, since single parents placed their children in day-care at an earlier time.

It is well known that better-off parents often choose high-quality day-care and/or private day-care if they can. This situation was not prevalent in our study. Day-care in Sweden is public, and a particular family can choose from only a few possibilities. When a Swedish family needs day-care, the family may get an offer from the municipality, which, of course, the family can refuse, but the family cannot choose a day-care center. And since most of the costs are subsidized, poor and rich families usually have the same standard of public day-care. That means that the day-care in our study represents normal Swedish day-care, and the probability that there exist any systematic differences in quality related to home background is very small.

One must recognize, however, that this study is not designed to be a representative study of Swedish families with small children. In the first place, all families were recruited from the two largest cities in Sweden. Second, at the start of the project all families lived in neighborhoods with apartment houses, which is a common way of living in Sweden's big cities, although many of the families later moved to their own houses. Third, single parents were oversampled. The last condition was controlled for in our analyses and should therefore not distort the results. Whether the first two conditions have influenced our results is harder to tell. When we checked our sample against population statistics, however, we found that our sample deviated very little from the relevant distributions in Stockholm and Göteborg (Sandqvist, 1982). Thus, we conclude that our sample rather well corresponds to normal families with small children in big cities.

Another important factor that might influence the results is the possibility that parents, irrespective of family background, who place their children in early day-care compensate for this by spending extra time with

their children and by providing them with extra stimulation. Likewise, parents who are able to work outside the home because their children are in day-care may also grow as parents.

Nevertheless, it is also possible that we have managed to uncover a positive effect of day-care, and there is no reason to exclude this possibility. When negative effects associated with day-care are found, they are seldom explained only by family characteristics.

It is important here to discuss the differences between our results and the results of Vandell and Corasaniti (1990). We regret that we were unable to add any measures of day-care quality to our study. Several authors have maintained that quality of day-care is related to children's development (see, e.g., Broberg, Hwang, Lamb, & Ketterlinus, 1989; Phillips et al., 1987; Scarr et al., 1990; Schliecker, White, & Jacobs, 1989; Vandell, Henderson, & Wilson, 1988; White, Jacobs, & Schliecker, undated). One must remember, however, that the children in this study were born in 1975 and 1976. At this time day-care research was still occupied with comparisons between home care and out-of-home care, and not until later did the quality of care become such an important issue. Nevertheless, the lack of quality measures does not invalidate the present results, although the explained variance probably is less than if we also had included quality measures.

In order to understand the differences in results between this and Vandell and Corasaniti's study (1990) we must, as stressed by Vandell (in press), interpret the data in the context of child care standards. When we talk about early day-care in this study one must observe that this means either high-quality center care or licensed family day-care with trained caregivers. American researchers visiting Sweden are usually very impressed by the standards of quality. Kamerman, in a comparison among 18 countries, including the United States, concluded: "... we can note that the child care services in Sweden offer the highest quality of out-of-home care available anywhere. Quality is stressed far more extensively than in most other countries. Standards of group size, staff/child ratios, and caregiver qualifications are based on extensive research and are rigorously set and enforced" (1989, p. 102). And Belsky (in press), like Vandell and Corasaniti (1990), refers to the high standards of

Swedish day-care in explaining the differences in results between American and Swedish results. The Vandell study was, for instance, performed in a state with very low standard requirements.

It is also important to note that early day-care in the present study refers to day-care that was typically initiated in the infant's second half year. At the time our study began, parental leave was available at full pay during the infant's first 6 months.

Thus the situation concerning both day-care and parental leave is quite different from that of the American scene, and therefore our data cannot be translated without consideration of the ecological contexts, especially the national family and child policies, which prevail in the two countries. For a more detailed description of the policy in Sweden, the reader is referred to Andersson (1989) and Broberg (1989).

A hypothesis for further investigation suggested by this study and Vandell and Corasaniti's (1990) is that the quality of care experienced in infancy is vital for later development. If infants are offered positive experiences, warmth, and high-quality care, they may enter a positive trajectory that can promote development for many years to come. If they instead are offered low-quality care and negative experiences, they may enter a negative trajectory with possible long-term negative outcomes.

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