Short- and Long-Term Effects of Child Care on Problem Behaviors in a Dutch Sample of Twins

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This study examined the association between early child care on the development of behavior problems. At the age of 5 years, child care information was collected from parents on a large group of twins who were born between 1985 and 1997. Mothers and fathers rated the behavior of the child at ages 3, 7, and 10 years using the Child Behavior Checklist (CBCL) and teachers reported on the same children's behaviors using the Teacher's Report Form (TRF) at ages 7 and 10. At the age of 3 years, children with nonparental child care experiences had more externalizing problems than children with only parental child care. The long-term effects of quantity of child care were mixed and were only significant for mother ratings and for children from families with a low socioeconomic status. Overall, the effect sizes of child care were very small (effect sizes were between .12 and .23). Children with a larger amount of child care did not show more behavior problems, therefore it was questioned whether the increased levels of behavior problems could be attributed to quantity of child care.

Recent findings of the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network showed that children who spent more time in nonparental child care during the first years of life had more externalizing problems at 54 months (NICHD, 2002, 2003). This association was independent of the quality of the child care and family characteristics, such as maternal sensitivity and educational level of mother. Although it was an American study, the results led to questions about the effect of early nonparental child care on children's development. In the Netherlands, the development of institutionalized child care has increased in recent years. From 1990 to 1999, the use of institutional child care grew from 6.1% to 17.4% (CBS, 2003). Many differences exist between the Netherlands and the USA in the organization of nonparental child care and in the labor participation of women. In the Netherlands, the organization of child care is often regulated by the government and has a relatively high quality compared to the child care centers in the USA (Van Ijzendoorn et al., 1998). In addition, most of the working mothers have a part-time job and only a small proportion of young Dutch children have full-time nonparental care. The main purpose of this study is to examine the association between early nonparental child care on behavior problems in a Dutch sample. An important question is whether the results of the NICHD study can be generalized to the Dutch experience.

Studies that examined the effect of early child care on behavior problems in young children showed mixed results (Belsky, 2001; Lamb, 1998). Different aspects of child care, such as type of daycare, quantity, quality, and stability of placement may affect behavior problems in young children. Quantity of early child care as a predictor for increased levels of externalizing behaviors has been reported by the NICHD study of early child care. The NICHD study is a longitudinal study that followed more than 1000 children. From birth on, data on child care measures, child, home and family environments were obtained by means of interviews and observations when children were 6-, 15-, 24-, 36-, and 54-months-old (Belsky, 2001). Regarding behavior problems, the mean finding is that children who spent a large amount of time in child care during the first 4.5 years of life were rated as more aggressive at 54 months (NICHD, 2002, 2003). This association remained statistically significant after correction for quality of the child care and family characteristics. Early findings, involving the same sample, reported more behavior problems for the 2-year-old children who spent more time in child care, but not for the 3-year-old children (NICHD, 1998). Also, it seemed that quality of care was important for the 2- and 3-year-old children; lower quality of care predicted more behavior problems. Instead of quantity, Love et al. (2003) emphasized the role of quality of care.

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At the hand of the results of three studies they showed the association between quality child care and behavior problems. The first study described an Australian sample of 147 families with a relatively high quality of child care. The results showed no association between problem behaviors and quantity and type of early child care, while stability of care had a negative influence on problem behaviors. The second study described was child care in the context of the federal Early Head Start program, an organization providing child development programs in the United States, which included mainly children from low income families receiving good quality center-based care. For this group of children, child care reduced the levels of aggressive behaviors, and suggests that quality is at least as important for certain subgroups. The third study described was an Israeli sample with low quality care and with high diversity of socioeconomic status (SES). It appeared that the low quality had negative effects on the security attachment relations of the children. Several other studies cite the instability of child care and number of child care arrangements as risk factors for increased behavior problems (Bacharach & Baumeister, 2003; De Schipper et al., 2003; Youngblade, 2003). Thus, it seems that there is a relation between early child care and problem behaviors, but it remains unclear whether quantity of child care, quality, type, stability, or number of arrangements account for the findings.

The present study examined the relation between quantity of early child care and behavior problems in young children. Previous studies showed that early child care had beneficial effects on children from lower income families (Borge et al., 2004; Hagekull & Bohlin, 1995; Votruba-Drzal et al., 2004). It was shown that especially high quality early child care experiences had beneficial effects. There are also indications that the association between child care and behavior problems is moderated by sex. Boys seemed to be more sensitive to the effects of early child care (Barglow et al., 1998; Hagekull & Bohlin, 1995). Because of the possible moderating effect of SES and sex, we will test whether there is an interaction between child care and sex and SES.

In the Netherlands, two types of child care could be distinguished: institutionalized care (center care and playgroups for toddlers) and informal care arrangements (family members and paid babysitters). About 16% of families make use of care centers, and 5% make use of care centers in combination with other forms of care (SCP, 2002). A large proportion of 3-year-old children attend playgroups for toddlers (30%). As this type of child care is only open 3 hours a day and not more than two to three times a week, it hardly has any function for working mothers. About 30% make use of informal child care. In the present study, nonparental care included all possible types of child care outside the home (including playgroups for toddlers). The control group consisted of children who did not attend child care and had been raised exclusively by their parents.

Furthermore, the question as to whether the effects of child care on behavior problems are longstanding or whether these are 'adjustment' effects will be addressed. That is, do children in child care have more problems because they have to adjust to a new environment, are the problems temporary or do the problems have a more enduring character? Externalizing and internalizing behavior problems were assessed using the Child Behavior Checklist (CBCL) and the Teacher's Report Form (TRF). Both sources of information were used because it is known that different informants tend to have different points of view and to observe different behaviors in different settings (Verhulst & Akkerhuis, 1989). Parental ratings were available for 3-, 7- and 10-year-old children and teacher ratings were available for the 7- and 10-year-old children. Because the age of the mother at birth and the educational level of mother were confusing variables, these two variables were included as covariates.

Method

Sample

The data of the present study were derived from a large, ongoing longitudinal twin study that examines the genetic and environmental influences on the development of behavior problems in families with 3- to 12-year-old twins. The families are volunteer members of the Netherlands Twin Register (NTR), kept by the Department of Biological Psychology at the Free University in Amsterdam (Boomsma et al., 2002). Since 1986 the NTR has recruited families with twins a few weeks or months after birth. Currently 40% to 50% of all multiple births are registered by the NTR. Both fathers and mothers of twin pairs were asked to fill in questionnaires about behavior problems for their twins at ages 3, 5, 7 and 10 years. Day care information was obtained at the age of 5 years. About 9000 questionnaires were available at this time for twins of birth cohorts 1987 to 1997. Parent permission was obtained and teachers were asked to fill in a questionnaire about behavior problems after they had known the child for at least 3 months. An overview of the available questionnaires for each age and rater is given in the upper part of Table 1. The decrease in sample size reflects the fact that the study is an ongoing longitudinal study and that some twins had not yet reached the appropriate age. For complete cohorts, the response rate was 77% for age 3 years (at least one questionnaire was returned) and the continued participation was around 80%. A family was excluded when a child went to a medical child care setting. The statistical analyses were carried out on a sample that randomly included the oldest or the youngest of a twin pair.

Measures

Behavior problem rated by the parents and teachers. At the age of 3 years, externalizing and internalizing

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behavior problems were measured with the CBCL/2–3 (Achenbach, 1992). Parents were asked to rate the behavior of the child for the preceding six months on a three-point scale. The CBCL/2–3 includes two broad categories of problem behaviors: externalizing behaviors (including the syndromes aggressive behavior, oppositional and overactive problems) and internalizing behaviors (including the syndromes anxious and withdrawn/depressed). The syndromes are constructed for the Dutch population (Koot et al., 1997) and comparable with the syndrome scales as developed by Achenbach (1992). Behavior problems were measured at the ages of 7 and 10 years with the CBCL4–18 (Achenbach, 1991a). The externalizing and internalizing scales overlap with the CBCL/2–3 to a large extent. Again, two broad problem dimensions were derived: externalizing (including the syndromes rule breaking behavior and aggressive behavior) and internalizing behavior (including the syndromes withdrawn, somatic complaints, and anxious/depressed behavior). At the ages of 7 and 10 years, teachers were requested to rate behavior problems using the Teacher's Report Form (TRF; Achenbach, 1991b). The problem scales were the same as for the CBCL4–18.

Child care. Child care information on the first 4 years of life were obtained at the age of 5 years and included information on the type of child care setting, the period of nonparental child care, and the number of times per week. If there was only home care, then the mother was asked whether the home care was mainly provided by parents or by nonparental caretakers. Children with home care, provided by nonparental caretakers were excluded from the analyses. As the association between nonparental child care and behavior problems from the age of 3 years onwards was examined, only child care experiences during the first 3 years were used. Types of child care possible were child care centers, playgroups for toddlers, medical day care centers and an 'other' category of nonparental child care. Child care centers in the Netherlands have, for the most, part a full-day program and parents are able to place their children in care five times a week. Playgroups for toddlers are for children between the ages of 2 and 4 years, and are only open 3 hours a day. To quantify the amount of child care, the number of months spent in outside child care during the first 3 years of life was multiplied with the number of visits per week. Subsequently, the total amount of time was divided into three categories: low, medium and high. The characteristics of these three groups are displayed in the lower part of Table 1.

Educational level and SES. Both the child's parents were asked about their profession and education once the child reached 3 years of age. The education level was measured on a 13-point scale, ranging from primary education only to postdoctoral education. Educational level was classified into five categories, from elementary school to university level. For presentation purposes, the five educational levels are collapsed to three levels (low, middle, high) in Table 1. The SES was obtained from a full description of the occupation of the parents. Subsequently, the level of occupation was coded according to the system used by Statistics Netherlands (CBS, 1993). The code was based on the mental complexity of the work and ranged from low-skilled to scientific work. The level of occupation was classified into three levels: low, middle and high. When the occupation information was present for both parents, the highest level was used.

Statistical Analyses

Dependent variables were analyzed using the Generalized Linear Modeling procedure (GLM; SPSS Inc., 2003). In all analyses age and educational level of the mother were included as covariates. Between factors were quantity of child care (none, low, medium or high), sex of the child, SES (low, middle or high), and cohort (1987–1989, 1990–1993, 1994–1997). To test whether the effect of child care was moderated by SES and sex, the interaction between child care and SES, and the interaction between child care and sex were specified in the model. If an interaction was nonsignificant then the interaction was removed from the model and the GLM was repeated. To evaluate the practical importance of significant findings, the effect size (Cohen's *d*) was computed. This was done by computing the difference between estimated means divided by the square root of the Mean Square Error (*MSE*). An effect size of 0.20 is considered small, of 0.50 moderate, and 0.80 large.

Results

Descriptives of the Sample

As shown in Table 1, about 75% of the children have some form of child care outside home. Most of the children visited playgroups for toddlers. If we examine the children with substantial time spent in child care (medium and high), it is seen that with increasing birth cohorts, the use of nonparental care had been increased. In the first birth cohorts, about 3.5% of the children had a medium amount of child care, and in the latest cohort this percentage was 12%. Also, the percentage of children with a high amount of child care increased fourfold. As expected, the three groups with different amounts of child care (low, medium and high) differ with respect to the type of care, age of entry, average period and frequency per week. As shown in the lower part of Table 1, the group who received low amounts of child care included mainly children who went to playgroups for toddlers, and entered child care with an average age of 28 months around twice a week. The group who received a high amount entered child care at an earlier age and visited child care more frequently.

Table 1 also included the family characteristics of the groups with different amounts of child care. In the group who received high amounts of child care, the mothers with high educational levels formed the largest group, while in the group who received low amounts of child care, the mothers with a low educational level formed the largest group (χ^2 [6] = 550.21;

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$p < .01$). The same pattern was seen for SES. Children from high SES families made more use of child care (χ^2 [6] = 380.32; $p < .01$). Furthermore, the four child care groups differed with respect to age of the mother (F [3, 8376] = 42.80; $p < .01$). Older mothers made more use of child care. To account for these differences, the ages and educational levels of the mothers were included as covariates in the statistical analyses.

Table 1

Number of Surveys at the Different Ages, Family, Child and Child Care Characteristics for the Groups with Varying Amount of Child Care

	3 years of age	7 years of age	10 years of age	
Number of surveys				
Mother	7411	6213	2856	
Father	4808	4847	3739	
Teacher	–	2012	1709	
	None	**Low**	**Medium**	**High**
Cohort				
1987–1989	595 (32.8%)	1120 (61.7%)	63 (3.5%)	36 (2.0%)
1990–1993	775 (24.6%)	1988 (63.3%)	211 (6.7%)	172 (5.5%)
1994–1997	619 (18.0%)	2137 (62.0%)	414 (12.0%)	276 (8.0%)
total number	1989 (23.7%)	5245 (62.4%)	688 (8.2%)	484 (5.8%)
Family characteristics				
Age mother	30.3	30.6	31.6	32.1
Educational level mother				
Low	49.7%	38.2%	22.8%	16.6%
Middle	39.8%	44.1%	39.2%	35.2%
High	10.6%	17.7%	38.1%	48.3%
Socioeconomic status (SES)				
Low	30.5%	20.4%	8.9%	4.5%
Middle	47.4%	49.6%	41.8%	33.5%
High	22.2%	30.0%	49.3%	62.0%
Sex				
Boys	47.7%	49.8%	45.8%	49.0%
Girls	52.3%	50.2%	54.2%	51.0%
Child care characteristics				
age of entry (months)	–	28.2	9.7	4.7
average period (months)	–	7.7	25.3	31
frequency per week	–	2.1	2.4	3.5
type of setting				
child care center	–	6.7%	57.9%	64.1%
playgroup for toddlers	–	90.2%	0.0%	0.0%
others	–	0.9%	9.1%	7.2%
combination of care settings	–	2.3%	33.0%	28.7%

Note: Number of surveys — the number of questionnaires available at the different ages. For mother and father the number indicates twin pairs. For teachers the number indicates number of twins.

Family characteristics — family and child characteristics for the groups with varying amount of child care (none, low, medium, and high amount of child care).

Child care characteristics — for the groups with varying amount of child care.

Nonparental Child Care and Behavior Problems

The means of the CBCL externalizing and internalizing behaviors are given for each rater, age, amount of child care, and by family characteristics in Table 2 and Table 3. Table 4 displays the statistical outcomes (displayed as F-values) of the final models of CBCL and TRF data. The initial analyses included 'child care × sex' and 'child care × SES' interactions in the model, but an interaction was removed from a model when it was not significant. In Figure 1, the relation between externalizing problems and amount of child care is depicted by sex and SES for 3-year-old children.

Externalizing behaviors. At the age of 3 years, parents reported more externalizing problems for children who had had out-of-home child care than for children with exclusively parental care. Post hoc comparisons of the adjusted means (with Bonferroni-correction) showed that children who received no child care differed from low and medium but not from high amounts of child care. Overall the effect sizes of child care were very small (the significant effect sizes for fathers in brackets): .20 (.17) and .23 (.12) for low and medium amounts of child care respectively. At the age of 7 years, the effect of child care on behavior problems differed across raters. A significant interaction between child care and SES was found for the mother reports. Additional analyses showed that the effect of quantity of child care was only significant in the low and middle SES families. The low and middle SES children with nonparental care showed more behavior problems than children with only parental care. The analyses of father and teacher reports yielded no significant effects of child care on behavior problems. At age 10, a significant interaction between SES and child care was found for mother-rated behaviors. Additional analyses showed a child care effect only for low SES families. Children from low SES families and with low amounts of child care had more mother-reported externalising problems than children without out-of-home child care. In the middle and high SES families, no child care effect was found.

Internalizing behaviors. Child care was significantly associated with internalizing problems at the age of 7 years. Mother reports showed that children who received low and medium amounts of child care showed more internalizing problems. However, effect sizes were small, .13 for children with low amounts of child care and .19 for children with medium amounts of child care. No other child care effects were found for other ages or raters.

Background Variables and Behavior Problems

Externalizing problems. Across ages and parental reports, the mother's age was associated with externalizing problems. Children of older mothers showed fewer behavior problems than children of younger mothers. The age of the mother was not a significant factor when the teacher rated the child. In addition, a significant effect of educational level of mother was found. A higher educational level of the mother was

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Table 2

Means and Standard Deviations for CBCL Externalising Behaviors as Rated by Mother, Father and Teacher

	3 years of age				7 years of age						10 years of age					
	Mother		Father		Mother		Father		Teacher		Mother		Father		Teacher	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Child care																
None	15.01	(9.48)	14.49	(9.22)	7.18	(6.57)	6.50	(5.98)	4.72	(7.67)	6.58	(6.90)	5.90	(6.15)	4.97	(8.14)
Low	16.60	(9.96)	15.70	(9.74)	8.07	(6.92)	6.99	(6.32)	4.52	(7.53)	7.16	(6.93)	5.96	(6.17)	5.40	(8.65)
Medium	16.07	(9.41)	14.40	(8.72)	7.19	(6.69)	6.05	(6.02)	4.34	(7.46)	6.17	(6.31)	5.38	(5.89)	4.75	(7.76)
High	14.81	(9.35)	12.99	(8.74)	6.74	(6.09)	5.59	(5.42)	4.37	(6.84)	6.07	(6.46)	4.99	(5.76)	6.59	(10.21)
Age mother																
< = 26	18.57	(10.29)	17.50	(10.03)	9.30	(7.22)	7.67	(6.40)	6.07	(9.11)	8.37	(7.61)	6.81	(6.49)	6.27	(9.32)
> 26 and < = 33	16.20	(9.72)	15.22	(9.42)	7.59	(6.66)	6.75	(6.15)	4.32	(6.96)	6.76	(6.70)	5.98	(6.20)	5.13	(8.41)
> 33	14.54	(9.43)	13.82	(9.17)	7.03	(6.47)	6.01	(5.84)	4.30	(7.52)	6.25	(6.67)	4.75	(5.22)	5.09	(8.32)
Educational level mother																
Low	17.20	(10.03)	16.31	(9.69)	8.42	(7.10)	7.27	(6.29)	4.77	(7.67)	7.52	(7.25)	6.55	(6.35)	6.33	(9.45)
Middle	15.79	(9.66)	15.08	(9.38)	7.50	(6.54)	6.64	(6.11)	4.57	(7.47)	6.69	(6.57)	5.64	(5.86)	4.71	(8.17)
High	14.07	(9.13)	12.78	(8.85)	6.45	(6.19)	5.71	(5.76)	3.64	(6.31)	5.82	(6.33)	4.72	(5.54)	4.20	(6.95)
Sex																
Boys	16.98	(10.02)	15.72	(9.75)	8.90	(7.23)	7.84	(6.61)	6.22	(8.66)	8.28	(7.70)	6.85	(6.68)	7.59	(10.26)
Girls	15.04	(9.43)	14.38	(9.13)	6.43	(5.96)	5.51	(5.37)	2.66	(5.16)	5.55	(5.68)	4.80	(5.25)	3.09	(5.64)
SES																
Low	17.44	(10.43)	16.63	(10.04)	8.88	(7.41)	7.60	(6.46)	5.50	(8.23)	7.77	(7.16)	6.71	(6.43)	7.10	(10.15)
Middle	16.28	(9.62)	15.64	(9.41)	7.80	(6.73)	6.97	(6.29)	4.52	(7.25)	6.98	(7.00)	5.95	(6.03)	5.10	(8.33)
High	14.59	(9.38)	13.40	(8.97)	6.60	(6.04)	5.79	(5.60)	3.88	(6.90)	5.98	(6.32)	4.94	(5.53)	4.25	(7.14)

Table 3

Means and Standard Deviations for CBCL Internalising Behaviors as Rated by Mother, Father and Teacher

	3 years of age				7 years of age						10 years of age					
	Mother		Father		Mother		Father		Teacher		Mother		Father		Teacher	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Child care																
None	4.67	(3.97)	4.34	(3.77)	4.29	(4.19)	3.28	(3.47)	4.44	(4.76)	4.97	(5.27)	3.85	(4.16)	4.86	(5.31)
Low	4.64	(3.89)	4.44	(3.87)	4.86	(4.60)	3.69	(3.88)	4.46	(4.99)	5.15	(5.28)	3.84	(4.30)	5.13	(5.92)
Medium	4.51	(3.91)	3.95	(3.49)	4.88	(4.48)	3.64	(3.86)	4.49	(4.33)	4.77	(4.91)	3.81	(4.16)	5.45	(6.44)
High	3.93	(3.80)	3.76	(3.12)	4.64	(4.73)	3.67	(3.77)	3.74	(4.17)	4.62	(5.45)	3.41	(4.18)	4.86	(6.14)
Age mother																
< = 26	5.15	(4.07)	4.87	(3.91)	5.08	(4.59)	3.77	(3.81)	4.28	(4.66)	5.53	(5.74)	4.04	(4.13)	5.24	(5.64)
> 26 and < = 33	4.68	(3.94)	4.43	(3.79)	4.72	(4.53)	3.62	(3.87)	4.29	(4.78)	5.11	(5.31)	3.93	(4.36)	4.86	(5.67)
> 33	4.20	(3.81)	3.87	(3.55)	4.38	(4.30)	3.31	(3.48)	4.65	(5.00)	4.61	(4.87)	3.37	(3.99)	5.31	(5.97)
Educational level mother																
Low	5.05	(4.19)	4.72	(3.94)	4.71	(4.50)	3.54	(3.72)	4.29	(4.99)	5.14	(5.37)	3.91	(4.36)	5.28	(5.88)
Middle	4.52	(3.80)	4.28	(3.69)	4.71	(4.51)	3.57	(3.80)	4.68	(4.87)	4.99	(5.14)	3.77	(4.16)	4.89	(5.60)
High	3.94	(3.63)	3.69	(3.44)	4.51	(4.36)	3.54	(3.75)	4.08	(4.46)	4.96	(5.25)	3.66	(4.15)	4.91	(5.97)
Sex																
Boys	4.58	(3.98)	4.30	(3.77)	4.46	(4.37)	3.45	(3.63)	4.66	(5.13)	4.87	(5.04)	3.77	(4.24)	5.32	(6.03)
Girls	4.62	(3.90)	4.32	(3.74)	4.88	(4.58)	3.66	(3.89)	4.15	(4.52)	5.21	(5.48)	3.84	(4.26)	4.78	(5.49)
SES																
Low	5.23	(4.26)	4.71	(3.88)	4.81	(4.52)	3.53	(3.65)	4.30	(4.88)	5.22	(5.18)	3.88	(4.22)	4.99	(5.33)
Middle	4.66	(3.92)	4.50	(3.82)	4.74	(4.52)	3.68	(3.85)	4.45	(4.78)	5.09	(5.39)	3.84	(4.32)	5.04	(5.68)
High	4.08	(3.66)	3.87	(3.55)	4.47	(4.42)	3.41	(3.69)	4.36	(4.86)	4.85	(5.14)	3.75	(4.34)	4.96	(5.89)

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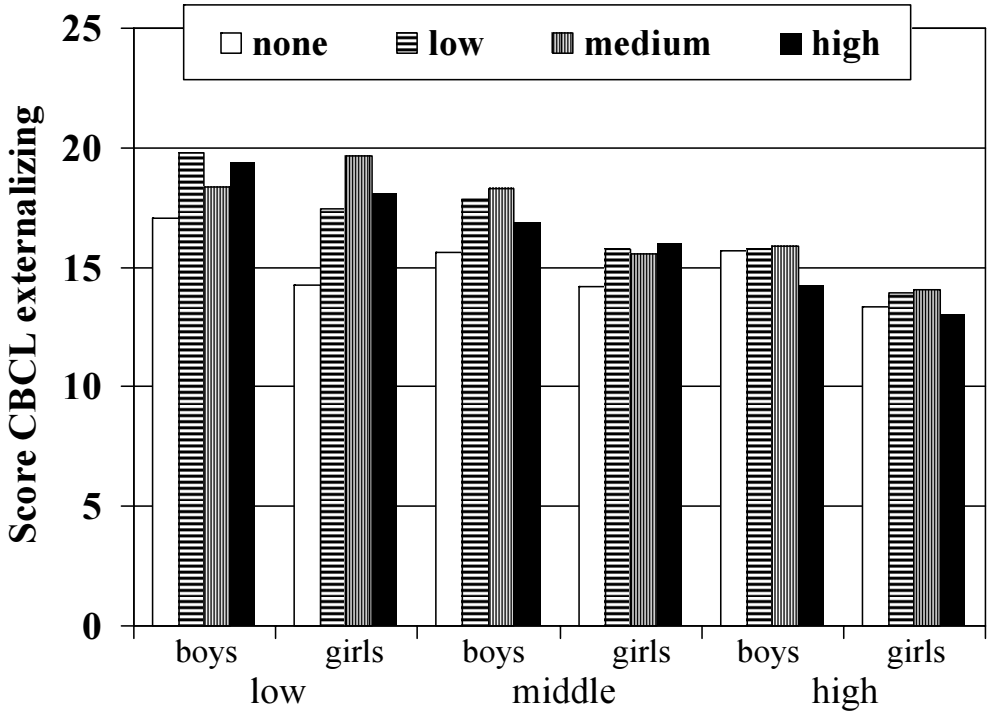

Figure 1

Quantity of child care (none, low, medium or high) and mother-reported externalizing problems of 3-year-old children by sex and SES (low, middle, high).

associated with less externalizing problems. This effect was present across ages and raters. Another consistent finding across ages and raters was the differences between boys and girls. As expected, all raters reported more externalizing problems for boys than for girls and these differences became more significant with increasing age. The effect sizes of sex for mother-reported behaviors (the sizes for fathers in brackets) were .21 (.16), .42 (.41), and .43 (.37) respectively for 3, 7, and 10 years of age. Teacher reports found the effect sizes of sex to be .50 at age 7 and .53 at age 10. The effects of SES were inconsistent across ages and raters. At age 3, fewer problems were reported in high SES families than in low SES families. The effect sizes of SES were small and ranged between .14 and .27 across raters and ages. Cohort differences were only significant at age 3 and 10. At age 3, mothers reported more problems in the later birth cohorts. At age 10 years, the effect of cohort was marginal.

Internalizing behaviors. In the lower part of Table 4, the results of the GLMs are given for internalizing behaviors. Across ages and raters, the most consistent finding is a significant effect of mother's age. Children of older mothers showed less internalizing problems. The only sex difference was found for mother-rated behavior at the age of 7 (effect size: .08): girls were rated to have more internalizing problems than boys. A mother's educational level seemed to play a role at the age of 3 years. A higher educational level was associated with less internalizing problems. SES differences were only found for mother-reported problems at age 3. Children of low SES families showed more internalizing problems than those in high SES families (effect size: .17).

Discussion

The main purpose of this study was to examine the association between early nonparental child care and behavior problems in a Dutch sample using parental and teacher reports. The findings of this study reveal that early nonparental child care have short-term effects on behavior problems. Consistent with earlier reports (Baydar & Brooks-Gunn, 1991; Burchinal et al., 1995; Egeland & Hiester, 1995; Harvey, 1999; NICHD, 2002, 2003), 3-year-old children with early child care had more behavior problems than children with only parental care. These effects were obtained after controlling for SES, maternal age, maternal educational level and sex.

The present study found that children with low and medium amounts of child care displayed more problem behaviors than children with only parental care. Remarkably, children with high amounts of child care did not display more problem behaviors. Thus, it could be questioned whether quantity of child care is the only predictive factor for problem behaviors. Several other alternative explanations to care quality could be considered. For example, the increased levels

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Table 4

Summary of GLM Analyses (*F*-values) with CBCL Externalizing and Internalizing as Dependent Variables

	Externalizing behavior							
	3 years of age		7 years of age			10 years of age		
	Mother (n = 6754)	Father (n = 4406)	Mother (n = 5050)	Father (n = 4026)	Teacher (n = 1601)	Mother (n = 3134)	Father (n = 2420)	Teacher (n = 1460)
Age mother	85.57**	30.91**	27.37**	16.83**	1.60	23.19**	28.25**	< 1
Education mother	40.45**	26.98**	17.59**	11.62**	< 1	7.17**	10.13**	6.32*
Sex	77.81**	27.66**	226.30**	172.50**	101.75**	144.28**	80.85**	101.39**
Quantity child care	16.01**	7.77**	7.08**	2.51	< 1	3.15*	< 1	< 1
SES	6.03**	6.67**	1.63	5.06**	2.03	< 1	2.15	4.99**
Cohort	3.91*	< 1	< 1	< 1	< 1	4.38*	3.54	< 1
Child care * SES	–	–	3.47**	–	–	3.95**	–	–
	Internalizing behavior							
	3 years of age		7 years of age			10 years of age		
	Mother (n = 6779)	Father (n = 4417)	Mother (n = 4971)	Father (n = 3991)	Teacher (n = 1531)	Mother (n = 3094)	Father (n = 2403)	Teacher (n = 1402)
Age mother	26.01**	19.29**	7.22**	5.67*	5.03*	9.79**	8.58**	< 1
Education mother	20.31**	16.74**	< 1	< 1	< 1	< 1	< 1	< 1
Sex	< 1	< 1	7.57**	1.72	2.38	1.19	< 1	3.15
Quantity child care	1.16	1.35	5.53**	2.41	< 1	< 1	< 1	< 1
SES	9.08**	1.16	1.57	< 1	< 1	< 1	< 1	< 1
Cohort	2.29	< 1	< 1	1.69	< 1	1.95	< 1	< 1

Note: ** $p < .01$; * $p < .05$.

of behavior problems may represent an adjustment to new situations. The majority of children in the low amounts of child care group attended playgroup for toddlers after the age of 2.5 years and only a few times a week. The period of entry to the playgroup coincides with the period in which the parents reported the behaviors of their twins. Another possible explanation could be the differences in types of care arrangements, or differences in the stability of the child care. Both aspects of child care have been associated with increased levels of behavior problems (Bacharach & Baumeister, 2003; De Schipper et al., 2003; Youngblade, 2003;). As shown in Table 1, both type and stability differed among the various quantity groups. In addition, it is not possible to preclude that the association was the result of unmeasured factors. Examples of unmeasured factors are maternal sensitivity and maternal stress. The NICHD study (2003) showed that maternal sensitivity/maternal stress was a stronger predictor for behavior problems than was quantity of care. Likewise, it may be that parents with children who have, for example, more externalizing problems are more inclined to place their children into day care. These variables were not directly tested in this study. Given, however, that most mothers enroll their children in one form of day care or another, combined with the large sample sizes, it seems likely that these factors do not explain all of these differences.

We tested whether low SES groups may have benefited from child care, but no indications of such an advantage were found. A negative association was found, however, between child care and problem behaviors for the 7- and 10-year-old children of low SES families. This is an unexpected finding, because it has been repeatedly reported that children from low SES families may benefit from child care (Borge et al., 2004; Peisner-Feinberg et al., 2001; Votruba-Drzal et al., 2004). It may be that the 'time spent' in nonparental care is a mediating variable in these findings. In the Netherlands many women have part-time jobs and the time spent in child care is limited to 2 to 3 days a week. And as shown in Table 1, only a few low SES families made use of child care centers. Therefore, it may be that the 'time spent' at the day care is too little to provide the beneficial effect of lowering externalizing behavior problems.

The present study showed that the long-term effects of early child care on behavior problems were mixed. At the age of 7 and 10 years, an effect of quantity of care was only found in low and middle SES families, not in high SES families. A second and methodologically important finding is that the long-term effect of early child care was only present for mother ratings. The reason for differences in maternal, paternal and teacher reports on child behavior problems has been studied by many (Verhulst &

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Akkerhuis, 1998); however, it is important to consider that mothers may be especially sensitive to the effects of others raising their children. It is conceivable that the perception of the mother may be biased because the mother may experience more stress in combining the duties of work and parenthood.

The results of this study should be viewed in light of the limitations of the study. One limitation is that the child care reports are based on retrospective reports. At the age of 5 years the mother was asked about child care over the first 4 years of life. Retrospective data may be less reliable. However, our child care could be validated to some extent. At age 3, information was obtained about child care covering the previous 3 months prior to filling in the survey. With respect to child care centers, 88% of the mothers in the survey who reported making use of child care centers when the child was 5 years of age also reported making use of these at 3 years of age. Another limitation is the lack of information about the quality of child care. However, quality seems to be an important factor only when the quality of day care is low. The quality of child centers in the Netherlands is rather good compared to that of other European and North American countries (Van IJzendoorn et al., 1998). A third limitation might be the use of a twin sample. Twins and singletons may differ in behavior problems for several reasons. For example, twins have a higher rate of congenital anomalies and have lower birth weights. Also, upbringing may differ between twins and singletons. Van den Oord et al. (1995) compared the level of behavior problems between 3-year-old twin pairs and singletons and found no twin–singleton differences. This finding provides support for the generalization of the results to the population of singletons.

In conclusion, the results show that 3-year-old children with low and medium amounts of child care have more behavior problems compared to children with only parental care. Even at the ages of 7 and 10 years, the level of behavior problems in low SES groups remained higher. Although the effect sizes of early child care were low (not larger than .23) and do not suggest extreme behavior problems, it is important to be aware of the potential influence of child care on problem behaviors. Further, it was found that maternal reports differ from the paternal and teacher reports. With respect to this finding, the issue is raised as to whether more than one informant should be used when collecting data on the effects of child care on children's behavior.

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