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Infant Behavior & Development 29 (2006) 276–288
Infant Behavior & Development

Peer interaction in child care centres at 15 and 23 months: Stability and links with children's socio-emotional adjustment

Mirjam Gevers Deynoot-Schaub [a], J. Marianne Riksen-Walraven [b,*]

[a] *Department of Education, University of Amsterdam, The Netherlands*
[b] *Department of Developmental Psychology, Radboud University Nijmegen, P.O. Box 9104, 6500 HE Nijmegen, The Netherlands*

Received 12 July 2005; received in revised form 17 December 2005; accepted 30 December 2005

Abstract

In this longitudinal study, 70 children were observed during 90 min of free play in their child care centres at 15 and 23 months of age. The children (39 boys and 31 girls) attended 51 different care groups in 39 centres. The occurrence and stability of peer interactions in the second year of life and their relations to children's socio-emotional adjustment were examined. The frequency of children's negative initiatives towards peers showed significant inter-individual stability from 15 to 23 months and predicted child aggressive/disruptive behaviour at 23 months as rated by professional caregivers in child care. Involvement in positive interactions with peers, and particularly positive responses to peer behaviours at 15 months, predicted well-being in child care at 23 months as rated by professional caregivers. The frequency of negative initiatives towards peers significantly increased and the frequency of positive responses to peer behaviours significantly decreased from 15 to 23 months.

Keywords: Peer interaction; Toddler; Child care; Longitudinal; Socio-emotional adjustment; Aggression

Many parents choose centre-based child care for their infants and toddlers because they assume that early experience with peers will contribute to their children's well-being and the development of social competence. Others, in contrast, attach less value to early peer experiences and argue that negative interactions might be harmful and lead to aggression or social withdrawal. In light of the sharply increasing numbers of infants attending child care centres over the past decade, surprisingly few studies have examined the foregoing assumptions (for reviews see Belsky, 2001; Howes, 1987; Lamb, 1998). Little is known about the everyday interactions of infants and peers in child care centres and just how these interactions relate to the children's well-being, social competence and behavioural problems. The present study was undertaken to shed more light upon this matter.

In a previous study, the children in the present sample were observed during 90 min of free play in their child care centres when they were 15 months of age (Gevers Deynoot-Schaub & Riksen-Walraven, in press). The 15-month-olds were found to have twice as many interactions with their professional caregivers as with their peers. Whereas the interactions with the caregivers were predominantly positive, moreover, 50% of the interactions with peers were negative. Our observations also showed large differences among the 15-month-olds, and these early individual differences in peer interaction meaningfully related to characteristics of both the children themselves and the caregiving

* Corresponding author. Tel.: +31 24 361 5550; fax: +31 24 361 2698.
E-mail address: m.riksen@psych.ru.nl (J.M. Riksen-Walraven).

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doi:10.1016/j.infbeh.2005.12.005

context. For example, the frequency at which children initiated negative interactions with peers was found to relate to child gender and to the quality of child care.

One question which remains to be answered is whether or not these early differences in peer interaction are stable across time and whether or not they predict later differences in children's socio-emotional adjustment. This question was examined in the present study. That is, the same children as in our previous study were again observed during free play in their child care centres at 23 months of age and different aspects of their socio-emotional adjustment were rated by their parents and professional caregivers.

Three-specific questions were addressed. First, how many positive and how many negative contacts infants actually have with peers in child care centres and just how these frequencies change across age was examined. In light of the growing number of infants attending child care centres it is surprising that only very few – mostly older – studies have addressed this question. In a cross-sectional study, Finkelstein, Dent, Gallacher, and Ramey (1978) observed the social interactions of 10- and 24-month-old children in child care centres and found the 10-month-olds to be engaged in interactions with caregivers during 42% of the observation intervals and with peers during only 6% of the intervals. For the 24-month-olds, the interactions with caregivers decreased to 26% and interactions with peers increased to 11% of the observation intervals. Both initiating and responsive peer contacts were found to increase from 10 to 24 months of age. In a cross-sectional study of children at six age levels between 12 and 42 months, Holmberg (1980) examined the occurrence of positive and negative or "assertive" initiations with peers and found both the number of positive and negative initiations to increase from 12 to 30 months. After 30 months, the number of negative initiatives decreased while the number of positive initiatives further increased. Up to 30 months, about 50% of all initiations of contact with peers were negative, as just noted, but this percentage decreased sharply after 30 months. This is in line with the results of recent research on the early development of "physical aggression"; negative acts such as hitting peers have been found to appear during the first year after birth, increase in frequency quite rapidly during the second year, and peak around 30 months of age (Hay, 2005; NICHD Early Child Care Research Network, 2004; Tremblay, 2004). In a longitudinal study focusing on positive peer interactions (i.e., complementary and reciprocal peer play), Howes (1988) observed a significant increase in such positive interactions from early toddlerhood (i.e., 1–2 years) to late toddlerhood (i.e., 2–3 years). In a more recent study, Volling and Feagans (1995), observing 14- to 48-month-olds during free play in child care centres, reported both the number of positive peer interactions and the number of negative peer interactions to increase with age. Research focusing on a specific type of positive peer interactions, namely sharing in response to a familiar peer's requests for an object—observed at the child's home—has yielded limited evidence for a decrease in such positive interactions over the second year of life (Hay, Caplan, Castle, & Stimson, 1991; Hay, Castle, Davies, Demetriou, & Stimson, 1999; see Hay, Payne, & Chadwick, 2004, for a review). Based on the results of the above studies, we expected an increase in the numbers of both positive and negative interactions with peers between 15 and 23 months. A concomitant decrease in the number of interactions with caregivers was also expected although we still expected the children to have more interactions with caregivers than with peers at 23 months (Gevers Deynoot-Schaub & Riksen-Walraven, in press).

The second-specific research question concerned the stability of children's peer interactions in child care centres from 15 to 23 months. In three earlier longitudinal studies along this line, the stability of peer interactions in child care centres across the very first years of life was examined. Howes (1988) found significant and moderate stability in positive peer play from early toddlerhood (i.e., 13–24 months) to preschool age (i.e., 40–57 months); however, observations of negative peer exchanges were simply not included. In a later study, Howes and Phillipsen (1998) reported moderate stability in positive peer play from age one to age four but no stability in aggressive peer exchanges. In the subsequent large-scale longitudinal NICHD study (NICHD Early Child Care Research Network, 2001), peer interactions in child care were observed at 24 and 36 months of age; moderate stability was found for both positive peer play and negative peer interaction across age. The results of the NICHD Early Child Care Research Network (2001) study suggest that stable individual differences in positive and negative contacts with peers in child care groups have emerged by the age of 24 months. In the present study, we examined whether such differences might be observed even earlier, namely at 15 months or the age at which most children have learned to walk. That is because learning to walk greatly increases children's possibilities for actively approaching and/or avoiding other children. When children learn to walk, they can much better "actualize" their sociability or fear of other children by approaching or avoiding other children. Before that age, much of the variance in peer contacts may be explained by the availability of older peers and the behaviour of caregivers who may promote or prevent peer contacts by placing infants together or not. Based on the above, we expected moderate stability for both positive and negative peer interactions observed at 15 and 23 months of age.

The third specific research question concerned the relations of children's peer interactions at 15 and 23 months to their well-being, social competence, and any behavioural problems as rated by their parents and professional caregivers at 23 months. Although children's early interactions with peers in child care centres are assumed to contribute to their social competence, this assumption has rarely been examined. In only a very few studies have the *actual experiences and behaviours* of children in interaction with peers in child care centres been examined in relation to their social competence. In a longitudinal study with two- to three-year-olds, Clarke-Stewart, Gruber, and Fitzgerald (1994) found children's social competence when confronted with an unfamiliar peer to not be related to their earlier interactions with peers in child care. The children's sociability with a friend, however, was predicted by earlier positive peer interactions in child care. Howes and co-workers conducted several studies relevant to this topic. In a longitudinal study on 18-to 36-month-olds, Howes (1990) showed preschoolers who engaged in more social pretend play with peers to be rated by their kindergarten teachers as being more sociable and as having less difficulty with peers. Howes and Matheson (1992) similarly found 13- to 24-month-old toddlers who showed high levels of positive peer play in child care to be rated as less withdrawn, less aggressive, and more prosocial at age 30–35 months than 13- to 24-month-old toddlers who showed less high levels of positive peer play. In a later study, Howes and Phillipsen (1998) reported comparable results; 1-year-old toddlers who were frequently involved in positive peer play in child care centres were again rated as more prosocial and less withdrawn at age four and as less aggressive at age nine than 1-year-old toddlers who were less involved in positive peer play. Moreover, those toddlers exhibiting relatively high levels of aggression in interactions with peers at age one were rated as less prosocial at age nine than those toddlers who were less aggressive at age one. More recently, in the NICHD study (NICHD Early Child Care Research Network, 2003) positive/neutral peer interactions of toddlers in child care centres were found not to contribute to the children's later social competence, but instead to predict lower levels of behavioural problems in the children. The results of the above studies suggest that early involvement in positive interactions with peers in child care may contribute to children's social competence and to lower levels of peer aggression; conversely, early involvement in negative peer interactions may reinforce aggression and hamper the development of social competence. Whether or not early peer interactions in child care contribute to children's well-being, on the one hand, or the development of such internalizing behaviour problems as anxious and withdrawn behaviour, on the other hand, has not been examined, but it seems reasonable to expect positive interactions with peers in child care to enhance children's well-being, and negative interactions to negatively influence children's well-being.

To summarize, three specific questions were examined in the present study. First, frequencies of various toddler contacts with peers during free were observed between 15 and 23 months of age. We expected the number of positive and negative interactions with peers to increase and the number of interactions with caregivers to decrease but remain high relative to the number of interactions with peers. Second, the inter-individual stability of peer interactions from 15 to 23 months of age was examined. Significant but moderate stability was expected for both positive and negative peer interactions. Third, just how children's peer interactions at 15 and 23 months related to various aspects of their socio-emotional adjustment at 23 months was studied. Involvement in many positive peer interactions was expected to be associated with higher levels of social competence and well-being, on the one hand, and lower levels of aggression and externalizing behaviour problems, on the other hand. Conversely, involvement in many negative peer interactions was expected to be associated with higher levels of aggression and externalizing behaviour problems, on the one hand, and lower levels of social competence and well-being, on the other hand.

1. Method

1.1. Participants

Recruitment of the participants occurred in two stages. In the first stage, 71 child care centres were randomly chosen from the telephone books for the West and Middle of the Netherlands and invited by letter to participate in the study. A total of 59 child care centres (or 83%) agreed to participate. Refusal was mostly due to organizational circumstances ("too busy"). In the second recruitment stage, the child care centres were asked to supply the names and addresses of parents and children meeting the following eligibility requirements. The children had to be 15 months of age and in child care for 3–4 days a week. The families had to speak Dutch. A total of 145 families were then approached by letter, and 128 (or 88%) agreed to participate. Refusal was mainly due to parental objections to the recording of

the observations on videotape. Of the remaining families, 70 families were randomly chosen to constitute the final sample for the study; more families could not be included due to time limitations. The sample of 70 children included 39 boys and 31 girls with a mean age of 15.2 months (S.D. = .46) at the time of initial assessment. The parental level of education ranged from low (elementary school = 1) to high (university degree = 7) with an overrepresentation of higher educated parents (M = 5.8, S.D. = 1.41) in the sample, which is in line with the general overrepresentation of children from higher SES families in child care centres in the Netherlands (Organisation for Economic Cooperation and Development [OECD], 2001). The children in the sample attended 51 different care groups distributed across 39 child care centres. The age of the professional caregivers ranged from 19 to 53 years (M = 29.7, S.D. = 7.99). There were several care groups with more than one study child; 32 groups included one study child and 19 groups included two study children.

The quality of the care provided in the 51 care groups, assessed with the Infant Toddler Environment Rating Scale (ITERS, Harms, Cryer, & Clifford, 1990) was moderate, on average (M = 4.3, S.D. = .74, on a 7-point scale). The quality of the professional child care for the present sample was not significantly different from the quality of the professional child care provided for other European samples but higher than the quality of the professional child care provided in a number of samples from the USA considered together (Gevers Deynoot-Schaub & Riksen-Walraven, 2005).

All of the children and their parents also participated in the subsequent assessment, which occurred when the children were 23 months (M = 23.0, S.D. = .34). Between the 15-month assessment and the 23-month assessment, 23 children in our sample moved to a different care group within the same child care centre and one child moved to another child care centre. At 23-month assessment, the children in our sample attended 54 different child care groups distributed across 40 child care centres; 39 care groups included one study child and 15 groups included two study children.

1.2. Procedure

At both ages, the children were visited at the child care centre in the morning by the first author and trained graduate students. The children were videotaped during 90 min of free play in their own care group. When the free play was interrupted by such routines as meals or diaper changing, the videotaping was halted and then resumed afterwards. At 23-month assessment, questionnaires concerned with behavioural problems, social competence, and well-being were completed by the children's parents and two professional caregivers (i.e., the child's primary caregiver and another caregiver from the same care group who was thus well-acquainted with the child).

1.3. Instruments and measures

1.3.1. Interactions with peers and caregivers during free play (15 and 23 months)

The children's interactions with peers and caregivers were coded from the 90-min video recordings using the "Observer" program (Noldus, 2002). All of the behaviours of the target child towards peers and caregivers were coded as well as all of the behaviours of peers and caregivers towards the target child.

For the children's interactions with peers, seven behavioural categories were defined, namely: *positive* and *negative initiatives* on the part of the target child towards peers; *positive* and *negative peer behaviours* aimed at the target child; and *positive*, *negative* and *withdrawal responses* on the part of the target child to peer behaviours. Examples of positive peer interactions are laughing, talking, or hugging other children and showing or offering objects. Examples of negative peer interactions are hitting, pushing, pulling, or kicking other children; taking away objects; and verbal or nonverbal sounds of protest. Examples of withdrawal responses are turning away or retreating following a peer behaviour aimed at the target child. The *total number of* (*positive*/*negative*) *peer interactions* was computed by summing the numbers of (positive/negative) peer-directed initiatives on the part of the target child, (positive/negative) peer behaviour aimed at the target child and (positive/negative) responses on the part of the target child.

For the children's interactions with caregivers, the same behavioural categories were defined as for their interactions with peers, namely: positive and negative initiatives on the part of the target child towards caregivers; positive and negative caregiver behaviours aimed at the target child; and positive, negative and withdrawal responses on the part of

the target child to caregiver behaviours. In the present study, we only analyzed the *total number of* (*positive*/*negative*) *caregiver-child interactions* computed as the sum of the number of (positive/negative) caregiver-directed initiatives on the part of the target child, (positive/negative) caregiver behaviours aimed at the target child and (positive/negative) responses on the part of the target child to caregiver behaviours.

The videotapes were coded by eight graduate students blind to all other scores and previously trained by the first author until an inter-rater reliability of .75 or more (Cohen's kappa) had been attained. Reliability checks for 20% of the tapes showed the inter-rater reliability to remain high throughout the coding process. The interactions with peers and caregivers at 15 and 23 months of age were scored by different individuals

1.3.2. Internalizing and externalizing symptoms and social competence (23 months)

The parents of the children completed the Dutch version of the Infant-Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2000). The ITSEA consists 136 items rated along a 3-point Likert scale reflecting the extent to which the parent observed the given behaviour for the child during the past month. The ITSEA items are grouped into five scales; three of the scales were used in the present study: externalizing symptoms, internalizing symptoms, and competence. The *externalizing symptoms* scale (24 items) includes subscales for activity/impulsivity, aggression/defiance and peer aggression. The *internalizing symptoms* scale (31 items) includes subscales for depression/withdrawal, general anxiety, separation distress and inhibition to novelty. Finally, a *social competence* score was computed by summing the children's scores for three of the subscales judged to be most relevant to children's interactions with peers from the competence scale, namely: imitation/play (6 items), empathy (7 items) and prosocial peer relations (5 items). The Cronbach's alphas for externalizing symptoms, internalizing symptoms and social competence were .84, .71 and .76, respectively. The validity and reliability of the ITSEA have been demonstrated in earlier research (Carter, Briggs-Gowan, Jones, & Little, 2003).

1.3.3. Aggression/disruptiveness and anxiety/withdrawal in child care (23 months)

The occurrence of behaviour problems was rated by two of their professional caregivers for each child using the Dutch version of the Behaviour Questionnaire for Toddlers and Preschoolers (BQTP; Goossens, Dekker, Bruinsma, & de Ruyter, 2000). The BQTP contains two scales: aggressive/disruptive (20 items) and anxious/withdrawn (12 items). The aggressive/disruptive scale includes such items as "Kicks or hits other children" and "Disobedient". The anxious/withdrawn scale involves such items as "Is rather on his/her own" and "Fearful". The internal consistencies (i.e., Cronbach's alphas) for the two scales were found to be .92 and .91 for primary caregivers and .91 and .87 for secondary caregivers. Given substantial correlations between the ratings provided by the two professional caregivers ($r = .72$, $p < .01$ for aggressive/disruptive and $r = .54$, $p < .01$ for anxious/withdrawn), the scores were averaged across caregivers for each scale. Aggressive/disruptive behaviour scores for 2-year-old children have been found to strongly predict externalizing behaviour problems when rated by parents and teachers for the same children at the age of five (Smeekens, Riksen-Walraven, & Van Bakel, 2005).

1.3.4. Children's well-being in child care (23 months)

The children's well-being in child care was measured using the Leiden Inventory for the Child's Well-Being in Day Care (LICW-D; De Schipper, Tavecchio, van IJzendoorn, & van Zeijl, 2004). The scale consists of 12 items rated along a 6-point Likert scale reflecting the extent to which the description applies to the child for the past 4 weeks. The items address the child's well-being in general ("This child enjoys attending the day care centre"), well-being in relation to the caregivers (e.g., "This child feels at ease with all the professional caregivers"), well-being in relation to other children (e.g., "This child tends to avoid contact with other children") and well-being in relation to the child care environment ("This child really enjoys the games and play material at the day care centre").

The internal consistency of the scale as rated by the two caregivers was found to be satisfactory; the Cronbach's alphas were .75 and .84 for the children's primary and secondary caregivers, respectively. Given the significant correlations between the well-being scores provided by the professional caregivers for the children in the present study ($r = .40$, $p < .01$), the well-being scores were averaged across caregivers. Children's well-being as assessed using the LICW-D has been found to significantly and negatively relate to internalizing problems as assessed using the CBCL (De Schipper et al., 2004), which provides support for the validity of the scale.

Table 1
Intercorrelations, means, standard deviations and ranges for scales indicating socio-emotional adjustment of children at 23 months ($N = 66$–69)

	2	3	4	5	6	*M*	S.D.	Min	Max
Parent-rated									
1. Externalizing symptoms	.37**	.01	.45**	.12	−.21*	.48	.25	.00	1.17
2. Internalizing symptoms		−.00	.05	.15	−.27*	.42	.16	.08	.87
3. Social competence			−.04	−.28*	.21*	1.37	.28	.76	1.94
Caregiver-rated									
4. Aggressive/disruptive				.07	−.03	1.72	.44	1.05	3.08
5. Anxious/withdrawn					−.73**	1.50	.38	1.00	3.25
6. Well-being						5.00	.47	3.25	5.75

* $p < .05$ two-tailed.
** $p < .01$ two-tailed.

2. Results

2.1. Preliminary analyses

In Table 1 the descriptive statistics for the ratings of social-emotional adjustment and the intercorrelations between these ratings for the children at 23 months of age are presented. As can be seen, children who showed more externalizing symptoms according to their parents were rated by their professional caregivers as more aggressive/disruptive and also lower for well-being. Children who showed more internalizing symptoms according to their parents also showed less well-being according to their professional caregivers. Finally, children who were rated by their parents as more socially competent were rated by their professional caregivers as less anxious/withdrawn and showing more well-being.

When the preceding socio-emotional adjustment variables were examined for sex differences, several significant differences were found. Boys were rated by their parents as significantly more externalizing than girls ($M_{boys} = .54$; S.D. = .25; $M_{girls} = .41$, S.D. = .24; $t = 2.17$, $p < .05$.) and as significantly less socially competent than girls ($M_{boys} = 1.31$; S.D. = .30; $M_{girls} = 1.45$, S.D. = .25; $t = -2.01$, $p < .05$.). In child care, boys were rated by their primary caregivers as significantly more aggressive/disruptive than girls ($M_{boys} = 1.82$; S.D. = .42; $M_{girls} = 1.61$, S.D. = .43; $t = 2.01$, $p < .05$) and also more anxious/withdrawn than girls ($M_{boys} = 1.59$; S.D. = .44; $M_{girls} = 1.39$, S.D. = .26; $t = 2.19$, $p < .05$).

The children's interactions during free play were also examined for sex differences. Mann–Whitney *U*-tests were used for testing the sex differences because most of the interaction scores were not normally distributed; most of the distributions were positively skewed. At 15 months of age, no sex differences were found. At 23 months, boys showed more negative peer interactions than girls ($M_{boys} = 31.28$; S.D. = 22.28; $M_{girls} = 20.13$, S.D. = 11.28; $U = 410.50$, $p < .05$) and also more peer interactions in general ($M_{boys} = 56.03$; S.D. = 31.25; $M_{girls} = 39.90$, S.D. = 23.20; $U = 420.00$, $p < .05$). Girls, in contrast, showed significantly more positive interactions with their professional caregivers than boys ($M_{boys} = 52.08$; S.D. = 31.07; $M_{girls} = 71.09$, S.D. = 38.24; $U = 403.00$, $p < .05$).

Table 2 shows the correlations among the different peer interaction scores separately for the two ages. Comparison of the patterns of correlations at 15 and 23 months shows the association between children's positive and negative behaviours to become weaker with age; the correlations between positive and negative initiatives toward peers, positive and negative responses to peers, and positive and negative behaviours received from peers, respectively, were all significant at 15 months but nonsignificant at 23 months.

When parental level of education was correlated with the various ratings of socio-emotional adjustment, only one significant correlation was detected. The children of lower educated parents were rated as significantly more aggressive/disruptive by their professional caregivers at 23 months than the children of higher educated parents ($r = -.26$, $p < .05$). Parental education was unrelated to the children's interactions with peers and caregivers.

Finally, we examined whether children who attended the same child care group were similar to each other with regard to the variables under study. For that purpose, intraclass correlations were computed for the children's interactions during free play and for the outcome measures. The intraclass correlations showed all of the free-play interaction scores for children in the same care group to be independent from each other, except for negative peer behaviour directed at the target child at 23 months; the intraclass correlation for this behaviour was marginally significant: $r = .42$, $p = .05$).

Table 2
Spearman rank correlations between children's interactions with peers at 15 months (below diagonal, $N=68$) and at 23 months (above diagonal, $N=69$)

	Initiatives towards peers		Responses to peers			Peer behaviours aimed at target child	
	Positive	Negative	Positive	Negative	Withdrawal	Positive	Negative
Initiatives towards peers							
Positive	–	.21	.43***	.19	.16	.53***	.21
Negative	.42***	–	.20	.26*	−.16	.24*	.52***
Responses to peers							
Positive	.32**	.06	–	.18	.09	.85***	.11
Negative	.14	.19	.41**	–	−.19	.21	.51***
Withdrawal	−.07	−.10	−.01	−.05	–	.15	−.02
Peer behaviours aimed at target child							
Positive	.43***	.18	.52***	.34**	.06	–	.10
Negative	.15	.35**	.35**	.49***	.07	.28*	–

* $p<.05$, two-tailed.
** $p<.01$, two-tailed.
*** $p<.001$, two-tailed.

For the outcome measures, one significant intraclass correlation was found, namely for child well-being at 23 months ($r=.50$, $p<.05$).

2.2. Changes in the frequency of peer interactions between 15 months and 23 months.

Our first research question concerned possible changes in the frequency of peer interactions between 15 and 23 months of age. In Table 3, the mean frequencies, standard deviations, and ranges for the children's interactions with peers and caregivers during free play at 15 and 23 months of age are presented. As can be seen from the Wilcoxon signed ranks test results, the expected decrease in the frequency of interactions with caregivers was found, but only for the

Table 3
Means, standard deviations and z-values (Wilcoxon signed rank test) for children's interactions with peers and caregivers during 90 min of free play in child care centres at 15 and 23 months; stabilities (spearman rank correlations) of children's interactions across age

	15 months ($N=68$)			23 months ($N=69$)				($N=68$)
	M	(S.D.)	Min–Max	M	(S.D.)	Min–Max	z	r_s
Initiatives towards peers								
Positive	7.5	(5.86)	0–27	8.8	(5.81)	0–24	1.29	.04
Negative	6.5	(5.06)	0–23	9.9	(10.51)	0–48	2.11*	.37**
Responses to peers								
Positive	4.7	(4.01)	0–17	3.2	(3.75)	0–21	−2.78**	.02
Negative	3.1	(2.27)	0–9	4.0	(3.94)	0–16	.83	.20
Withdrawal	1.3	(1.72)	0–7	0.7	(1.30)	0–6	−1.70*	−.08
Peer behaviours aimed at target child								
Positive	7.6	(4.66)	0–20	10.5	(9.83)	0–48	.91	−.06
Negative	11.0	(7.38)	0–33	11.7	(8.87)	0–46	.13	.02
Total interactions with peers[a]	41.8	(18.99)	4–90	48.8	(28.88)	11–136	1.02	.12
Positive	19.9	(11.30)	2–47	22.5	(16.89)	0–89	0.00	.09
Negative	22.0	(11.48)	1–50	26.3	(18.90)	3–107	1.31	.24*
Total interactions with caregivers[b]	82.8	(47.30)	16–284	66.3	(38.42)	4–169	−2.01*	.18
Positive	72.9	(42.99)	16–233	61.0	(35.51)	4–148	−1.49	.19
Negative	9.9	(9.22)	0–51	5.7	(8.70)	0–44	−3.97***	.27*

[a] Sum of initiatives towards peers, responses to peers and peer behaviours aimed at target child.
[b] Sum of initiatives towards caregivers, responses to caregivers and caregiver behaviours aimed at target child.
* $p<.05$, one-tailed.
** $p<.01$, one-tailed.
*** $p<.001$, one-tailed.

negative interactions and not for the positive interactions. The expected increase in the frequency of interactions with peers was only found for the number of negative initiatives on the part of the target child towards peers. Furthermore, the children at 23 months showed significantly fewer positive responses and less withdrawal in response to peer behaviours than at 15 months. As expected, and just as we found for the children at 15 months (Gevers Deynoot-Schaub & Riksen-Walraven, in press), the children at 23 months still had significantly more interactions with caregivers than with peers ($M_{caregivers} = 66.3$, $M_{peers} = 48.8$; $z = 2.64$; $p < .01$). And the children at 23 months had equal numbers of positive and negative peer interactions ($M_{pos} = 22.5$. $M_{neg} = 26.3$; $z = 1.38$, n.s.), just as at 15 months.

2.3. Stability of individual differences in peer interaction from 15 to 23 months

Our second research question addressed the stability of individual differences in peer interaction between 15 and 23 months of age. Significant but modest stability was expected for both positive and negative peer interactions. Table 3 shows that, in contrast to our expectation, significant stability was found for negative peer interactions ($r_s = .24$, $p < .05$) but not for positive peer interactions ($r_s = .09$). The stability of negative peer interactions was found to be due in particular to the stability of negative *initiatives* towards peers ($r_s = .37$; $p < .01$); when sex differences in negative initiatives towards peers were examined, significant stability was found for boys ($r_s = .37$, $p < .05$) but not girls ($r_s = .27$, n.s.). The total number of children's negative interactions with caregivers was also found to be stable from 15 to 23 months ($r_s = .27$, $p < .05$); again, stability was found for boys ($r_s = .36$; $p < .05$) but not girls ($r_s = .13$, n.s.).

2.4. Children's peer interactions in relation to their socio-emotional adjustment at 23 months

Our third and final research question concerned how children's peer interactions at 15 and 23 months related to different aspects of their socio-emotional adjustment at 23 months of age. The relevant correlations are depicted in Table 4 for peer interactions at 23 months and Table 5 for peer interactions at 15 months. Given the large number of correlations, two-tailed tests of significance were used. The results show *aggressive/disruptive* behaviour as rated by the professional caregivers to relate most strongly and consistently to the children's interactions with peers. As expected, children who were rated as highly aggressive/disruptive by their caregivers at 23 months were also involved in more negative peer interactions at 23 months; they showed significantly more negative initiatives towards peers and were the target of more negative behaviours from peers at this age than children who were rated as less aggressive/disruptive. As can be seen from Table 5, ratings of aggressive/disruptive behaviour at 23 months were also predicted by the children's *earlier* peer interactions: children who were involved in many negative peer interactions and particularly showed many negative *initiatives* towards their peers at 15 months were rated as more aggressive/disruptive by their caregivers at 23

Table 4
Peer Interactions at 23 months in relation to children's socio-emotional adjustment at 23 months (spearman rank correlations, $N = 69$)

	Parent-rated			Caregiver-rated		
	Externalizing	Internalizing	Social Competence	Aggressive/Disruptive	Anxious/Withdrawn	Well-being
Initiatives towards peers						
Positive	.06	−.22	.31*	.20	−.14	.03
Negative	.39**	−.04	−.05	.55***	.07	−.22
Responses to peers						
Positive	.06	.00	.22	.02	−.20	.04
Negative	.17	.00	.07	.13	.10	−.21
Withdrawal	−.20	.04	.11	−.05	−.11	−.11
Peer behaviours aimed at target child						
Positive	.15	−.00	.19	.15	−.13	−.01
Negative	.28*	−.01	−.03	.34**	.02	−.21
Total interactions with peers						
Positive	.11	−.07	.29*	.14	−.17	.04
Negative	.35**	−.03	.03	.47***	.12	−.28*

* $p < .05$, two-tailed.
** $p < .01$, two-tailed.
*** $p < .001$, two-tailed.

Table 5
Peer interactions at 15 months in relation to children's socio-emotional adjustment at 23 months (spearman rank correlations, $N = 66–67$)

	Parent-rated			Caregiver-rated		
	Externalizing	Internalizing	Social competence	Aggressive/disruptive	Anxious/withdrawn	Well-being
Initiatives towards peers						
Positive	−.03	−.05	−.21	.26*	−.15	.19
Negative	.22	−.08	−.01	.35**	−.04	−.13
Responses to peers						
Positive	−.04	−.09	−.04	.10	−.05	.26*
Negative	−.13	−.08	−.04	.05	−.11	.05
Withdrawal	−.08	.03	−.18	.09	−.00	.12
Peer behaviours aimed at target child						
Positive	−.07	−.15	.01	−.10	−.10	.25*
Negative	.01	−.17	−.05	.15	−.09	.05
Total interactions with peers						
Positive	−.09	−.11	−.11	.09	−.12	.28*
Negative	.11	−.13	−.05	.27*	−.03	−.08

* $p < .05$, two-tailed.
** $p < .01$, two-tailed.

months than children who were involved in fewer negative peer interactions at 15 months. However, the number of *positive* initiatives towards peers at 15 months also correlated with higher levels of aggressive/disruptive behaviour at 23 months according to professional caregivers.

Hierarchical multiple regression analysis was next undertaken to examine which combination of peer interactive behaviours at 15 months best predict ratings of aggressive/disruptive behaviour at 23 months. The predictors were entered in three blocks. In the first block, child sex and parental education were entered because the preliminary analyses showed both variables to be significantly related to aggressive/disruptive behaviour. In the second block, peer interactions at 15 months were entered. And finally, to examine whether the children's peer interactions at 23 months improved the prediction of aggressive/disruptive behaviour when added to the model with peer interactions at 15 months, these peer interactions were entered in the third block of the regression analysis. For each regression block, those variables that contributed significantly to the prediction were selected in a stepwise fashion. In a stepwise regression the number of variables in the regression analysis does not need to relate to the number of subjects (e.g., Tabachnick & Fidell, 2000). In the first step, parental education was found to make a significant contribution to the variance explained in children's aggressive/disruptive behaviour at 23 months ($R^2_{\text{change}} = .07; F_{\text{change}} = 4.66, p < .05$). In the second step, negative initiatives towards peers at 15 months were found to explain an additional 13% of the variance in the ratings of aggressive/disruptive behaviour ($F_{\text{change}} = 10.35$, $p < .01$). As shown by the significant betas, lower parental education ($\beta = -.32$, $t = -2.79$, $p < .01$) and more negative initiatives towards peers at 15 months ($\beta = .37$, $t = 3.22$, $p < .01$) independently contributed to the prediction of child aggressive/disruptive behaviour ratings at 23 months. The children's peer interactions at 23 months did not explain additional variance in aggressive/disruptive behaviour beyond the variance explained by parental education and children's negative initiatives towards peers at 15 months. Our finding that peer interactions at 23 months did not add to the prediction implies that children at risk for later aggressive/disruptive behaviour can be spotted already at 15 months on the basis of their interactions with peers in their regular child care group, and that additional observations of their peer interactions at a later age (23 months) are not needed to predict aggressive/disruptive behaviour. The residuals of the regression equation were found to be normally distributed (Shapiro–Wilk = .98, $p = .21$), which justifies the use of nonnormally distributed variables as predictors in the regression analysis.

Returning to Table 4, it can be seen that parental ratings of *externalizing symptoms* for the children at 23 months of age show a similar pattern of correlations with the children's peer interactions at 23 months as caregiver ratings of aggressive/disruptive behaviour. Children who were rated as highly externalizing by their parents at 23 months showed significantly more negative peer interactions and particularly more negative initiatives towards their peers in child care at 23 months than children rated as less externalizing by their parents. In contrast to caregiver ratings of aggressive/disruptive behaviour, however, parental ratings of externalizing symptoms at 23 months did not correlate with the children's peer interactions at 15 months.

As shown in Tables 4 and 5, the parental ratings of *internalizing symptoms* and the conceptually related socio-emotional measure of *anxiety/withdrawal* as rated by the child's professional caregivers were not related to any of the concurrent or earlier peer interactions of the children.

As can be seen from Table 4, the children's *social competence* as rated by their parents at 23 months related to positive interactions with peers at 23 months. More socially competent children had significantly more positive interactions with peers and particularly showed more positive *initiatives* towards their peers than children rated as less socially competent by their parents. Table 5 shows that children's social competence at 23 months was not predicted by their interactions with peers at 15 months of age.

The final aspect of the children's socio-emotional adjustment assessed within the context of the present study was child *well-being* in child care at 23 months and found to correlate significantly with positive peer interactions at 15 months (Table 5). Those children who were involved in more positive peer interactions at 15 months and particularly those children who were the *target* of more positive behaviours from peers and *responded* more positively to such peer behaviours at 15 months were rated higher on well-being at 23 months by their professional caregivers than those children who were involved in fewer positive peer interactions at 15 months. At 23 months, in contrast, children's involvement in *negative* peer interactions related to their well-being; children who were involved in relatively few negative interactions with peers at 23 months were rated significantly higher on well-being by their professional caregivers than children were involved in relatively many negative interactions with peers (Table 4). Hierarchical multiple regression analysis, moreover, showed positive responses to peers to be the only category of interactive behaviour at 15 months to independently contribute to the prediction of children's well-being at 23 months ($R^2 = .09$; $F = 7.46$, $p < .01$; $\beta = .32$, $t = 2.73$, $p < .01$; $\text{Shapiro–Wilk}_{\text{residuals}} = .98$, $p = .21$). Negative peer interactions at 23 months did not contribute further to the prediction of child well-being at 23 months.

3. Discussion

The present study is one of the first to longitudinally observe children's interactions with peers in child care centres before the age of two and relate the observed peer interactions to later socio-emotional adjustment. As expected, the children were found to have significantly more interactions with caregivers than with peers, both at 15 months and at 23 months. The total number of interactions with caregivers was found to significantly decrease with age, but the expected increase in the total number of interactions with peers with age was not found. A significant increase was only found for negative initiatives towards peers. The frequencies of positive responses to peer behaviour and withdrawal as a response to peer behaviour significantly decreased over age. In addition, the expected stability of individual differences in peer interaction between 15 and 23 months was only observed for the negative peer interactions and particularly negative initiatives on the part of the target child. Finally, the children's peer interactions at 15 months significantly predicted their aggressive/disruptive behaviour in child care at 23 months and also their well-being in child care at 23 months as rated by their professional caregivers.

Our finding of no significant increases in the frequency of positive peer interactions over the course of the second year is not in line with the results of three previous studies of age-related changes in the peer interactions of children in child care centres (Finkelstein et al., 1978; Holmberg, 1980; Howes, 1988). One possible explanation for this inconsistency is that the present study differs from the earlier studies in several respects. First, the studies by Finkelstein et al. and Holmberg employed a cross-sectional design while the present study—along with that of Howes—was longitudinal. Moreover, the sample sizes in the two cross-sectional studies were very small when compared to the present study (i.e., 12–15 children per age level as opposed to 68 children in the present study). While the study by Howes (1988) was longitudinal and involved a larger sample ($N = 43$), the system used to code the different levels of complexity for peer play was very different from the system used to characterize positive and negative peer contacts in the present study. It is not unlikely that the complexity of peer play increases while the number of positive peer contacts need not increase during the second year of life, which then explains the observed inconsistency. Differences in the cultural, social and economic contexts of the studies may also have contributed to different outcomes. It is questionable whether the child care centres in the Netherlands and the families of the children attending the centres are comparable to those in the USA where the earlier three studies on age-related changes in the peer interactions of very young children were performed (Finkelstein et al., 1978; Holmberg, 1980; Howes, 1988). In the Netherlands, children attending child care centres are known to have relatively high educated parents while children of lower educated parents are more often cared for by relatives (OECD, 2001). Infants in both the Netherlands and the USA enter child care at about 3 or 4 months of age,

but most infants in the Netherlands attend child care centres for only 3 or 4 days a week because many Dutch mothers choose to work only part-time when they have small children. Given that the socio-economic characteristics of families and time spent in child care have both been found to relate to children's peer interactions in child care centres (NICHD Early Child Care Research Network, 2001, 2003), the child care differences between the Netherlands and the USA may explain the observed differences in peer interaction across countries.

The significant decline in positive responses to peer behaviour found in the present study is in accordance with the results of a study by Hay et al. (1991), who found a significant decline in children's sharing of objects with a familiar peer over the second year; in our coding system, such sharing would have been counted as a "positive response" to a peer behaviour. A direct comparison between the rates of sharing in both studies cannot be made, however, because we did not distinguish among different behaviours within the category of positive responses to peer behaviour. Further research may shed more light on whether the decline in sharing that was observed by Hay et al. (1991) during children's interactions with a familiar peer at home may also indeed be found in the context of peer interactions in child care centres.

Negative peer interactions and particularly negative initiatives towards peers were found in the present study to be remarkably stable between 15 and 23 months of age. Stability of aggressive behaviour towards peers has been reported in many other studies with older children (see Coie & Dodge, 1998; Hay et al., 2004) but our study is the first to demonstrate the stability of negative behaviours in children under the age of two in child care centres. We found significant stability of negative initiatives towards peers for boys but not girls, while the results of earlier longitudinal studies are inconsistent. Cummings, Iannotti and Zahn-Waxler (1989) also found aggression towards peers to be highly stable from 2 to 5 years for boys but not for girls. In contrast, Hay, Castle and Davies (2000) found the rate of hitting peers to be stable across a period of 6 months for toddler girls but not for toddler boys. The two earlier studies differed from the present study in that the children were observed while playing with "best available friends" in dyads within the home or in the lab, while the children in the present study were observed in larger child care groups. It is not unlikely that a negative interaction style stabilizes more quickly in children who regularly interact with a variety of peers as opposed to one or two familiar peers during the first years of life, but more detailed documentation is certainly required.

Contrary to our expectation and the results of earlier longitudinal studies (Howes & Phillipsen, 1998; NICHD Early Child Care Research Network, 2001), children's *positive* interactions with peers in child care centres were not stable over time. The difference from the NICHD study may be explained by the older age of the children considered in that study—children 24 and 36 months of age, as compared to 15 and 23 months in the present study. The studies by Howes (1988) and Howes and Phillipsen (1998) involved the same age children as in the present study but different measures of positive peer interaction. Mostly qualitative aspects of peer play, such as the complexity of social exchanges (Howes, 1980) were examined in the earlier studies while we examined the sheer number of positive and negative peer contacts, not taking into account the length and complexity of bouts of interaction. The relations between the quantitative and qualitative aspects of children's interactions with peers in child care centres is nevertheless an interesting topic for further study as very little is known about the topic.

Our finding that the rates of involvement in positive and negative peer interactions were significantly and positively correlated to each other is in line with the findings of other studies (Brownell & Brown, 1992; NICHD Early Child Care Research Network, 2001). Along these lines, it has been suggested that negative interactions among infants and toddlers may not have the same meaning as for older children. Negative peer interactions may simply be an indicator of sociability and/or the result of immature efforts to engage in interaction for young children (Brownell & Hazen, 1999; NICHD Early Child Care Research Network, 2001). Our results indeed show the association between positive and negative peer interactions to decrease during the course of the second year of life (see Table 2), which suggests increased differentiation of positive and negative styles of interaction for the children.

An important research question in the present study was whether the peer interactions observed in child care at 15 months of age would predict the socio-emotional adjustment of the same children at 23 months of age. The 15-month peer interactions were indeed found to predict two aspects of the children's socio-emotional adjustment eight months later, namely the children's well-being in child care and aggressive/disruptive behaviour as rated by their professional caregivers. The finding that well-being at 23 months was predicted by positive interactions with peers at 15 months was in accordance with our expectations. The finding that the 23-month peer interactions did *not* contribute to the children's concurrent well-being beyond the contribution of positive peer interactions at 15 months was, however, puzzling. Does this outcome mean that earlier experiences in interactions with peers have more impact on children's

well-being than later experiences? Or do experiences with peers perhaps have a delayed effect on child well-being, which means that the contribution of peer experiences at 23 months to children's well-being may only be detected during later assessment? Given that this is the first study to examine the effects of early peer interactions on children's well-being in child care, the present evidence is too incidental to permit conclusive interpretation.

In contrast to the above findings for well-being, the prediction of child *aggressive/disruptive behaviour* from early peer interactions was much more robust and in line with the findings of earlier studies. Peer interactions at 15 months were found to contribute beyond parental education to the prediction of later aggressive/disruptive behaviour. Our findings show aggressive/disruptive behaviour to be predicted by early negative *initiatives* towards peers but not by negative *responses* to peer behaviour. And this outcome is in keeping with the suggestion that serious aggression in later childhood may be predicted by proactive rather than by reactive aggression in early life (Loeber & Hay, 1997). Proactive aggression or the use of force without provocation has been found in particular to predict disruptive behaviour and delinquency in adolescence (Vitaro, Gendreau, Tremblay, & Oligny, 1998). It has also been suggested that such personal assaults as hitting other children are probably a better predictor of later aggression than the instrumental use of force as in the grabbing of toys away from peers (Hay et al., 2000). In the current study, we did not distinguish between these two types of behaviour, because the demands of coding the relatively long episodes of free play (i.e., two times 90 min per child) did not permit the use of a more finely differentiated coding system. Future research should nevertheless determine whether the prediction of aggressive/disruptive behaviour in child care from early negative initiatives towards peers is further improved by distinguishing person-directed versus object-directed initiatives.

The results of the present study have clear implications for child care practice. The finding that negative initiatives at 15 months predict the occurrence of later aggressive/disruptive behaviour suggests that young children displaying high rates of negative initiatives towards peers in child care centres may require extra attention. The high stability of negative initiatives towards peers as found in the present study suggests that such negative peer behaviours are not easy to change. In the education and training of professional caregivers, sufficient attention should also thus be paid to the development of the skills needed to monitor negative peer interactions, to intervene as necessary and to also foster positive interactions and thereby social competence and well-being.

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