
Peer Contacts of 15-Month-olds in Childcare: Links With Child Temperament, Parent–Child Interaction and Quality of Childcare

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Abstract

Seventy 15-month-old children were observed during 90 minutes of free play with their peers in childcare centers. The study aimed to describe individual differences in the children's contacts with peers and to explain the individual differences in relation to: (1) child temperament, (2) the quality of parental behavior toward the child and (3) the quality of the professional childcare environment. Three distinct peer contact factors emerged from our analyses; one reflects children's involvement in peer contacts initiated by peers and two reflect the positive and negative contacts initiated by the target children themselves. Children in groups with more children per caregiver were found to be involved in more contacts initiated by peers. Children with a relatively difficult temperament were less involved in contacts initiated by peers although only in cases of lower quality childcare, as assessed using the infant/toddler environment rating scale. Boys initiated significantly more negative contacts with peers than girls. In addition, more peer-directed negative initiatives were observed in lower quality childcare.

Keywords: peer contacts; childcare quality; parent–child interaction; temperament

Today many infants and toddlers spend significant amounts of time in childcare centers, often beginning as early as a few months after birth. Center care brings children into contact with many similarly aged peers and provides much greater exposure to other children than typically experienced at home. Little is known about the impact of such early and extensive exposure to peers on children's developing social skills. The few available empirical studies relating early and extensive center care to children's socio-emotional development have yielded mixed results. Some have found extensive childcare from infancy onward to be associated with poorer peer relations, less popularity and heightened aggression toward peers in preschool and beyond (Bates, Marvinney, Kelly, Dodge, Bennett & Pettit, 1994; Haskins, 1985; NICHD Early Child Care Research Network, 2002; Park & Honig, 1991; Rubinstein,

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Howes & Boyle, 1981; Schwartz, Strickland & Krolick, 1974; Vandell & Corasaniti, 1990a, 1990b; and, for a review, Belsky, 2001). Others have found no adverse effects of early and extensive childcare on children's social competence (Balleyguier & Melhuish, 1996; Hegland & Rix, 1990; Pierrehumbert, Ramstein, Karmaniola & Halfon, 1996; Scarr & Thompson, 1994) and still others have found positive effects of infant childcare on children's social competence, friendship formation and popularity (Andersson, 1989, 1992; Field, 1991; Field, Masi, Goldstein, Perry & Park, 1988; Howes, 1988, 1991; Lamb, Hwang, Broberg & Bookstein, 1988).

To gain more insight into the *processes* that may link children's early exposure to peers in childcare centers to their later behavior and competence with peers, we need to know more about children's actual early experiences with peers in childcare. Social behaviors, social skills and status within the peer group are typically assumed, for example, to emerge and stabilize during everyday encounters with peers. Early involvement in positive exchanges with peers may thus set the stage for a positive orientation toward peers, and the development of social competence and friendships (Howes, 1988; Howes & Phillipsen, 1998; Lamb, Hwang, Bookstein, Broberg, Hult & Frodi, 1988). Early involvement in negative peer contacts, in contrast, may adversely affect children's emerging social competence. Young children who—for whatever reason—show a tendency to initiate negative behavior towards peers or negatively respond to peer initiatives may, in turn, elicit negative reactions and negative expectations on the part of their peers. The result is the possible emergence of an increasingly stable cycle of negative interactions, and various studies have indeed shown remarkable stability in the initiation of peer conflict and aggression from toddlerhood onward (Cummings, Iannotti & Zahn-Waxler, 1989; Hay, Castle & Davies, 2000; Hay & Ross, 1982; Rubin, Burgess, Dwyer & Hastings, 2003). If adequate supervision and support are missing, repeated involvement in negative encounters with peers can thus mark the beginning of a developmental pathway toward aggressive behavior.

Early differences in how children behave towards other children may thus be important as they may develop into more stable differences in orientation toward peers and contribute to the emergence of differences in socio-emotional development. This is particularly true for young children who attend a childcare center, where they spend all of their time together with other children. Given the large numbers of young children attending childcare centers today and the potential impact of early peer contacts on the later socio-emotional adjustment of children, surprisingly few studies have been conducted on the nature of children's contacts with their peers in childcare. The aim of the present study was thus to examine the encounters of 15-month-olds with their peers in childcare and the frequency of positive and negative peer contacts in relation to three potential sources of influence: (1) child temperament, (2) the quality of parental behavior towards the child at home and (3) the quality of the professional childcare environment. In the following paragraphs, the results of earlier studies addressing these characteristics of children's early peer encounters will therefore first be summarized.

Research has shown difficult or dysregulated temperament in infancy and toddlerhood, which often manifests itself in terms of negative reactivity and inhibitory deficits, to be associated with later peer aggression and externalizing behavior problems (Bates, Bayles, Bennett, Ridge & Brown, 1991; Rubin, Hastings, Chen, Stewart & McNichol, 1998; see Campbell, Shaw & Gilliom, 2000, for a review). Difficult child temperament has also been linked to lower levels of *positive* peer involvement. In a study of 37-month-old children in childcare centers, De Schipper, Tavecchio, Van IJzendoorn and Linting (2003) found significantly fewer positive peer interactions for

children rated as more difficult by their mothers. In another study of young children in childcare, those children rated as temperamentally difficult by their mothers at 24 and 36 months were also rated by their mothers as less sociable toward peers, although a difficult temperament did not correlate with *observational* measures of the children's childcare play with peers (NICHD Early Child Care Research Network, 2001).

Earlier research has also shown various aspects of parenting to be related to children's behavior with peers and social competence. Such positive parenting behaviors as sensitivity, warmth and involvement relate to positive peer play, social competence and friendship (Chen & Rubin, 1994; Clarke-Stewart, Gruber & Fitzgerald, 1994; McGrath, Wilson & Frassetto, 1995; NICHD Early Child Care Research Network, 2001; Youngblade & Belsky, 1992; see also Rubin, Bukowski & Parker, 1998, for a review). In contrast, parental insensitivity, harshness, hostility and negative control have been found to be associated with negative peer interactions and child aggression (Bates, Pettit, Dodge & Ridge, 1998; Booth, Rose-Krasnor, McKinnon & Rubin, 1994; NICHD Early Child Care Research Network, 2001; see Rubin & Burgess, 2002, for a recent review). In the present study, we therefore examined the aforementioned dimensions of parental behavior in relation to children's peer contacts.

Finally, the quality of the professional childcare environment was examined in relation to the individual differences observed in peer contacts. The quality of the professional childcare was assessed using a variety of process and structural measures. Firstly, the well-known infant/toddler environment rating scale (ITERS, Harms, Cryer & Clifford, 1990) was used to assess the quality of the caregiving provided and the educational process. Among other things, the ITERS assesses the quality of the personal care provided and the quality of the language and learning activities provided. Secondly, professional caregiver–infant interactions were observed during a structured task to gain a more detailed picture of the quality of the care provided. Previous research has shown that children receiving a higher quality of care are more positively engaged with peers and exhibit fewer negative peer interactions than children receiving a lower quality of care (Holloway & Reichart-Erickson, 1989; Howes, 1990, 1997; Howes & Matheson, 1992; NICHD Early Child Care Research Network, 2001; Phillips, McCartney & Scarr, 1987; Volling and Feagans, 1995; Wishard, Shivers, Howes & Ritchie, 2003). We therefore expected a higher quality childcare process to be associated with more positive and fewer negative peer contacts.

The quality of the childcare environment was also assessed using two structural measures, namely the number of children per caregiver or child–caregiver ratio and the size of the childcare group. Both of these measures have been found to reflect the quality of childcare in that more positive caregiving has been found to occur in smaller groups and in groups with a smaller child–caregiver ratio (see Lamb, 1998; Vandell & Wolfe, 2000). We therefore expected more positive and fewer negative peer contacts to occur in groups with a smaller child–caregiver ratio because caregivers with fewer children to care for literally have more time and greater opportunities to supervise and support the interactions among the children. A positive relation between smaller child–caregiver ratios and children's social adjustment has indeed been found in previous research (Holloway & Reichart-Erickson, 1989; Howes, 1983; Howes & Rubenstein, 1985). The findings with regard to group size and peer contacts are less clear. On the one hand, children in larger groups have been found to receive less positive caregiving (NICHD Early Child Care Research Network, 1996), which may negatively affect their contacts with peers. Larger groups of peers with higher levels of unrest and noise may also negatively affect children's general well-being and thereby

lead to their social withdrawal or negative behavior toward peers. Children in more crowded classrooms, for example, have been found to exhibit more behavioral disturbances, more hostility and more conflict in their interactions than children in less crowded classrooms (Holloway & Reichart-Erickson, 1989; Maxwell, 1996; Ruopp, Travers, Glantz & Coelen, 1979). On the other hand, *more* peer encounters of both a positive *and* a negative nature can be expected in larger groups than in smaller groups as there are simply more children available for interaction in larger as opposed to smaller groups.

In other research (Volling & Feagans, 1995), childcare quality was found to interact with child temperament in the prediction of positive peer contacts. In low quality childcare centers, children with high levels of social fear were found to display fewer positive peer contacts and play more on their own than children with less social fear; in high quality centers, in contrast, children with high levels of social fear displayed more positive peer contacts than children with less social fear. These findings suggest that high quality care may decrease the risk of children with a difficult temperament developing problems with their peers. Within the context of the present study, moreover, the relation between quality of childcare and peer contacts can be expected to be moderated by child temperament.

In numerous studies aiming to explain individual differences in the peer encounters of infants and toddlers, the children have been observed while playing in dyads in the home or in the laboratory and mostly in the presence of their mothers (e.g., Cummings et al., 1989; Hay et al., 2000; Rubin Hastings et al., 1998). In only a very few studies, however, have the peer contacts of infants and toddlers while playing freely in professional childcare centers been examined. Most notably, Howes and colleagues examined the possible sources of individual differences in peer interactions within the childcare center in a series of studies starting in the 1980s (e.g., Howes, 1983, 1988, 1990; Wishard et al., 2003). These studies are not entirely comparable to the present study, however, as Howes observed mostly the quality and the complexity of peer play, whereas we observed the frequency of positive and negative peer contacts.

As far as we know, only one study has considered the quality of parent-child interactions, child temperament and the quality of the professional childcare environment in relation to children's peer interactions within the childcare center (NICHD Early Child Care Research Network, 2001). When children's peer interactions were observed at 24 and 36 months, individual differences in the frequencies of both positive and negative peer interactions were detected and found to be relatively stable with age. The correlates of the individual differences in peer interaction were also found to be very similar for the two- and three-year-olds. That is, the frequency of *positive* peer play was predicted by maternal sensitivity at home, but not by child temperament or the quality of the professional childcare environment at both ages. Conversely, higher levels of *negative* peer interaction were found to be associated with lower quality childcare, but not maternal sensitivity or child temperament.

The present study complements the NICHD study referred to above in four respects. Firstly, children's peer contacts in childcare were examined at an even earlier age than in the NICHD study. The results of the NICHD study suggest that stable individual differences in contacts with peers have emerged by the age of 24 months. Such differences, however, may arise even earlier, namely by the time that children learn to walk, which greatly increases the possibilities for actively approaching and/or avoiding other children. In the present study, we therefore examined whether meaningful individual differences in peer contacts could already be observed at 15 months, the age at

which most children have learned to walk. Secondly, the present study extends the NICHD study in that a more comprehensive set of measures to assess the quality of the professional childcare environment is used. Just as in the NICHD study, an observational measure of the professional care received by the children is used. In addition, however, a more comprehensive measure of the quality of the caregiving and educational process (ITERS, Harms et al., 1990), as well as two structural measures (i.e., group size and child-caregiver ratio), are used. In such a manner, which aspects of the childcare environment differentially relate to the children's peer contacts can be explored. Thirdly, the present study extends the NICHD study in that the present coding system distinguishes between whether a contact was initiated by the target child or a peer, which was not the case in the NICHD study. This is an important distinction because the behavior of the target child and the behavior of peers may be affected by different factors. Fourthly, the present study was conducted in a non-US country, namely The Netherlands. Center-based childcare in The Netherlands differs in several respects from that in the USA. For example, Dutch children attending childcare centers in The Netherlands are known to have relatively highly educated parents, as children of less well educated parents are more often cared for by relatives (Organisation for Economic Co-operation and Development [OECD], 2001). And although infants in both The Netherlands and the USA tend to enter professional childcare at the age of 3 to 4 months, most infants in The Netherlands attend a childcare center on less than a full-time basis (i.e., three or four days a week at most) as many Dutch mothers choose to work part-time when they have small children. Given the limited generalizability detected for some of the findings from the NICHD study (see Love, Harrison, Sagi-Schwartz, van IJzendoorn, Ross, Ungerer et al., 2003), inspection of the extent to which the aforementioned NICHD findings generalize to such a different childcare context will be interesting.

The present study thus had two research aims. Given that so little is known about young children's experiences with peers in childcare, the first aim was simply to gain greater insight into the number and nature of peer contacts involving 15-month-old children in professional childcare. How many positive and negative contacts do children experience at this age? Is there a relation between children's involvement in positive vs. negative contacts? And do major differences in the patterns of peer contact already exist across children of this age? The second research aim was to explain observed individual differences in the peer contacts of children in childcare. We expected individual differences to be related to: (1) child temperament, particularly for the lower quality childcare centers; (2) the quality of parent-child interactions and (3) the quality of the professional childcare environment.

Method

Participants

Recruitment of the participants occurred in two stages. In the first stage, 71 childcare centers 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 childcare centers (or 83 percent) agreed to participate. Refusal was mostly due to organizational circumstances ('too busy'). In the second recruitment stage, the childcare centers 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 be in childcare for

three to four days a week. The families had to speak Dutch. A total of 145 families were approached by letter, and 128 (or 88 percent) 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 ($SD = .46$) at the time of initial assessment. The parental level of education was measured along a scale, from low (elementary school = 1) to high (university degree = 7). In the present sample, parental education ranged from 2 (lower occupational training) to 7, with an over-representation of higher educated parents ($M = 5.79$, $SD = 1.41$), which is in line with the general over-representation of children from higher socioeconomic status families in childcare centers in The Netherlands (OECD, 2001). The 70 children in the sample attended 51 different care groups distributed across 39 childcare centers. Thirty-two care groups included one study child and 19 groups included two study children. The age of the professional caregivers ranged from 19 to 53 years ($M = 29.7$, $SD = 7.99$).

Procedure

Center Visits. The children were visited by the first author and trained graduate students at their childcare centers. The visits lasted from 0800 h until about 1300 h. When two children were visited in the same group, the visits were planned at least two weeks apart. The children were videotaped during 90 minutes of free play with peers. Video recording started at about 0830 h, after all of the children had arrived. When the free play was interrupted by routines such as meals or diaper changing, the videotaping was halted and then resumed thereafter.

Afterward, the quality of childcare was assessed using the ITERS (Harms et al., 1990) during two to three hours of observation. The ITERS was applied by four graduate students who were intensively trained in advance by the first author. The inter-rater reliability, expressed as Cohen's kappa (for agreement within one scale point), ranged from .74 to .91.

To obtain a more detailed picture of the caregiver's behavior toward the target child, the caregiver was also videotaped during a 12-minute structured play session with the child and three peers of about the same age as the target child. During the structured play session, which was performed at about 1100 h, the caregiver was asked to have the children perform four consecutive tasks (i.e., put a puzzle together, read a book, play with a doll and play with clay). The caregivers were told that they could help the children whenever they felt the need to, but to focus on the target child.

Home Visits. At the start of the home visit, the parent and child were videotaped during a 12-minute structured play session involving the same four interaction tasks as in the childcare structured play session. The parent was then interviewed, and a questionnaire to assess the child's temperament was left behind for completion by the parent.

Instruments and Measures

Contacts with Peers and Caregivers During Free Play in Childcare. The videotapes of the 90-minute free play sessions were coded using the 'Observer' program (Noldus, 2002). All of the behaviors of the target child toward peers and professional caregivers were coded as well as all of the behaviors of peers and caregivers towards

the target child. For the children's *contacts with peers and caregivers*, seven behavioral categories were defined, namely: positive and negative initiatives on the part of the target child toward peers/caregivers; positive and negative peer/caregiver behaviors aimed at the target child and positive, negative and withdrawal responses on the part of the target child to peer/caregiver behaviors. In addition to the children's contacts with other individuals, their *play behavior* was also coded. Three levels of play involvement were distinguished: no play; uninvolved play and involved play. The coding system is described in more detail in Table 1. The coding was done by four graduate students who were blind to all other scores and previously trained by the first author until an inter-rater reliability of .75 or more (Cohen's kappa) was reached. Reliability checks for 20 percent of the videotapes showed the inter-rater reliability to remain high.

Child Temperament. The Dutch version of the toddler behavior assessment questionnaire-supplemental (TBAQ-S, Goldsmith & Rothbart, 1999) was used by the parents to assess child temperament. The TBAQ-S consists of 144 items constituting 13 scales: activity level (seven items), anger (nine items), attentional focusing (13 items), attentional shifting (eight items), discomfort (nine items), high pleasure (12 items), inhibitory control (14 items), low pleasure (10 items), perceptual sensitivity (13 items), positive anticipation (11 items), sadness (13 items), social fear (11 items) and soothability (14 items). *Difficult temperament* factor scores were determined via factor analysis on the 13 scale scores (principal component analysis [PCA] with varimax rotation) and were used in the remainder of the analyses in the present study. The difficult temperament factor was the first to emerge from the PCA with an eigenvalue of 3.19. The factor explained 24.6 percent of the variance in the TBAQ-S scores and was characterized by high positive loadings for the scales of social fear (.72), sadness (.67) and anger (.64), and negative loadings for the scales of attentional shifting (-.71) and inhibitory control (-.43).

Parent-Child Interaction at Home. The videotapes of the structured play session within the home were rated using seven-point scales developed by Erickson, Sroufe, and Egeland (1985). The behavior of the parent was scored for: (1) supportive presence or the extent to which the parent constitutes a 'secure base' for the child and provides emotional support and encouragement when needed; (2) respect for the child's autonomy or acknowledgment of the child's individuality, motives and perspective, with low scores reflecting intrusiveness on the part of the parent; (3) structure and limit setting or the flexible and well-timed provision of structure and limits needed for the child to succeed on a task; (4) quality of instruction or the degree to which the parent's instructions are well-timed, stated clearly, paced at a rate that allows comprehension and graded in logical steps that the child can understand and (5) hostility, or the extent to which the caregiver expresses anger at the child or rejects the child. A composite score for the quality of parental behavior was computed by summing the five standardized scale scores after reversal of the score for hostility (Cronbach's $\alpha = .81$). The validity of the rating scales has been demonstrated in previous research (Riksen-Walraven, Meij, Hubbard & Zevalkink, 1996; Van Bakel & Riksen-Walraven, 2002a, 2002b; Zevalkink & Riksen-Walraven, 2001). The three graduate raters were trained by the second author, who has extensive experience with the use of the scales. The inter-rater reliabilities computed for 20 percent of the tapes were found to be over .88 for all of the scales (intra-class correlations).

Table 1. Coding System for Contact and Play Behavior

Code	Definition
<i>A. Contact with peers/caregivers</i>	All behavior on the part of the target child aimed at a peer/caregiver and vice versa. To be coded, the behavior has to be accompanied by a gaze at or in the direction of the interaction partner. Merely watching another person is not coded as contact.
1. Initiative	The child directs a positive or negative behavior at a peer/caregiver without solicitation from the peer/caregiver. To be coded as an initiative, the child's behavior does not have to be noticed by the other person.
1.1. Positive	Positive/neutral behaviors such as: shows, offers, or gives an object; points to object or other person; vocalizes words or non-distress sounds; smiles; gives affection (e.g., hugs or kisses); reaches for or touches an object held by another person (friendly); imitates positive/neutral behaviors of another person.
1.2. Negative	Negative behaviors such as: hits, pushes, pulls, bats at, or kicks other person; hits other person with an object; forcefully tugs or grabs away an object held by another person.
2. Response	Child directs behavior at a peer/caregiver in response to behavior on the part of the peer/caregiver aimed at the target child. To be coded as response, the child's behavior does not have to be noticed by the other person.
2.1. Positive	See A.1.1; also: accepts an object offered by another person; gives or releases an object in response to another person's reach, touch, or request; grants a request made by another person.
2.2. Negative	See A.1.2; also: makes verbal or non-verbal sounds of protest.
2.3. Withdrawal	Turns away, moves away, or walks away from other person apparently in response to a behavior on the part of the other person aimed at the target child.
3. Peer/caregiver Behavior aimed at target child	Peer/caregiver directs behavior at the target child and the behavior appears to be noticed by the target child.
3.1. Positive	See A.1.1 and A.2.1; also: talks to the child (friendly/neutral); helps the child.
3.2. Negative	See A.1.2 and A.2.2; also: handles, commands, or disciplines the child in a harsh or negative manner (e.g., yells, criticizes, reprimands, threatens, uses sarcasm, laughs at the child).

Table 1. Continued

Code	Definition
<i>B. Play involvement (three levels)</i>	
1. Involved play	Active engagement in a playful or exploratory activity in which the child's attention is clearly focused on the activity, as evident from a concentrated attitude and positive affect (e.g., exploring an object; constructive or pretend play; practicing a specific motor activity).
2. Uninvolved play	Playful or exploratory activities without focused attention (e.g., holding, touching, or manipulating objects without focused attention or while wandering around).
3. No play	Default.

Note: Contacts are coded as events (frequencies); play involvement is coded as a state (duration). The different *categories* of contact and different *levels* of play involvement are mutually exclusive; however, contact and play involvement are not mutually exclusive.

Quality of Childcare. The quality of the professional childcare was assessed using both process and structural measures. The process measures were the ITERS (Harms et al., 1990) and the quality of the primary caregiver's behavior toward the child during the structured play session. The structural measures were group size and child-caregiver ratio, which were computed on the basis of the number of children and childcare staff present on the day of observation in the center.

The ITERS comprehensively assesses the day-to-day quality of the care provided for children from birth to 30 months of age. In the present study, the Dutch version of the ITERS was used (Reiling, Verhoeven & Tavecchio, 1995). The ITERS consists of 35 items constituting seven scales. We used the scores from the five scales that most directly reflect children's experiences in childcare: furnishing and display for children (five items), personal care routines (nine items), listening and talking (two items), learning activities (eight items) and social interaction (three items). A total quality score was computed by averaging the scores for the 27 relevant items (Cronbach's $\alpha = .83$).

The quality of the professional caregiver's behavior toward the target child during the structured play session was rated using the same set of scales that were used to assess parental behavior during the structured play session at home (Erickson et al., 1985). In addition to any hostility toward the target child, however, caregiver hostility toward the other children participating in the play session was also rated along a seven-point scale. The Cronbach's α for the composite scale was .83. The raters were three graduate students trained by the second author. The inter-rater reliabilities computed for 20 percent of the tapes were found to be over .89 for all of the scales (intra-class correlations). The structured play sessions in the home and at the childcare centers were scored by different observers blind to all other results.

Results

Preliminary Analyses

Table 2 shows the intercorrelations, mean scores, standard deviations and ranges for the child temperament, parental behavior and professional childcare variables. No differences between the boys and the girls were found for any of the variables.

The average ITERS score ($M = 4.29$) was 'moderate', according to the quality criteria defined by Harms et al. (1990): inadequate = 1 to 2.9; moderate = 3 to 4.9 and high = 5 to 7. Inadequate care was found to characterize 6 percent of the care groups; the majority of the care groups (76 percent) provided a moderate quality of care and 18 percent provided a high quality of care. The quality of the professional childcare for the present sample was not significantly different from the quality of the professional childcare provided for other European samples but it was higher than the quality of the professional childcare provided in a number of samples from the USA (Gevers Deynoot-Schaub & Riksen-Walraven, 2005).

The parental level of education was not related to any of the variables included in the present study, which eliminated the need to include parental education as a selection-effect covariate in the predictive analyses. The number of hours the children were in childcare was also unrelated to any of the variables in the present study. When the children in childcare groups that included only zero- to two-year-olds ($N = 48$) were compared with the children in groups that also included two- to four-year-olds ($N = 22$), significant differences between the two types of groups emerged for group size and child-caregiver ratio: the groups with younger children were smaller than the groups with older children ($M_{\text{younger}} = 9.28$, $SD = 2.36$; $M_{\text{older}} = 12.14$, $SD = 1.94$; $t = 4.96$; $p < .001$) and had fewer children per caregiver ($M_{\text{younger}} = 4.29$, $SD = 1.10$; $M_{\text{older}} = 5.58$, $SD = 1.02$; $t = 4.60$; $p < .001$). The children in the two types of groups did not differ with regard to their behavior during free play, however.

Peer Contacts During Free Play in Childcare

Table 3 shows the occurrence of various types of contact with peers and with caregivers during 90 minutes of free play and the levels of play involvement. The 15-month-olds were found to have significantly more contact with caregivers than with peers ($M_{\text{caregivers}} = 82.8$, $M_{\text{peers}} = 41.8$; $t = 6.60$; $p < .001$). Inspection of the *total contact with caregivers* also shows the contact with caregivers to be predominantly positive ($M_{\text{pos}} = 72.9$; $M_{\text{neg}} = 9.9$; $t = 12.77$; $p < .001$), which is in contrast to the *total contact with peers*, with no significant difference between the number of positive vs. negative contacts ($M_{\text{pos}} = 19.9$, $M_{\text{neg}} = 22.0$). The standard deviations and ranges reported in Table 3 also suggest considerable variation across the children.

When a PCA with varimax rotation was next undertaken on the scores for contact and play involvement during the 90 minutes of free play, five interpretable factors with eigenvalues over 1 were found to explain jointly 65 percent of the observed variance. Three factors pertaining to contact with peers and two factors pertaining to contact with caregivers were identified and labeled as follows (with the loadings presented in parentheses).

- (1) *Peer-initiated peer contact* had positive loadings for positive (.73) and negative (.68) peer behaviors aimed at the target child and positive (.79) and negative (.74) responses on the part of the target child to peer behaviors.

Table 2. Intercorrelations, Mean Scores, Standard Deviations and Ranges for Child Temperament, Parent-Child Interaction and Quality of Professional Childcare (N = 69)

	2	3	4	5	6	M	SD	Min.	Max.
<i>Child temperament</i>									
1. Temperamental difficulty	.16	-.32**	-.05	.01	-.11	.00	1.00	-2.35	2.67
<i>Parent-child interaction</i>									
2. Parental behavior		.06	.45**	-.02	-.20	.00	3.72	-13.94	5.86
<i>Quality of childcare</i>									
3. ITERS			.25*	-.31*	-.01	4.29	.75	2.30	5.59
4. Caregiver behavior				-.22	-.11	.00	3.99	-10.13	6.18
5. Group size					.61**	10.19	2.59	5.00	20.00
6. Child-caregiver ratio						4.71	1.23	2.50	9.00

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

ITERS = Infant/toddler environment rating scale.

Table 3. Means, Standard Deviations and Ranges for Children's Contact with Peers and Caregivers (Frequencies) and Play Involvement (% of Time) During 90 Minutes of Free Play in the Childcare Center (N = 68)

	<i>M</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>
<i>Contact with peers</i>				
Initiatives toward peers				
Positive	7.5	5.86	0	27
Negative	6.5	5.06	0	23
Responses to peers				
Positive	4.7	4.01	0	17
Negative	3.1	2.27	0	9
Withdrawal	1.3	1.72	0	7
Peer behaviors aimed at target child				
Positive	7.6	4.66	0	20
Negative	11.0	7.38	0	33
Total contact with peers ^a	41.8	18.99	4	90
Positive	19.9	11.30	2	47
Negative	22.0	11.48	1	50
<i>Contact with caregivers</i>				
Initiatives toward caregivers				
Positive	12.2	10.05	0	47
Negative	1.4	4.09	0	21
Responses to caregivers				
Positive	16.6	10.92	2	49
Negative	2.5	2.72	0	14
Withdrawal	0.7	1.40	0	8
Caregiver behaviors aimed at target child				
Positive	44.6	25.72	10	137
Negative	5.3	4.86	0	28
Total contact with caregivers ^b	82.8	47.30	16	284
Positive	72.9	42.99	16	233
Negative	9.9	9.22	0	51
<i>Play (% of time)</i>				
Involved play	32	9	10	58
Uninvolved play	21	9	4	60
No play	47	13	20	79

^a Sum of initiatives toward peers, responses to peers and peer behaviors aimed at target child.

^b Sum of initiatives toward caregivers, responses to caregivers and caregiver behaviors aimed at target child.

- (2) *Positive initiatives toward peers and involved play* had positive loadings for positive initiatives on the part of the target child toward peers (.70) and involved play on the part of the target child (.78).
- (3) *Peer-directed (vs. caregiver-directed) negative initiatives* had a positive loading for negative initiatives on the part of the target child toward peers (.77), a negative

loading for negative initiatives toward caregivers ($-.52$), and a negative loading for withdrawal in response to caregiver behavior ($-.66$). For the sake of brevity, the abbreviated label *peer-directed negative initiatives* will be used for this factor henceforth.

- (4) *Positive contact with caregivers* had positive loadings for positive initiatives on the part of the target child toward caregivers (.88) and positive responses to caregivers (.85) as well as for positive caregiver behaviors aimed at the target child (.92).
- (5) *Negative contact with caregivers* had positive loadings for negative initiatives on the part of the target child toward caregivers (.45) and negative responses to caregivers (.68) as well as for negative caregiver behaviors aimed at the target child (.86).

Sex differences were found for one of the five factors. The boys scored significantly higher than the girls on the factor *peer-directed negative initiatives* ($M_{\text{boys}} = .31$; $SD_{\text{boys}} = .78$; $M_{\text{girls}} = -.36$, $SD_{\text{girls}} = 1.12$; $t = 2.81$; $p < .01$). Whether or not the 19 pairs of study children who attended the same childcare group showed similar patterns of contact with their peers during free play was examined by computing intra-class correlations for the three peer contact factors. None of the three correlations proved significant, and whether or not the children attended the same care group was therefore not taken into account in subsequent analyses.

Peer Contacts in Relation to Child Temperament, Parent–Child Interaction and the Quality of Professional Childcare

Hierarchical multiple regression analyses were next conducted to determine how the children's peer contacts in childcare (i.e., the three peer contact factors described above) related to child temperament, parental behavior toward the child at home, and the quality of the professional childcare provided.

The predictors were entered in four blocks, and the results are presented in Table 4. The child's characteristics (i.e., their gender and temperamental difficultness) were entered in the first block. In the second block, parental behavior toward the child at home was entered. In the third block, the four different measures of childcare quality were entered (i.e., ITERS, observer ratings of caregiver behavior, group size and child–caregiver ratio). In the fourth and final block, four separate interaction terms were entered to test our hypothesis that the relation between the quality of professional childcare and peer contacts may be moderated by the child's temperament. The interaction terms were computed for each of the four measures of the quality of childcare, namely: temperamental difficultness \times ITERS, temperamental difficultness \times caregiver behavior during structured play, temperamental difficultness \times group size, and temperamental difficultness \times child–caregiver ratio. The interaction terms were computed by centering and then multiplying the measures (Aiken & West, 1991). 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).

As can be seen from Table 4, two predictors were found to make significant contributions to the variance explained in children's *peer-initiated peer contacts*. Child–caregiver ratio explained a significant amount of the variance in the frequency of peer-initiated peer contacts with the frequency of such being higher for those groups

Table 4. Regression of Child Characteristics, Parental Behavior and Quality of Childcare on Children's Contact with Peers in Childcare Centers (N = 64–68)

	Peer-initiated Peer Contact		Positive Initiatives toward Peers/ Involved Play		Peer-directed Negative Initiatives	
	β	F_{change}	β	F_{change}	β	F_{change}
1. <i>Child</i>						
Gender (male)	-.10		.15		.34**	6.82*
Temperamental difficultness	-.19		-.03		.11	
2. <i>Parent</i>						
Parental behavior	.02		-.08		-.03	
3. <i>Quality of childcare</i>						
ITERS	-.09		.17		-.25*	4.49*
Caregiver behavior	-.04		.12		-.12	
Group size	.01		.08		-.08	
Child-caregiver ratio	.34**	6.00*	-.24		-.08	
4. <i>Interaction terms</i>						
Temperamental difficultness \times ITERS	.27*	5.17*	.03		-.07	
Total R^2	.16**		.11		.16**	
$F_{total model}$		5.79**		.65		5.85**

Note: The predictors were entered stepwise within each block (1–4). F_{change} applies to the R^2_{change} produced by each individual significant predictor.

ITERS = Infant/toddler environment rating scale.

* $p < .05$, ** $p < .01$.

with a higher child-caregiver ratio—that is, more children per caregiver. The significant contribution of the temperamental difficultness \times ITERS interaction term to the explanation of the variance in the frequency of peer-initiated peer contacts shows the relation between temperament and peer-initiated peer contacts to be moderated by the quality of the professional childcare. To gain more insight into the interaction, the ITERS scores were split at the median to create high and low quality childcare groups. The correlation between temperamental difficultness and peer-initiated peer contacts proved non-significant ($r = -.01$) for the high quality group (ITERS > 4.37 , $N = 34$) and significantly negative ($r = -.38$, $p < .05$) for the low quality group (ITERS ≤ 4.37 , $N = 34$). This shows that children with difficult temperaments enter into relatively few peer-initiated contacts in low quality childcare centers in particular. Inspection of the correlations for the separate subscales defining temperamental difficultness (i.e., social fear, sadness, anger, attentional shifting and inhibitory control) further showed the significant correlation between temperamental difficultness and peer-initiated peer contacts in low quality childcare centers to be due in particular to the association of high levels of *social fear* with a lack of

involvement in contacts initiated by peers ($r = -.40, p < .05$). For the high quality group, none of the correlations between the difficult temperament subscales and peer-initiated peer contacts were significant.

For *positive initiatives toward peers and involved play*, the total regression model failed to reach significance. That is, positive initiatives towards peers and involved play did not relate significantly to any of the child, parental, or professional childcare variables as can be seen from Table 4.

Finally, for *peer-directed negative initiatives*, the child's gender and the quality of childcare were found to be significant predictors. The boys were found to direct more negative initiatives toward their peers than the girls. More peer-directed negative initiatives were also found to occur in lower quality childcare as assessed using the ITERS. Inspection of the correlations between peer-directed negative initiatives and the ITERS subscales showed more peer-directed negative initiatives to be observed, particularly for those children attending childcare groups with lower scores for the ITERS subscales of *learning activities* ($r = -.32, p < .01$) and *social interaction* ($r = -.23, p < .05$).

Discussion

The present investigation aimed to gain greater insight into the number and nature of early peer contacts in childcare centers and the origins of individual differences in such contacts. Our findings show considerable variation in both the frequency and the nature of peer contact for 15-month-old children. Three distinct peer contact factors emerged from our analyses; one reflects the children's involvement in peer contacts initiated by peers and two reflect their positive and negative initiatives toward peers. The peer contact factors differentially related to characteristics of the children and the professional childcare environment. Parental behavior toward the children at home was unrelated to the children's contact with peers in childcare.

In general, the 15-month-olds in our study were found during free play to have more contacts with caregivers than with peers. Whereas the contacts with the caregivers were predominantly positive, the contacts with peers were both positive and negative. The relatively high proportion of *negative* peer contacts (56 percent) found in the present study is in accordance with the results of earlier research on the peer contact of similarly aged children (Holmberg, 1980). Negative peer encounters appear to be relatively normal during the toddler years and may serve an important developmental function (Hay & Ross, 1982; Laursen, Hartup & Koplak, 1996; O'Brien, Roy, Jacobs, Malacuso & Peyton, 1999). Infants and toddlers have relatively limited verbal repertoires and may therefore solve their interpersonal problems via 'aggression' as opposed to negotiation or compromise. But whereas some degree of aggression is age-normative, some variations in normal development eventually produce highly aggressive individuals (Loeber & Hay, 1997). *Negative initiatives* aimed at peers, or such unprovoked negative behaviors as hitting, kicking and grabbing may constitute some of the early precursors to later peer aggression and externalizing behavior problems. Such unprovoked negative behavior resembles *proactive* aggression, which—unlike *reactive* aggression—predicts disruptive behavior and delinquency in later years (Vitaro, Gendreau, Tremblay & Oligny, 1998). The former assumption is further supported by our finding that negative *initiatives* toward peers and negative *responses* to peer behaviors were unrelated and loaded onto different factors in our PCA (i.e., the factors *peer-directed negative initiatives* and *peer-*

initiated peer contacts, respectively). Moreover, the two peer contact factors showed different patterns of relations to the characteristics of the children and the professional childcare environment.

It should be noted that the second peer contact factor, namely *peer-directed negative initiatives*, was defined by a high *positive* loading of negative initiatives toward peers and also a high *negative* loading of negative initiatives toward caregivers. This means that children scoring high on this factor are not characterized by a tendency to initiate negative contact *in general*, but by a tendency to initiate direct negative contact with peers in particular. The high negative loading of child withdrawal in response to caregiver behavior on this factor further shows that the children's tendency to initiate negative contact with peers but not with caregivers did *not* stem from a tendency to avoid all interaction with caregivers in general.

The children's peer-directed negative initiatives were found to relate to the child's gender and the quality of the professional childcare environment as assessed using the ITERS. The boys were observed to initiate significantly more negative contacts with peers than the girls. This is in line with the higher levels of peer aggression that have been reported for boys vs. girls in numerous earlier studies (Coie & Dodge, 1998). Most of these studies involved preschoolers and older children; our study is one of the very few to observe peer 'aggression' in boys during the very first years of life. Our findings are in line with the observations of Hay, Nash, and Pedersen (1983), who reported that six-month-old boys were more likely to grab toys held by same-age peers than six-month-old girls in a laboratory setting. In the large-scale NICHD study (NICHD Early Child Care Research Network, 2001), however, no gender differences in negative or aggressive encounters with peers in childcare centers were observed, which may be explained by the fact that negative initiatives were not distinguished from other negative peer contact within the relevant coding system.

In the present study, a greater number of peer-directed negative initiatives was associated with not only the child's gender but also with the quality of the professional childcare environment, as evaluated using the ITERS. In particular, the children directed more negative initiatives toward peers in childcare groups with lower scores on the *learning activities* subscale (e.g., pretend play and sand and water play) and the *social interaction* subscale (e.g., caregiver sensitivity, reinforcement of positive peer interaction, adequate disciplining). These findings underscore Howes's (1990) assumption that 'children in low-quality child care may be more hostile and aggressive because they have spent their days either aimlessly wandering within a large peer group or competing for adult attention' (p. 293).

The children's involvement in *peer-initiated peer contacts*—or another peer contact factor within the present study—was found to relate to the child-caregiver ratio, with more such contacts observed in groups with more children per caregiver. In other words, the frequency of peer-initiated peer contacts may be a function of the relative unavailability of caregivers; children simply have more contact with each other when fewer opportunities for contact with a caregiver exist. The frequency of peer-initiated peer contacts also related to temperamental difficultness and particularly *social fear*—but only in lower, as opposed to higher, quality centers. The same was found by Volling and Feagans (1995) in a study of 2.5-year olds. Taken together, these findings suggest that socially fearful children may withdraw from peers in lower quality childcare centers and thus decrease their chances of being chosen as an interaction partner. In other words, low quality childcare appears to place children who are already temperamentally vulnerable at a greater risk of exacerbating social

fear and the development of problems with peer contact (see also Volling & Feagans, 1995).

In contrast to the other two peer contact factors revealed in the present study, the factor *positive initiatives toward peers and involved play* did not relate to child characteristics or the quality of the professional childcare environment. This is in contrast with the results of earlier research. When Howes and Matheson (1992) studied the same age children using the same measure of childcare quality as in the present study (i.e., the ITERS), for example, they found young toddlers enrolled in higher quality childcare centers to engage in higher quality play with peers than age mates enrolled in lower quality centers. One explanation for the discrepancy in the findings may lie in the different coding systems used to rate the quality of the children's play behavior in the two studies. Howes and Matheson (1992) rated the complexity of the children's play with peers while we computed the percentage of time that the children were engaged in involved play—irrespective of whether the play was solitary or with peers. That is, high scores on the factor *positive initiatives toward peers and involved play* reflect considerable involved play and many positive initiatives for contact with peers, but we did not observe whether the positive contacts were initiated within the context of peer play or not. Just how the specific aspects of young children's play in childcare centers relate to each other is thus an important question for further study, as very little is known about the topic.

An unexpected finding in the present study is that parental behavior toward the child at home did not relate to the child's contact with peers during childcare. In numerous other studies, parental behavior has been consistently shown to relate to children's contacts with peers. The lack of an association between parental behavior and children's peer contacts in the present study could be due to low reliability and/or validity for the measure of parental behavior we used. The validity of the measure, however, has been clearly demonstrated in previous research. Furthermore, in a longitudinal study involving a community-based sample of Dutch families exactly the same measure of parental behavior toward 15-month-old children was found to predict children's aggressive/disruptive behavior at 28 months of age when rated by professional caregivers in childcare centers, and externalizing behavior problems at five years of age when rated by teachers (Smeekens, Riksen-Walraven & Van Bakel, 2004). A more probable explanation for the lack of an association between parental behavior and the peer contacts of the children in the present study may be the over-representation of higher educated parents within the sample. The parental level of education within the present sample was significantly higher than that of the community-based Dutch sample studied by Smeekens et al. (2004) ($M_{\text{present}} = 5.79$, $SD = 1.41$; $M_{\text{comm.based}} = 4.95$, $SD = 1.77$; $t = 3.66$; $p < .01$). Similarly, the quality of parental behavior was significantly higher in the present study than in the study by Smeekens et al. (2004) ($M_{\text{present}} = .21$, $SD = .70$; $M_{\text{comm.based}} = -.11$, $SD = .78$; $t = 2.88$; $p < .01$). It is thus possible that a threshold effect may account for the absence of a relation between parental behavior and child behavior toward peers within the context of the present study. In other words, when the quality of parental behavior is above a certain level, further improvement may no longer lead to changes in child behavior. Further research is nevertheless needed to gain more insight into this matter.

Perhaps the most important finding in the present study is that the quality of childcare appears to affect children's contact with peers during childcare at a very early age. Early peer contacts can thus contribute to children's well being and socio-emotional adjustment or maladjustment. For example, high levels of negative

initiatives toward peers during childcare may play a part in the development of later peer aggression and externalizing behavior problems. Before this can be concluded, however, we need to know more about the stability of the observed differences in children's early contacts with peers and just how these differences relate to their later socio-emotional adjustment. The few studies that address this issue do not concern peer contacts at such an early age (Cummings et al., 1989; Hay et al., 2000; NICHD Early Child Care Research Network, 2001). Longitudinal follow-up of the present sample may thus shed greater light on the stability and developmental significance of children's early peer contacts during childcare.

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