Origins and Predictors of Friendships in 6- to 8-Year-Old Children Born at Neonatal Risk

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Objective To test effects of gestational age (GA), early social experiences, and child characteristics on children's friendships and perceived peer acceptance.

Study design As part of the prospective Bavarian Longitudinal Study (1147 children, 25-41 weeks GA), children's friendships (eg, number of friends, frequency of meeting friends) and perceived peer acceptance were assessed before school entry (6 years of age) and in second grade (8 years of age) using child and parent reports. The parent–infant relationship was evaluated during the 5 months after birth. Child characteristics (ie, height, motor impairment, cognitive ability, behavioral problems) were measured at 6 years of age. Multiple regressions estimated effects of GA, parent–infant relationship, and child characteristics.

Results Overall, children with higher GA had more friends, spent more time with friends, and were more accepted by peers at 6 years of age. Better parent–infant relationships, higher cognitive abilities, and fewer motor and behavioral problems predicted more friendships and higher peer acceptance after adjusting for sex, socioeconomic status, multiples, siblings, and special schooling. Across all GA groups, number of friends (child report: mean change, 1.77; 95% CI, 1.57-1.96) and peer acceptance (child report: mean change, 0.14; 95% CI, 0.09-0.19; parent report: mean change, 0.14; 95% CI, 0.11-0.17) increased with age, but the increase in number of friends was higher among preterm children (ie, interaction effect age*GA group: $P = .034$).

Conclusions Our results provide evidence of a dose–response effect of low GA on children's friendships and perceived peer acceptance. Improvements in early parenting and motor, cognitive, and behavioral development may facilitate friendships and peer acceptance for all children across the gestation spectrum. *(J Pediatr 2017;■■:■■-■■).*

Children's peer relationships are crucial for their emotional, cognitive, and social development.[1] Having close, dyadic friendships and being well-accepted by the peer group facilitates life span mental health, behavioral, and academic outcomes,[2-6] and protects against peer victimization.[7]

Children born very preterm (VP; <32 weeks gestational age [GA]) are at increased risk of poor social adjustment.[8] Compared with term-born peers, VP children more often experience peer relationship problems and social isolation,[9-15] and differences persist into adulthood.[16,17] Although social difficulties are well documented for VP/very low birth weight (<1500 g) individuals, few studies have investigated the social adjustment of moderately to late preterm children (32-36 weeks GA).[18-22] Some have reported more internalizing problems, including social withdrawal,[20,21] whereas others did not.[18,22]

There is considerable uncertainty whether VP children's peer relationship problems extend across the whole gestation spectrum,[8] as has been found for cognitive difficulties.[23] Additionally, past studies mainly investigated the broader domain of peer relationships in VP children using subscales of screening questionnaires, and these were often limited to parent and teacher reports in childhood.[9,14] Little attention has been paid to children's own perceptions of friendships and their quality.

Some studies reported that VP children's social difficulties are related to their cognitive and neuromotor deficits,[12,24] but others found differences after accounting for cognitive or neurosensory impairments.[10,14,25] Some authors suggest that multiple risk factors such as biological conditions (eg, brain alterations, poor somatic growth), early life stress (eg, neonatal pain), social experiences (eg, parent–infant attachment), and individual child characteristics (eg, minor motor and visual difficulties, impaired cognitive functions, poor social skills, and early behavioral problems) may contribute to preterm children's vulnerability in social contexts.[12,14,26,27] Furthermore, it is uncertain whether entering school provides an opportunity for preterm children to make more friends or whether it may increase the risk of adverse peer relationships.[28] Overall, the origins and underlying mechanisms of preterm children's social relationship problems are still poorly understood.[24]

FT	Full-term
GA	Gestational age
SES	Socioeconomic status
VP	Very preterm

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In this study, we investigated children's friendships and perceived peer acceptance across the total spectrum of GA at 6 years of age (before school entry) and at 8 years of age using child and parent reports. First, we expected to find a dose–response effect of GA, that is, children with higher GA would have more friendships and higher perceived peer acceptance, irrespective of whether reported by children or parents. Second, we investigated whether parent–infant relationship as well as child characteristics such as height, motor impairment, cognitive ability, and behavioral problems independently predict number and frequency of meeting friends and perceived peer acceptance at 6 and 8 years of age. Third, we explored whether friendships and perceived peer acceptance improved or deteriorated from preschool to second grade (6 to 8 years of age).

Methods

Child and parent reports were obtained from the Bavarian Longitudinal Study, a geographically defined population-based sample of neonatal at-risk children who were born in 1985 and 1986 in Southern Bavaria (Germany). There were 7505 children admitted to a children's hospital within the first 10 days after birth (10.6% of all live births) and 916 healthy control children born after 36 weeks GA were recruited.[29] Only children whose parents had given written informed consent were included. Details of the sampling criteria, design, and dropout rates have been previously described.[30-32] Of the initial sample (n = 8421), 1513 children were selected and followed up at 6 and 8 years of age. Children born post term (>41 weeks GA; n = 41) were excluded because previous findings suggest an elevated risk for adverse developmental outcomes.[33] Only participants with complete assessments were included in the current study (n = 1147 [75.8%]; gestation range, 25-41 weeks). Of these, 179 were VP, 231 were healthy full-term (FT) control children born between 39 and 41 weeks of gestation (no neonatal risk), and 737 were born between 32 and 41 weeks GA (randomly selected and stratified according to sex, family socioeconomic status [SES], and degree of neonatal risk).

Participating children born preterm did not suffer from major neurodevelopmental impairments. In case children were born as multiples, all living, same-aged siblings were included in the follow-up assessments and analyses. The study was approved by the Ethics Committee of the University of Munich Children's Hospital and the Bavarian Health Council (Landesärztekammer).

Measures

GA, birth weight, and sex were obtained from obstetric records.

Parent–infant relationships were assessed with a standard parent interview and study nurses' observations during the first 5 months after birth. Eight items measuring attachment-related parental feelings and concerns, and relationship problems were evaluated (**Table I**; available at www.jpeds.com) and summed into the *Parent–Infant Relationship Index* score ranging from 0 to 8 with greater values indicating poorer parent–infant relationship. Study nurses were trained to ensure the reliability and validity of observations.[32]

Family SES at birth was coded into 3 categories based on maternal and paternal highest education and occupation (low, middle, high).[39] Children were grouped by having living multiples (0 = no or dead multiples, 1 = living twin or multiples) at 6 years of age. Additionally, the number of siblings living in the same household at 6 years of age (0-7; including multiples) and whether children received special schooling at 8 years of age (0 = no, 1 = yes) was assessed.

At 6 years of age, children's height (in cm) was measured by specially trained research nurses. A German version of the *Test of Motor Impairment-Henderson Revision*[40] was used to assess motor impairment with 8 tasks. Children's general cognitive ability (IQ) was assessed with the German version of the *Kaufman Assessment Battery for Children* mental processing composite score.[41,42] The German version of the *Child Behavior Checklist*[43] was used to measure children's behavioral problems with 113 items that were summed into 1 *Total problems* score.

The semistructured *Friendship and Family Interview*[34,35] was used to assess the nature of children's friendships before children had entered elementary school at 6 years of age (7% had been in school for less than 3 months) and toward the end of second grade at 8 years of age. Children were asked to name up to 10 playmates or friends (siblings not included). These listed friends were summed into a *Number of friends* index score. For the first 5 of these friends (or fewer, depending on the number listed) children were asked to give information about ages and how often they met their friends (**Table I**). Responses about ages of friends were counted across friends and grouped to obtain a *Number of older, same age, and younger friends* index score, respectively. The *Frequency of meeting friends* index score was calculated by averaging responses across friends. Interviewers were trained over 2 months. All interviews were videotaped and double-rated by 2 psychologists. Interrater-reliability was excellent with a Cohen kappa of >0.95.

To assess parents' perceptions of their children's friendships at 6 and 8 years of age, the structured *Mannheimer Parent Interview*,[36] subsection *Contact with peers*, was administered. Parents were instructed to list up to 8 friends including sex, age, and meeting frequencies (**Table I**). The same index scores as those for the child reports were calculated (ie, number of friends; number of older, same age, and younger friends; frequency of meeting friends). Interviewers were trained to >95% agreement as described.

An adapted German version of the *Pictorial Scale of Perceived Competence and Social Acceptance for Young Children*,[37,38] subscale *Peer acceptance*, was administered. The scale contains 6 items that are each presented via 2 pictures displaying a sex-matched child. Children have to select which of the 2 children is most like them and responses are coded on a 4-point scale with greater values indicating higher acceptance (**Table I**). The 6 items are averaged into a *Perceived peer acceptance* index score. Internal consistency was acceptable ($\alpha = 0.71$ at 6 years of age, $\alpha = 0.72$ at 8 years of age). Parents answered a parallel version of these items, reformulated into questions (**Table I**). Internal consistency was $\alpha = 0.75$ and $\alpha = 0.79$, respectively.

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