

Social Integration of Deaf Children in Inclusive Settings

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This article examines social integration of deaf children in inclusive settings in The Netherlands. Eighteen Grade 1–5 deaf children and their 344 hearing classmates completed 2 sociometric tasks, peer ratings and peer nomination, to measure peer acceptance, social competence, and friendship relations. Deaf and hearing children were found to be similar in their peer acceptance and friendship relations, but differences occurred in social competence. Deaf children scored lower than hearing children on prosocial behavior and higher on socially withdrawn behavior. Structural equation modeling showed peer acceptance, social competence, and friendship relations to be stable over time, and the structure of interrelations between variables at 2 measurements were found to be the same for deaf and hearing participants.

In many countries, inclusion of children with disabilities, including deaf children, is a core element of educational policy. If possible, deaf children are educated in mainstream settings. Given this policy, it is surprising to see how few studies have been carried out into the social integration of deaf children. Yet, social integration seems to be one of the major challenges for deaf children in inclusive settings. Stinson and Antia (1999) define social integration as the ability to interact with, make friends with, and be accepted by peers. From the studies available, it appears that deaf children in mainstream education often have few friends, have less interaction with hearing peers, and

are more often rejected or neglected than their hearing peers. In addition, they may feel isolated and lonely (Kluwin, Stinson, & Colarossi, 2002; Musselman, Mootilal, & MacKay, 1996; Stinson & Antia, 1999; Stinson & Kluwin, 2003). For deaf children in a co-enrollment program the image of social integration seems somewhat more positive. Co-enrollment classes include both deaf and hearing children who are cotaught by a general education and a special education teacher. In theory, co-enrollment programs provide the opportunity for intensive contact between deaf or hard-of-hearing children and their hearing peers (Antia & Kreimeyer, 2003; Kirchner, 1994) in an environment where they are not the only deaf or hard-of-hearing child. Although deaf or hard-of-hearing and hearing children have been found to interact more with peers with the same hearing status (Kluwin et al., 2002), interaction between deaf or hard-of-hearing and hearing peers increased during the co-enrollment program studied by Kreimeyer, Crooke, Drye, Egbert, and Klein (2000). In the very few co-enrollment programs studied, mostly located in the United States, deaf or hard-of-hearing children did not seem to feel lonely or isolated, did not have a lower self-esteem, and did not differ from their hearing peers in how much their peers liked them (Kluwin, 1999; Nunes, Pretzlik, & Olsson, 2001). However, Nunes et al. (2001) found deaf or hard-of-hearing children to be neglected more often than their hearing peers and to have less friends in the classroom.

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Although Nunes et al. did not explicitly identify the inclusive settings they have studied as co-enrollment settings, it is clear from their description that their settings entail the characteristics of co-enrollment programs.

Because research into social integration of deaf children is fairly limited and to a great extent focused on educational practices in the United States, it is important to carry out additional studies, preferably in other countries with somewhat differing educational policies. The Netherlands is such a country, characterized by a relatively high number of special schools for children with disabilities and a fairly reluctant position toward inclusion as an ideologically motivated educational policy (Knoors, 2007). Forty-one percent of all hard-of-hearing and deaf children are educated in a mainstream setting; the percentage for profoundly deaf children who are mainstreamed is 13.5. However, as a consequence of the introduction of universal newborn hearing screening and cochlear implantation, this percentage is increasing.

This article examines the social integration of deaf or hard-of-hearing children in both co-enrollment and mainstream programs by focusing on peer acceptance, social competence, and friendship relations. In the mainstream programs, there is only one deaf child in the classroom (the programs will be further explained in the Methods section), whereas in the co-enrollment program several children are groupwise placed in a class with hearing classmates. Peer acceptance refers to the degree to which children are liked or disliked by their peers. Social competence consists of three dimensions, prosocial behavior, antisocial behavior, and socially withdrawn behavior, that characterize children from an early age and pervade many areas of functioning (Güroğlu, van Lieshout, Haselager, & Scholte, *in press*). "Friendship relations" refers to the number of mutual friends (number of mutual antipathies is also taken into account). Having at least one friend may diminish the negative influence of being rejected by most of your peers (Gifford-Smith & Brownell, 2003).

Children need relationships and friendships to develop social skills. These skills are necessary to develop social relations later on in life (Gifford-Smith & Brownell, 2003). Children with different degrees of

peer acceptance, social competence, and friendship relations have been found to show differences in their behavioral development (Gest, Graham-Burmann, & Hartup, 2001; Gifford-Smith & Brownell, 2003). Popular children, who are well liked by many peers and seldom disliked, show many prosocial behaviors (such as cooperating, helping, being considerate); they are more sociable; often display behaviors such as associative play, friendly approaches, and social conversation; and they are seldom engaged in aggressive behaviors. Rejected children, who are frequently disliked and seldom well liked, often display aggressive and antisocial behaviors (such as bullying or victimizing) and are seen as arrogant by their peers. Rejected children are at greater risk of negative developmental outcomes than other children. Neglected children, who are neither liked nor disliked by their peers, have low social visibility. Not much information is available about their behavioral development. Apart from a general lack of sociability, they are hard to distinguish from their popular peers. Controversial children, who are both liked and disliked, are highly visible in the peer group and display behaviors that are characteristic of both popular and rejected children. They are sociable and show high rates of positive interaction, but they are also aggressive and arrogant. A neglected or controversial status seems to be less stable over time than the other categories.

Levels of peer acceptance may affect the opportunities to make friends (Gest et al., 2001) and friendships provide the context for social, emotional, and cognitive development. Children with mutual friends generally show more sociable and prosocial behaviors and have higher self-esteem (*cf.* Hartup, 1996). According to Van Lieshout, Verhoeven, Güroğlu, Haselager, and Scholte (2004), the number of mutual friendships and antipathies is related to peer acceptance and social competence. Children who only have friendships (and no antipathies) usually are more socially competent and have a popular or average status (*cf.* Gifford-Smith & Brownell, 2003). For children with both friendships and antipathies, social competence is somewhat lower than for children with friendships only. These children generally have a controversial or rejected status. Children who only have antipathies have low social competence, show

a high degree of antisocial behavior, and are usually rejected by their peers. Children who do not have any friendships or antipathies are not very visible in the classroom and show a high degree of socially withdrawn behavior. These children mostly have a neglected status. It is clear from these studies and reviews that peer acceptance, social competence, and friendship relations are interrelated. Although peer acceptance, social competence, and friendship relations already have been studied in deaf children (e.g., Kluwin et al., 2002; Nunes et al., 2001), the interrelations between these variables have not. Furthermore, no previous studies have looked at these interrelations over time. Therefore, this article is the first to examine the stability of and the interrelations between these variables over time in both deaf and hearing students.

Relationships and friendships with peers are related not only to social and behavioral development but also to children's academic achievement (Gifford-Smith & Brownell, 2003; Johnson, 2000). Children with more friends have fewer adjustment problems, have higher self-esteem, report less loneliness, enjoy wider peer acceptance, and display better school adjustment, positive attitudes toward school, and better achievement (Gifford-Smith & Brownell, 2003). Children who are rejected by their peers are at risk for school failure or drop out. Pellegrini (1992) found peer interaction in kindergarten to be positively related to academic achievement in Grade 1. Wentzel, Barry, and Caldwell (2004) found that middle school students with mutual friends showed higher academic achievement than students who were friendless. Hatzichristou and Hopf (1996) found that rejected children in elementary and secondary schools showed academic difficulties and low achievement scores. Diehl, Lemerise, Caverly, Ramsay, and Roberts (1998) found that peer acceptance and having friends significantly incremented the prediction of achievement scores over the contributions of race, gender, attitudes toward school, and age for Grade 1–3 children. Popular children with at least one friend had the best school adjustment.

This article focuses on the social integration of deaf students who are in an educational setting with hearing children. Using peer ratings and peer nomi-

nation tasks, the deaf children will be compared to their hearing peers on peer acceptance, social competence, and friendship relations. Although peer ratings and peer nominations were used previously to measure peer acceptance of deaf children in inclusive settings, they were less often used to measure social competence and friendship relations. Studies focusing on social competence in deaf students mostly did so using self-reports of deaf students. Although self-reports provide valid information, deaf students' view of their own social skills might be very different from how they are perceived by their peers. Friendship relations have not been studied in great detail. Most studies draw conclusions on deaf children's friendships from the number of nominations the deaf child receives on being liked without taking into account whether the deaf child also likes the child that nominated him or her. The only study that looked at mutual nominations was the one by Nunes et al. (2001). However, their conclusions were drawn from nominations on inviting a child to play at home, not on whether a child is your friend. This article examines social competence and friendship relations in more detail.

Because correlations have been found between social integration and characteristics such as gender (Van Lieshout et al., 2004), grade level (Gifford-Smith & Brownell, 2003), and mainstream setting (Musselman et al., 1996), this article examines the relation between gender, inclusive setting, grade level, use of a cochlear implant (CI), peer acceptance, social competence, and friendship relations for the deaf children. In addition, the relation between social integration and academic achievement will be studied for the deaf children. This relation has been studied before in hearing children, but not in deaf children.

Method

Participants

Participants were 18 deaf or hard-of-hearing children (56% female, 44% male) and their 344 hearing classmates (52% female, 48% male). In the remainder of this article, the deaf and hard-of-hearing children will be referred to as deaf children. The mean unaided hearing loss of the entire group was 103 dB (ranging from 60 to 130 dB); 1 child had a moderate hearing

loss, 4 had a severe hearing loss, and 13 had a profound hearing loss. Nine of the children with a profound hearing loss had a CI; the other nine children had conventional hearing aids. The children without implants are typically the children with relatively less profound hearing losses, ranging from 60 to 105 dB. For the children with implants, the mean age of implantation was 3 years 9 months (ranging from 1 year 11 months to 6 years 10 months). The mean length of time a child had an implant (from the implantation until the first sociometric measurement) was 5 years 4 months (ranging from 2 years 10 months to 7 years 10 months).

All deaf participants had normal intellectual development. The mean age at the first measurement was 9 years 5 months (ranging from 7 years 7 months to 10 years 10 months). All children had hearing parents; four children had parents who were of non-Dutch origin. The parents of two of these children primarily used Dutch in communicating with their deaf child; for the other two, Turkish was the main language used at home. Preferred communication was oral for 13 participants; the other 5 used both oral and sign communication.

All deaf children were in some type of an inclusive setting. Four children were in a co-enrollment program. These four children enrolled in a Grade 2 classroom with 21 hearing classmates and two teachers. Both teachers, a general education teacher and a deaf education teacher, were always in the classroom and were equally responsible for the instruction. The teacher of the deaf communicated in sign-supported Dutch; her mainstream colleague communicated in spoken Dutch. All children, deaf and hearing, received sign language instruction by a deaf sign language teacher for half an hour each week. The deaf children were pulled out of class for 3 hrs a week. During these hours they received additional sign language instruction and speech therapy. The other 14 deaf children were individually integrated in mainstream education. The classrooms typically held 25–30 hearing pupils in addition to the one deaf child. All 14 deaf children had been in mainstream education for at least 1 year (ranging from 1 to 5 years). Eleven of those 14 mainstreamed children were in a school where they were the only deaf child in the entire school. The other three were in the

same school, but in different grades. According to their itinerant teacher, these deaf children did not interact much with each other during breaks.

The language of communication and instruction in schools where deaf children were placed on an individual basis was spoken Dutch exclusively. Only one deaf child used a qualified sign language interpreter. The others had to perceive the communication of their teachers and classmates through audition (they all used FM equipment) and speech reading. All children received educational support by itinerant teachers. These teachers are trained as teachers of the deaf. They each supported a deaf child approximately 6 hrs a week, carrying out activities such as speech and language therapy, remedial teaching (focusing on reading and mathematics), and additional explanations of curricular content. These teachers also instructed the mainstream teachers with respect to communication with deaf children.

This project started off as an evaluation of the co-enrollment program, which was the first of its kind in The Netherlands. Parents of the children in this program gave permission for a scientific evaluation of the project, allowing their child to participate for over a period of 2 years. The selection criteria for the other deaf children were their year of birth (1995, 1996, or 1997), to make sure that the age range for this group would be comparable to the age range in the co-enrollment group and their placement in mainstream education with an itinerant teacher. Permission for participation was requested from parents of eligible children and the schools in which the children were enrolled. This resulted in a group of 14 children in mainstream education for whom both parents and school gave permission for participation. Schools also gave permission for administering the tasks to the hearing classmates of each deaf child. No permission was given, though, to collect additional data about these hearing participants, such as data on academic achievement.

In the first year of the study (the first measurement), 14 schools participated with children from Grades 1–5. The number of deaf and hearing participants in the different schools and grades at the two times of measurement are presented in Table 1. At the Grade 1 level, 1 deaf child and 26 hearing children

Table 1 Number of deaf and hearing children at the various schools and grade levels for both measurements

School	Grade at Measurement 1	Peer ratings				Peer nomination			
		Measurement 1		Measurement 2		Measurement 1		Measurement 2	
		Deaf	Hearing	Deaf	Hearing	Deaf	Hearing	Deaf	Hearing
1	2	4	21	3	20	4	21	3	20
2	3	1	20	—	—	1	20	—	—
3	1	1	26	—	—	1	26	—	—
4	4	1	29	1	28	—	—	1	28
5	3	1	29	1	29	1	29	1	29
6	4	1	25	1	26	1	25	1	26
7	4	1	24	1	24	1	24	1	24
8	2	1	15	1	20	1	27	1	20
9	2	1	23	1	25	1	23	1	25
10	2	1	12	1	12	1	12	1	12
11	2	1	21	1	21	—	—	—	—
11	4	1	20	1	20	—	—	—	—
11	5	1	19	1	19	—	—	—	—
12	4	1	25	1	25	1	25	1	25
13	4	1	35	1	35	1	35	1	35

Note. Children in School 1 (co-enrollment group) were tested in April of the first and March of the second school year. Children in Schools 2–10 were tested in June of the first year and between March and June of the second year. Children in Schools 11–13 were tested in October of the second year and between March and June of the second year. Dashes mean that no data are available for that particular school at that particular time or task.

participated in the first measurement. At the Grade 2 level, a total of 8 deaf and 92 hearing children participated. Two deaf and 49 hearing children were in Grade 3 at the first measurement. At the Grade 4 level, a total of 6 deaf and 158 hearing children were included, and at the Grade 5 level, 1 deaf child and 19 hearing children participated in the study.

Not all 18 deaf and 344 hearing children who participated in the first measurement also participated in the second measurement of the study. Either children transferred to a different school or schools were not willing to participate in the second measurement. Therefore, only 15 deaf students (and 304 hearing classmates) took part in the peer ratings task at the second measurement and 12 deaf students (and 244 hearing classmates) took part in the peer nomination task. Eleven deaf students participated in both tasks at both times. Because some hearing children moved to other classrooms or schools between the two measurements, only 176 hearing classmates participated in both tasks at both measurements.

Materials

Sociometric instruments. Two instruments were used to measure peer relations in the various classrooms: peer ratings and peer nomination. In the peer ratings

task, children were asked to rate each classmate on how much they liked to play with him or her. Following Nunes et al. (2001), we used a visual scale on which the children could indicate how much they liked to play with a classmate. A happy face meant that a child liked to play with the classmate, a sad face meant that he did not like to play with the classmate, and the neutral face indicated that a child had no specific preference or dislike to play with the classmate. Children were asked to color the face that indicated how much they liked to play with a classmate. In contrast to Nunes et al., children were asked to rate their peers on a three-point scale instead of a five-point scale, because the latter would ask for too much differentiation of the youngest children in our group. According to Asher, Singleton, Tinsley, and Hymel (1979), both three-point and five-point scales are valid instruments for measuring peer relations. Based on the positive (like) and negative (dislike) nominations, a social impact and social preference score was calculated for each child. Social impact refers to the visibility of a child in a classroom and is the sum of the number of positive and negative nominations. Social preference refers to how much a child is liked by his classmates and is the number of positive nominations minus the number of negative nominations. Because of

different class sizes, standardized scores (Z scores) were used in the analyses.

The peer nomination task was a combination of the task by Güroğlu et al. (in press; see also Haselager, 1997) and that of Nunes et al. (2001). The peer nomination task measures peer group functioning in individual children. For this purpose, children were asked 15 questions on which they could nominate a maximum of three same- or different-sex classmates. They were not allowed to nominate themselves. The questions had the format “Which three classmates ...?” (see Appendix for all items). For each item, the number of nominations received by each student was summed and transformed into binomial probability scores that take into account how many nominations a student can receive given the class size (Newcomb & Bukowski, 1983) using the statistical program SocStat (Thissen & Bendermacher, 1996). A probability score ranges between 0 and 1, with a high probability corresponding to a high raw score on an item. Because of different class sizes, the calculated probability scores were standardized within classes using Z scores. For example, a high standardized probability score on “often bullies” means that a child shows a high prevalence of bullying behavior compared to his own classmates. These standardized probability scores were used in the analyses of the peer nomination task.

The program SocStat also categorized children into social status groups based on the probability scores of the “like” and “dislike” nominations and of the social impact score (number of like nominations minus number of dislike nominations). *Popular* children have a significant high like score and a dislike score below the mean. *Rejected* children have a significant high dislike score and a like score below the mean. *Neglected* children have a significant low social impact score (total of like and dislike nominations), implying that they have a low score on both like and dislike. *Controversial* children either have a significant high like score and a dislike score over the mean (but not significantly high) or a significant high dislike score and a like score over the mean (but not significantly high). *Average* children are all children who do not belong to any of the foregoing groups.

Based on the item “Which three classmates are your friends?,” mutual friendships were identified

when two children nominated each other on this item. Based on the item “Which three classmates do you like least?,” mutual antipathies were identified. In addition to the social status groups, children were classified into one of four relationship networks based on whether they had one or more friendships or antipathies: (a) only friendship, (b) friendship and antipathy, (c) only antipathy, or (d) without friendship or antipathy (Van Lieshout et al., 2004). The exact number of friendships or antipathies was not taken into account in this categorization. Both a child with one friendship and three antipathies and a child with three friendships and one antipathy were categorized in the “friendship and antipathy” network. Their social status would differ, though, with the first one probably being “rejected” and the latter one being “popular” (depending on the number of nominating classmates).

Based on eight other items in their nomination task, Abecassis, Hartup, Haselager, Scholte, and Van Lieshout (2002) calculated factor scores resulting in three dimensions of social competence. The items “bullies,” “fights,” and “disturbs” loaded on the factor antisocial behavior. The items “cooperates” and “helps” together formed prosocial behavior. The items “shy,” “seeks help,” and “is bullied” represented socially withdrawn behavior. A principal components factor analysis with varimax rotation on our data resulted in the same factor solution, explaining 71% of the variance, with the only difference that the item shy loaded on both socially withdrawn and antisocial behavior (although negatively). This same difference was found by Rooyer (1993). Following Abecassis et al. (2002) and Van Lieshout et al. (submitted), the item shy was included in the socially withdrawn category. For each dimension of social competence the standardized probability scores of the specific items were averaged to calculate the behavioral measures.

Academic achievement. Academic achievement of the deaf participants was measured by the national pupil monitoring system. This hearing-normed monitoring system is used by Dutch primary schools to measure pupils’ progress in reading, spelling, and mathematics. The tests in this monitoring system have not been normed for deaf children, but are used in most schools for the deaf. The raw score on each test is the number

of correct answers. Each student's raw score is converted into a latent score representing the level of performance along a scale provided by the pupil monitoring system, which encompasses the scores on all tests for the various levels of primary education. Based on these latent scores, each child is appointed to one of five performance level groups that are based on a norm group of Dutch children. If a child is appointed to Group A, he belongs to the 25% highest scoring children; if appointed to Group B, he belongs to the 25% children who score at or just above the mean; Group C contains the 25% children who score just below the mean; a child appointed to Group D belongs to the 15% children who score far below the mean but above the lowest scoring children; and Group E contains the 10% lowest scoring children. These performance levels were used in the analyses.

Procedure

In the co-enrollment program, all hearing children were individually tested by the first author, who is hearing. She also administered the peer ratings task to the deaf children, using sign-supported Dutch. A deaf teacher, a fluent native signer, administered the peer nomination task to the deaf children in the Sign Language of The Netherlands, due to the more complex questions used in this task. At the first time of measurement, the deaf children had spent 7 months in general education and thus in a classroom with a high number of pupils compared to special education. Not wanting to risk children not rating or nominating children because they did not know their names, photographs were used in this setting (following Nunes et al., 2001). In the peer ratings task, children were presented with photographs of their classmates followed by the three-point scale. They had to color the face on the three-point visual scale that represented how much they liked to play with the child in the photograph. In the peer nomination task, children were presented a roster with the photographs of all classmates. In each question, children were asked to nominate three classmates. They could point at the photographs of the three nominated classmates. The test administrator wrote down which classmates the child identified.

In the mainstream settings, the tasks were not administered individually, but by the teacher within the classroom setting. In these settings, the itinerant teacher was present to provide help if a question was unclear to the deaf child. Because the children in these classrooms had been in the same classroom for at least 1 year, names instead of photographs were used in these settings. In the peer ratings task, children were presented with the name of each classmate followed by the three-point scale. In the peer nomination task, children were not presented with a roster, but they were allowed to use the names in the peer ratings task if they wanted to. In both the co-enrollment and the mainstream programs the two tasks were administered within 1 week, starting with the peer ratings task.

Participants were tested twice during two school years. The children in the co-enrollment were tested in April of the first school year and in March of the second school year. Of the individually mainstreamed children, nine were tested in June of the first school year (end of the school year) and between March and June of the second school year (middle of the school year). Due to organizational issues at the schools, the other five were tested in October and between March and June of the second school year. However, these five children had also known their classmates from at least the year before. Data of the first school year (or from October for five of the children) will be referred to as data from the first measurement and data of the second school year as data from the second measurement.

School 11 (see Table 1), with three of the individually mainstreamed children, only gave permission for administration of the peer ratings task. Therefore, the peer nomination task was not administered here. In another school, administration of the peer nomination task occurred incorrectly at the first measurement, resulting in exclusion of this school from the analyses of the peer nomination task. Thus, the data for the peer ratings task at the first measurement will be reported for all 18 deaf children and their 344 hearing classmates, whereas the peer nomination task will only be reported for 14 deaf children and consequently 267 hearing classmates.

The analyses on the data of both times of measurement will be reported for the 11 deaf children (45% female, 55% male) and 176 hearing classmates

(55% female, 45% male) who took both tasks at both measurements. Six of the 11 deaf children had a CI. At the first measurement, the 11 children were in Grades 2, 3, and 4. Their mean age was 9 years 5 months, ranging from 7 years 9 months to 10 years 4 months at the first measurement. Three of these 11 children were in the co-enrollment program; for them, the two measurements were 11 months apart. Eight children were from a mainstream setting. For six of them, the two measurements were 8 or 9 months apart. For the other two children the two measurements were 7 months apart.

Data Analyses

The analyses of the data from the sociometric instruments consisted of three parts. The first two parts were based on the data of the first time of measurement only, because of the larger number of participants. The first part looked at the differences that occurred between deaf and hearing participants in peer acceptance (measured by social impact, social preference, mean peer rating from peer ratings task, and social status from peer nomination task), social competence (measured by antisocial, prosocial, or socially withdrawn behavior), and friendship relations (measured by number of friendships or antipathies and relation networks). The second part used correlational analyses to examine the relation between peer acceptance, social competence, and friendship relations on the one hand and characteristics and academic achievement of the deaf participants on the other hand.

The third part of the data analyses studied relations between the two times of measurement using the data of the 11 deaf and 176 hearing students who took part in both sociometric tasks at both times. The stability of the variables over the two times of measurement and the interrelations among the variables were investigated using Amos 4.0 for structural equation modeling (SEM) (Arbuckle & Wothke, 1999). SEM is a technique that establishes the plausibility of a theoretical model and estimates the degree to which the various explanatory variables influence the dependent variables. Starting point was the model for hearing students investigating the stability of the variables over the two times of measurement. For the two times of

measurement, variables included in this model were the social impact and social preference measure as calculated from the peer ratings task as measures for peer acceptance. From the peer nomination task, the following variables were included: probability of impact, probability of preference, and social status as measures of peer acceptance; prosocial behavior, anti-social behavior, and socially withdrawn behavior as measures of social competence; and number of mutual friends and number of mutual antipathies as measures of friendship relations. The variable social status was divided into four dichotomous variables: popular, neglected, controversial, and rejected. Subsequent to this base model, hypotheses concerning the relationship between variables were specified assuming a path from one variable to another for the hearing students. If the path proved to be nonsignificant, it was removed from the model, and if not, it remained in the model. To improve the fit of the model, it was also adapted on the basis of modification indices. Based on the more specified model for the hearing students, relations between the variables were studied for the 11 deaf students for whom data were available for both tasks at both measurements.

The goodness of fit of all estimated models was assessed by five indices: χ^2 , with degrees of freedom and *p* value, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), and the root mean-square error of approximation (RMSEA). The smaller the χ^2 relative to the degrees of freedom, the better the fit (a ratio of the χ^2 to the degrees of freedom that is smaller than 3:1 provides an acceptable fit). Furthermore, a model can be viewed to fit the data when the GFI, AGFI, and NFI are higher than .90 and the RMSEA is lower than .08.

Results

Sociometric Differences Between Deaf and Hearing Children

The peer ratings task was administered to 18 deaf and 344 hearing children. In the peer ratings task, children rated their classmates on a three-point scale on how much they liked to play with them. Mann-Whitney analyses were performed on the standard scores obtained from this task. Deaf and hearing children

Table 2 Mean standard scores for deaf and hearing children on peer ratings measures at the first time of measurement

	Deaf (<i>N</i> = 18)	Hearing (<i>N</i> = 344)
Negative nominations	−.301	.016
Positive nominations	.101	−.005
Social impact	−.202	.011
Social preference	−.213	.011

did not differ in the mean rating they received ($p > .05$). Deaf and hearing children were further compared on the number of positive (like) and negative (dislike) nominations they received and on the social impact and social preference score. No differences were found between deaf and hearing children on any of these measures (all $p > .05$). Mean standard scores on these measures are shown in Table 2.

The peer nomination task was administered to 14 deaf and 267 hearing children. Of these children, 10% was categorized as popular, 13.9% as rejected, 7.1% as neglected, 7.1% as controversial, and 67.6% as average. Table 3 shows the percentages for deaf and hearing children separately. The distribution over the social status groups did not significantly differ for deaf and hearing children ($\chi^2(4) = 1.53$, $p = .82$).

Mann–Whitney analyses were performed on the standardized probability scores of the items in the peer nomination task. Deaf children were less often nominated on the items cooperates ($Z = -3.01$, $p < .01$), “agreeable to work with” ($Z = -2.32$, $p < .05$), and helps ($Z = -3.04$, $p < .01$) than their hearing peers. On the items seeks help ($Z = -2.07$, $p < .05$) and is bullied ($Z = -3.55$, $p < .001$), deaf children were nominated more often than their hearing peers. No differences were found on the other items. Table 4 shows the mean standard scores for deaf and hearing children on the items in the peer nomination task.

Table 3 Percentage of deaf and hearing children in the various social status groups at first time of measurement

	Deaf (<i>N</i> = 14)	Hearing (<i>N</i> = 267)
Popular	14.3% (<i>n</i> = 2)	9.7% (<i>n</i> = 26)
Rejected	14.3% (<i>n</i> = 2)	13.9% (<i>n</i> = 37)
Neglected	7.1% (<i>n</i> = 1)	5.6% (<i>n</i> = 15)
Controversial	7.1% (<i>n</i> = 1)	2.6% (<i>n</i> = 7)
Average	57.1% (<i>n</i> = 8)	68.2% (<i>n</i> = 182)

Table 4 Mean standard scores for deaf and hearing children on the peer nomination items at first time of measurement

	Deaf (<i>N</i> = 14)	Hearing (<i>N</i> = 267)
Like	−.222	.011
Dislike	.148	−.008
Cooperates**	−.772	.040
Fights	.416	−.022
Is bullied***	.905	−.047
Seeks help*	.554	−.029
Shy	.099	−.005
Helps**	−.785	.041
Disturbs	.086	−.005
Is a friend	−.478	.025
Bullies	.386	−.020
Feels sick often	.111	−.006
Is asked to play at home	−.340	.017
Is not asked to play at home	.142	−.007
Is agreeable to work with*	−.614	.032

* $p < .05$, ** $p < .01$, and *** $p < .001$.

Mann–Whitney analyses were also performed on the standardized probability scores of social impact, social preference, prosocial behavior, antisocial behavior, and socially withdrawn behavior. Deaf and hearing children did not differ in social impact and social preference (both $ps > .05$). As for the behavioral measures, deaf children scored significantly lower than their hearing peers on prosocial behavior ($Z = -3.32$, $p < .001$) and higher on socially withdrawn behavior ($Z = -2.97$, $p < .05$). No significant differences were found in antisocial behavior. Standard scores on the behavioral measures are shown in Table 5.

No differences were found either in number of mutual friendships and antipathies between deaf and hearing children. Of the participating children, 56.2% were involved in a friendship-only relationship

Table 5 Mean standard scores for deaf and hearing children on the behavioral measures at the first time of measurement

	Deaf (<i>N</i> = 14)	Hearing (<i>N</i> = 267)
Prosocial behavior***	−.779	.041
Antisocial behavior	.296	−.016
Socially withdrawn behavior*	.519	−.027

* $p < .05$ and *** $p < .001$.

network, 23.5% in a friendship and antipathy network, 9.3% in an antipathy-only network, and 11% in a network without friendship or antipathy. Although the deaf children seemed to be less often involved in a friendship-only network (35.7% vs. 57.3%), more often in a network without friendship and antipathy (21.4% vs. 10.5%), and slightly more often in an antipathy-only network (14.3% vs. 9%) than hearing children, the distribution over the networks was not significantly different for deaf and hearing children ($\chi^2(3) = 3.11, p = .38$).

Relations Within the Group of Deaf Children

The nominations the deaf children received on the peer ratings and peer nomination task were analyzed in the light of use of a CI, inclusive setting, grade level, and gender. Mann–Whitney and Kruskal–Wallis tests were performed with the standard scores. In addition, data on academic achievement and data of the peer nomination task were included in correlational and nonparametric analyses.

In the peer ratings task, mean rating, number of positive or negative nominations, social impact, and social preference were not significantly related to gender, grade level, inclusive setting, and the use of a CI (all $p > .05$).

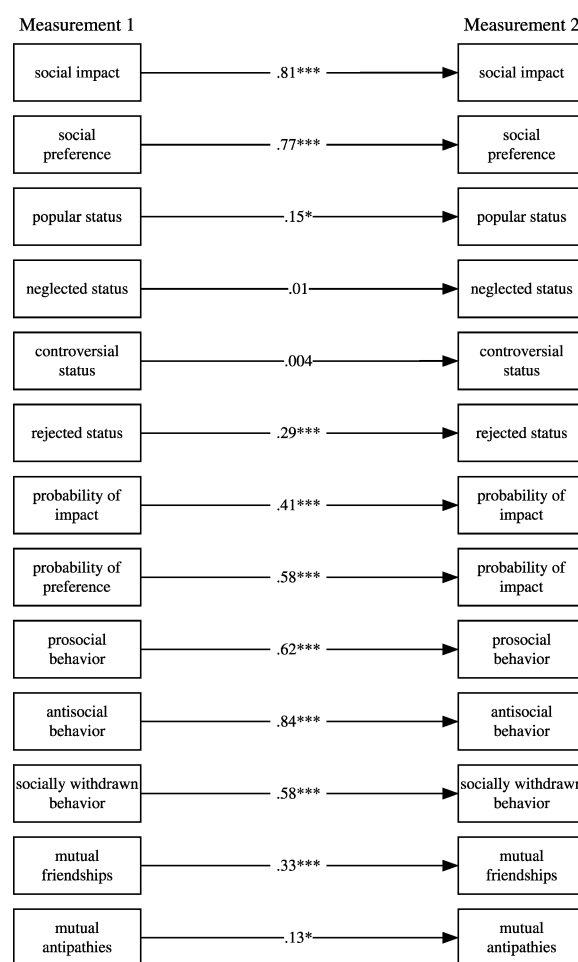
For the peer nomination task, gender, grade level, inclusive setting, and use of CI were not significantly related to the standardized probability scores of social impact and social preference. The standardized probability scores on the items of the peer nomination task and on prosocial behavior, antisocial behavior, and socially withdrawn behavior were not related to gender, grade level, inclusive setting, or use of a CI (all $p > .05$) either. The distribution over the social status groups was also not correlated with these variables ($p > .05$).

Correlations were calculated between social status, social impact, social preference, and the behavioral measures on the one hand and performance level on the achievement tests on the other hand. The only significant correlation found was between the standard score of the probability of impact (social impact) and performance level on the mathematics test ($r = -.85, p < .001$). Children with a high probability of impact were likely to score low on the mathematics test.

Relations Between the Two School Years

The stability of the variables over the two measurements was investigated for the hearing group using SEM. Error terms of the variables at both measurements were allowed to correlate. Figure 1 shows the relationships between the variables at the first and the second measurement for the hearing group. The goodness-of-fit statistics for this base model were acceptable ($\chi^2(156) = 295.03, p < .001$; GFI = .90; AGFI = .77; NFI = .89; RMSEA = .07). Except for the variables “neglected social status” and “controversial social status” all relations between the two measurements were significant.

Apart from the stability of the variables, relations among the various variables were studied. According



* $p < .05$, *** $p < .001$

Figure 1 Base model of relations between sociometric variables for the hearing group at first and second measurement.

to Gifford-Smith and Brownell (2003), children who are socially competent, that is, who show a high amount of prosocial behavior, often have a popular social status. However, children who have a rejected status often show aggressive behavior. Children with a controversial status show a mix of behaviors of popular and rejected children and children with a neglected status are less prosocial and somewhat shy and withdrawn. Van Lieshout et al. (2004) also state that children with socially withdrawn behavior are at risk of being rejected or neglected. According to both Gifford-Smith and Brownell (2003) and Van Lieshout et al. (2004), children who have mutual friendships show a high amount of prosocial behavior and often have a popular status. Children who have mutual antipathies and especially those who have only antipathies and no friendships show less prosocial behavior and more antisocial and socially withdrawn behavior. These children are at risk of being rejected by their peers.

Based on these theoretical assumptions, a SEM analysis was done for the hearing group in which, in addition to the relations in the base model, relations were included between prosocial behavior, antisocial behavior, socially withdrawn behavior, number of mutual friendships, and number of mutual antipathies at the first measurement and social status (popular, neglected, controversial, and rejected), prosocial behavior, antisocial behavior, socially withdrawn behavior, number of mutual friendships, and number of mutual antipathies at the second measurement. Figure 2 shows the relations for this specified model for the hearing group. The goodness-of-fit statistics showed that the model had an acceptable fit ($\chi^2(103) = 184.31$, $p < .001$; GFI = .92; AGFI = .81; NFI = .92; RMSEA = .067). In this model, social preference (as calculated from the peer ratings task) at the first measurement was negatively related to socially withdrawn behavior at the second measurement. A positive relation was found between prosocial behavior at the first measurement and popular status and number of mutual friendships at the second measurement. A negative relation was found between prosocial behavior at the first measurement and rejected status at the second measurement. Antisocial behavior at the first measurement was positively related to the number of mutual antipathies at the second measurement. The number

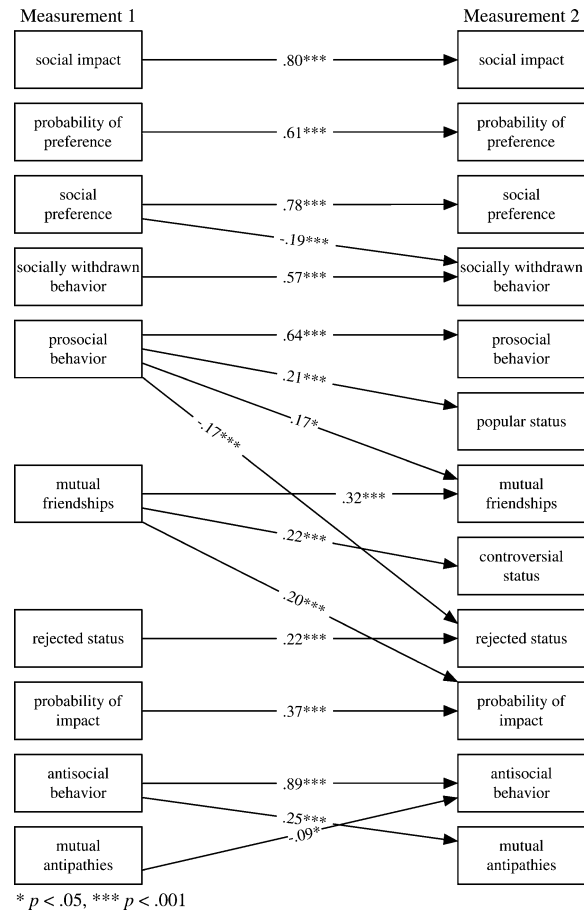


Figure 2 Specified model of interrelations between sociometric variables for the hearing group.

of mutual friendships at the first measurement was positively related to controversial status and probability of impact at the second measurement. The number of mutual antipathies at the first measurement was negatively related to antisocial behavior at the second measurement.

Based on the specified model for the hearing group (referred to as the hearing model in the remainder of this section), relations between variables in the deaf group were studied. Because the group consisted of only 11 deaf students, it was not possible to test the complete hearing model. Therefore, the hearing model was divided into five submodels. Submodels were based on relations between variables that were found in the specified model for the hearing group. All variables that were directly or indirectly interrelated were included in the same submodel. For example, social preference at the first measurement and

social preference at the second measurement were related. Social preference at the first measurement was also related to socially withdrawn behavior at the second measurement that, in its turn, was related to socially withdrawn behavior at the first measurement. Therefore, these four variables were included in one submodel.

The relations between the variables for the deaf group at the two measurements are shown in Figure 3. The results will be presented for each submodel. In a group of 11 children it is not useful to look for significant relations between the variables at the two times of measurement. Therefore, no p values are given in Figure 3. The coefficients show the relation between variables; the higher the coefficient, the stronger the relation. Instead of looking for significant relations, we studied whether the model for the deaf group was similar to that for the hearing group. The first model for the deaf group examined the relation between the social impact at the first measurement and the second measurement. The goodness-of-fit statistics showed that the relation between these two variables was no different for the deaf than for the hearing students ($\chi^2(1) = 0.21$, $p = .64$). The second model examined the relation between the probability of preference at the first and second measurement. Again, this relation did not differ from the relation for the hearing students ($\chi^2(1) = 2.43$, $p = .12$). The third model studied the relation between social preference and socially withdrawn behavior at the first measurement and social preference and socially withdrawn behavior at the second measurement. The relation between these variables was no different for the deaf than for the hearing group ($\chi^2(1) = 6.92$, $p = .14$). The fourth model studied the relations between prosocial behavior, number of mutual friendships, rejected status, and probability of impact at the first measurement and prosocial behavior, popular status, number of mutual friendships, rejected status, and probability of impact at the second measurement. In the hearing model, controversial status was also included in this part of the model. However, for the deaf group this variable was excluded from the analysis because none of the deaf students had such status, leading to a standard deviation of zero. The adjusted model for the deaf differed from the model for the hearing students

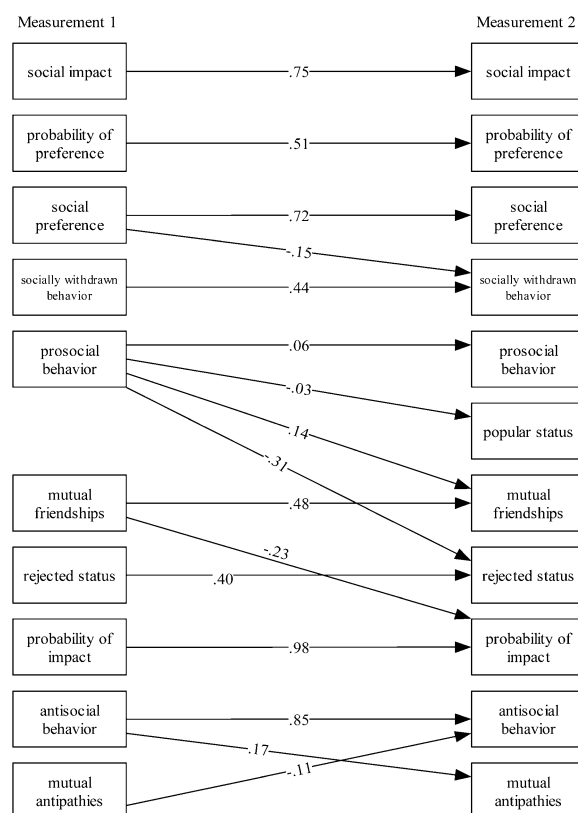


Figure 3 Interrelations between sociometric variables for the deaf group.

($\chi^2(12) = 24.18$, $p < .05$). In the deaf group, no relation existed between prosocial behavior at the first measurement and prosocial behavior and popular status at the second measurement. The relation between prosocial behavior at the first measurement and number of mutual friendships and rejected status at the second measurement was similar to that in the hearing group. The number of mutual friendships at the first measurement was still positively related to the number of mutual friendships at the second measurement. However, a negative instead of a positive relation occurred with probability of impact. The relation between rejected status at the first and second measurement was similar to the one in the hearing group as was the relation between probability of impact at the first and second measurement. The fifth model for the deaf studied the relation between antisocial behavior and number of mutual antipathies at the first measurement and antisocial behavior and number of mutual antipathies at the second measurement. The same

relations were found as in the hearing group ($\chi^2(4) = 5.87, p = .21$).

Discussion

This article examined peer acceptance, social competence, and friendship relations of deaf children in a co-enrollment program or in mainstream education. With the growing number of deaf children in mainstream settings, it is important to study their social integration and its development over time. First, deaf children were compared to their hearing peers on peer acceptance, social competence, and friendship relations. Second, the relation between these variables and child characteristics and academic achievement was studied for deaf children. Third, this article focused on the stability over time and the interrelations between the different variables.

Sociometric Differences Between Deaf and Hearing Children

No differences are found between the deaf children and their hearing peers in peer acceptance, social status, the number of mutual friendships, or the number of mutual antipathies. However, deaf children seem to be more often involved in a network without any friendships (network without friendship or antipathy and antipathy-only network) than their hearing peers. Although no differences are found in peer acceptance, deaf and hearing children differ on some dimensions of social competence. The deaf children score lower than their hearing peers on prosocial behavior (less nominated on cooperates and helps) and higher on socially withdrawn behavior (caused by more nominations on seeks help and is bullied).

The results on peer acceptance agree with other studies on co-enrollment programs in that the deaf children do not differ from their hearing peers in peer acceptance. However, Nunes et al. (2001) found deaf children to be more neglected than their hearing peers and to have a higher chance of not having a friend in the classroom. Differences with the Nunes et al. study might be explained by communication issues. Nunes et al. reported communication problems between the deaf and hearing children. Although communication is not studied in this article, the students in the main-

stream settings have good oral communication skills and use oral communication in the classroom. Therefore, communication with their hearing classmates may have been easier than in the Nunes et al. study. Three of the co-enrollment children can also communicate fairly well in spoken Dutch, but in addition, communication with their classmates is enhanced by half an hour of sign language instruction each week for both the deaf and the hearing children. This may have solved some of the communication issues Nunes et al. talk about. Also, nine of the deaf children in this article have a CI that has improved their oral communication skills. Unfortunately, the deaf group in this article is too small to further study the impact of communication skills and of having a CI which influences oral communication skills.

The results on social competence are somewhat difficult to interpret, partly because this has not been studied before in deaf children. It is unclear whether deaf children are nominated less on cooperates and helps because they are indeed less cooperative and helpful or because the hearing children are simply not feeling comfortable to ask a deaf child to help them. Anyway, it seems important that both possible interpretations receive attention from teachers in inclusive settings. They should be addressed during classroom discussions with deaf and hearing classmates, focusing on helping and supporting each other and, in doing this, showing appropriate behaviors.

Relations Within the Group of Deaf Children

No significant relations are found between peer acceptance and social competence on the one hand and use of a CI, inclusive setting, grade level, and gender on the other hand. Previous studies found significant effects of inclusive setting, grade level, and gender. The lack of these effects in this article may be caused by the small research group.

Various studies found a relation between social integration and academic achievement in hearing children. This relation was never studied before in deaf children. This article performed a first exploratory analysis to see whether such a relation exists in this group of deaf children. The only significant correlation is found between social impact and mathematical

achievement. Children with a high social impact, that is, children who receive many like and/or dislike nominations on the peer nomination task, tend to score low on mathematics. It is unclear why these highly visible students score lower on the mathematics test. Further research with a larger deaf group and a comparison to their hearing classmates could shed some more light on this relation.

Relations Between the Two School Years

Analyses on the stability of the sociometric measures for the hearing students show significant relations between most of the measures in the first and second school year. The only measures that are not found to be stable over the two school years are the measures of neglected and controversial status. This is in accordance with other studies in which these social status categories are found to be less stable over time than the other categories (Gifford-Smith & Brownell, 2003). The specified model of interrelations between the sociometric measures shows interrelations between different measures at the two times of measurement in addition to the relations between identical measures at the two times of measurement. Prosocial behavior in the first school year is positively related to popular status and negatively related to rejected status in the second school year, which is in accordance with the literature. Antisocial behavior in the first school year is positively related to the number of mutual antipathies in the second school year. This can be explained by the fact that children who only have mutual antipathies are usually rejected by their peers (Van Lieshout et al., 2004) and rejected children display high degrees of antisocial behavior (Gifford-Smith & Brownell, 2003).

The number of friendships in the first school year is positively related to probability of impact and to having a controversial status in the second school year. Van Lieshout et al. (2004) found the number of friendships to be related to prosocial behavior and popular status. Although that relation is not found in this article, the relations found are not unexplainable. Controversial children are children who are not only liked by many peers but also disliked by many others. Having at least one friend has been found to diminish the negative effect of rejection (Gifford-Smith & Brownell, 2003). If children who are disliked by many peers have

enough friends, their status might become controversial instead of rejected. These children are not at such a high risk of negative outcomes. A higher probability of impact means that a child is often nominated by his peers, either as liked or disliked; having friends will increase the number of like nominations and therefore the social impact of a child.

Apart from these relations, a negative relation is found between the number of mutual antipathies in the first school year and antisocial behavior in the second school year. Van Lieshout et al. (2004) found the opposite relation; children with mutual antipathies showed a higher degree of antisocial behavior. Even when a child also has mutual friendships, social competence tends to be lower. Although the relation in this article is small, it is unclear why it is a negative one.

For the deaf group, the examination of the relations between the measures is based on the specified model for the hearing participants. For most relations, the structure for the deaf children is the same as it is for the hearing children. Some differences occur though. For the deaf children, no relation is found between prosocial behavior in the first year and prosocial behavior and popular status in the second year. Children who show prosocial behavior generally have a popular status (Gifford-Smith & Brownell, 2003). Because prosocial behavior is not stable over the two school years for the deaf children, it is not surprising that no relation is found between prosocial behavior in the first year and popular status in the second year.

The number of mutual friendships in the first year is only related to the number of friendships and the probability of impact in the second year. As opposed to the relation for the hearing students, the relation with the probability of impact is a negative one. Probably, the deaf children with more friends have less antipathies which decreases their probability of impact compared to (hearing) children with both friendships and antipathies. No relation is found between the number of mutual friendships and controversial status. Additionally, the relation between the probability of impact in the first and second year is much stronger for the deaf than for the hearing participants. Obviously, the degree of visibility in the classroom changes less over the two school years for deaf than for hearing children, indicating that the total number of friendships and antipathies changes less.

The results of this article provide a positive image of the social integration of this group of deaf children in inclusive settings. Deaf and hearing children are found to be similar in their peer acceptance, social status, and friendship relations. Furthermore, the structure of the interrelations between sociometric measures in two school years is similar for deaf and hearing children, whereas the structure for hearing children is mostly in agreement with findings in previous studies. Over a period of 2 years, the relations for hearing students are similar to relations found within one time of measurement in previous studies.

Differences between the deaf and hearing children occur in social competence and the stability of prosocial behavior and probability of impact. Because the group of deaf children in this article is quite small, the times of the two measurements show discrepancies, and little previous research has been done, future research is needed, aimed at further exploration of differences in social competence, interrelations between the sociometric measures and characteristics of the deaf children and their educational setting.

Even though future research is necessary, this article shows that it is important to keep differences between the deaf and hearing children in mind when deaf children are included in general education. Teachers need to be sensitive to the behavior of both the deaf and the hearing students when it comes to social competence. Not only does the deaf child have to learn these behaviors but also the hearing children have to give him or her the opportunity to display the appropriate behaviors. Teachers should be aware of this. Training of deaf children in aspects of social competence seems plausible as well as focused classroom discussions including hearing and deaf classmates about issues of mutual cooperation and support.

It should be noted that in The Netherlands only a relatively small group of deaf children is educated in an inclusive setting. These children mostly have good oral communication skills and they may also differ on other characteristics from their deaf peers in special education. These differences may influence their social integration in an inclusive setting. In The Netherlands, inclusion of these deaf children is carefully prepared and there is considerable educational support afterward. Appropriate selection, careful preparation,

and strong educational support might be essential prerequisites for successful social integration of deaf children in inclusive settings.

Appendix: Translation of the Peer Nomination Task (with item label in brackets)

1. Which three classmates do you like most? (liked).
2. Which three classmates do you like least? (disliked).
3. Which three classmates are very considerate and are very cooperative? (cooperates).
4. Which three classmates often start fights with other children? (fights).
5. Which three classmates are often bullied, teased, and picked on by other children? (is bullied).
6. Which three classmates want someone to come to help them, even if they did not try to find a solution themselves? (seeks help).
7. Which three classmates are very shy? (shy).
8. Which three classmates always offer to help you if you ask for it? (helps).
9. Which three classmates always disturb the way things usually go and disrupt everything? (disturbs).
10. Which three classmates are your friends? (is a friend).
11. Which three classmates often bully other children, pick on them, and tease them? (bullies).
12. Which three children often have physical complaints? They often have a headache, tummy-ache, or sickness; they often do not feel very well (often feels sick).
13. Which three classmates would you like to invite to your house to play? (asked to play at home).
14. Which three classmates would you not like to invite to your house to play? (not asked to play at home).
15. Which three classmates do you like to cooperate with? (agreeable to work with).

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