Factors Associated With Social Interactions Between Deaf Children and Their Hearing Peers: A Systematic Literature Review

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Research indicates that deaf children can have marked social difficulties compared with their hearing peers. Factors that influence these social interactions need to be reviewed to inform interventions. A systematic search of 5 key databases and 3 specialized journals identified 14 papers that met the inclusion criteria. Methodological quality of the articles was assessed using an adapted checklist. There was a general lack of consensus across studies. The main factors investigated were the deaf child’s communication competency, age, and level of mainstreaming, which overall were positively associated with peer interactions. Some studies also found that females were more likely to have positive social interactions. The majority of studies were cross-sectional. Some studies lacked appropriate control groups and did not recruit an appropriate range of informants. A wide range of factors were associated with social interactions between deaf and hearing children. The role of communication gained the highest consensus across studies. Other factors were involved in more complex interactions.

This review aimed to investigate the factors that are associated with and/or directly influence the social interactions between deaf children and their hearing peers. While individual studies have looked at the various factors that are associated with improved peer relationships between deaf children and hearing peers, no systematic review of the findings has yet been undertaken. By exploring these factors, parents, professionals, and policy makers are best informed to support and develop interventions to help deaf children enjoy positive social interactions, peer acceptance, and deep and meaningful friendships with their hearing peers. These relationships are associated with a wide range of positive outcomes, for children’s psychological well-being and their academic career. This could ultimately reduce risk factors in later life and increase resiliency against any future challenges.

Developmental Importance of Friendships

A key aspect of development for every child, whether deaf or hearing, is the ability to interact socially. Social interactions and friendships in childhood are associated with a wide range of factors related to psychological well-being and can be considered protective factors against life stressors and developmental challenges, such as those faced by deaf children. Having close positive peer relationships is associated with increased self-esteem (Bishop & Inderbitzen, 1995), emotion regulation (McElwain & Valling, 2005), successful adjustment to school transitions, and positive attitudes toward school (Tomada et al., 2005). However, peer rejection is related to the reverse. Studies have found that isolated children display more internalizing problems, such as depression, anxiety, and low self-concept (Strauss, Forehand, Smith, & Frame, 1986), while concurrently disliking school and performing more poorly academically (Flook, Repetti, & Ullman, 2005).

Peer relationships offer children opportunities to practise key competencies related to interpersonal interactions, such as helping, sharing, and negotiating
The establishment of positive peer relations is crucial for children’s global socio-emotional development, advancing emotional regulation and expression (Parker & Gottman, 1989), while simultaneously fostering communication skills (Newcomb & Bagwell, 1996) and aspects of cognitive development, such as perspective taking (McGuire & Weisz, 1982). Friendship building is a developmental goal for children (Buysse, Goldman, & Skinner, 2002) and contributes to later adjustment and life satisfaction (Brissette, Scheier, & Carver, 2002; Ladd, Kochenderfer, & Coleman, 1996; Overton & Rausch, 2002). Therefore, peer friendships could provide deaf children with opportunities to develop specific social, emotional, and cognitive skills, alongside increasing their overall well-being and self-confidence. However, rejection by peers or the absence of friendships could lead to increased psychosocial and educational difficulties for deaf children, over and above the challenges they can already face.

**Deaf Children: The Developmental Challenge**

Deaf children born to hearing families are more vulnerable to language delays (Moog & Geers, 1985). The potential mismatch of communication modalities used between deaf children and their families could be linked to this. Vulnerability to language delays can affect children’s development of communication strategies; understanding of the thoughts and feelings of others (Peterson & Slaughter, 2006); ability to self-regulate especially in relation to attention, impulsivity, and emotions (Mitchell & Quittner, 1996; Rieffe, 2011); rate of understanding social rules (Rachford & Furth, 1986); and overall social functioning (Marschark et al., 1993; Stinson & Whitmire, 2000). Additionally, deaf children have been found to be 1.5 to 2 times more vulnerable to mental health difficulties (Hindley, 2005) compared with their hearing peers. Problems can relate to loneliness (Most, 2007) and depression (Theunissen, et al., 2011), along with wider behavioral problems (Barker, et al., 2009).

**Social Interaction Between Deaf Children and Hearing Peers**

Alongside the communication and psychological difficulties that deaf children can face, deaf children’s social behavior has been found to be more withdrawn and less collaborative than that of their hearing peers (Wauters & Knoors, 2007). While there are mixed findings in assessing deaf children’s peer acceptance (Stinson & Kluwin, 2003), deaf children have been found to feel more rejected and neglected than their hearing peers (Cappelli, Daniels, Durieux-Smith, McGrath, & Neuss, 1995; Wauters & Knoors, 2007). Research indicates that deaf children do not have as many close friendships with hearing peers (Wauters & Knoors, 2007) and these relationships are more sporadic (Lederberg, Rosenblatt, Vandell, & Chapin, 1987). Deaf children are also more likely to have a complete lack of friends in their mainstream class than their hearing peers (Nunes, Pretzlik, & Olson, 2001). Furthermore, compared with mothers of hearing teenagers, mothers of deaf adolescents have rated their children’s friendships as higher in aggression and lower in warmth (Henggeler, Watson, & Whelan, 1990). However, this was not found in the children’s self-reports.

It is also important to consider the attitudes and beliefs of hearing children regarding their deaf peers and what may mediate this. Most, Weisel, and Tur-Kaspa (1999) compared hearing peers who had regular contact with deaf children in mainstream education compared with those who did not, according to their perceived personal qualities and the student’s attitudes of deafness. It was noted that the deaf student’s speech intelligibility was associated with more positive perceived personal qualities by their hearing peers. Furthermore, the group that had contact with their deaf peers associated more positive qualities of those with poor speech intelligibility compared with students who did not have this contact. Within this context of familiarity, Lewis (1995) found that peer acceptance of children with disabilities is affected by other children’s understanding of a child’s special needs. Stinson and Liu (1999) found that hearing peers had varying attitudes toward deafness, with negative attitudes centred on frustration, misinterpretation, communication breakdowns, fear, and lack of familiarity with deaf peers and an unwillingness to consider children who are “different.” This demonstrates that it is necessary to consider both the impact of characteristics associated
with the deaf child and the attitudes and characteristics of their hearing peers on peer interactions and relationships.

**Understanding Social Interaction in the Context of Research and Child Development**

While social behavior, peer status, and friendships are independent and complex social constructs, this review recognizes the importance of exploring the range of social interactions when considering deaf children’s experiences with hearing peers.

Researchers emphasize the importance of distinguishing between the different components of social interaction—social behavior: considering social skills and overall social competence; social status: including a child’s acceptance or rejection by their peers; and friendships: considering the quantity, quality, and stability of long-term peer relationships (Bukowski & Hoza, 1989; Mikami, 2010; Stinson & Antia, 1999). The different components of social interaction can relate to different developmental stages in children, both in formation and impact (Mikami, 2010). Typically, social behaviors and skills are initially developed in the preschool years of early childhood, thereby impacting future social interactions and relationships subsequently (Engels, Dekovic, & Meeus, 2002). Peer acceptance, a construct of social status, is more relevant to middle childhood, from around the age of 7−12 years old (Gifford-Smith & Brownell, 2003). The presence of a close, reciprocal friendship has been found to be more pertinent to older children, during adolescence (Buhrmester, 1996). Pederson, Vitaro, Barker, and Borge’s (2007) sequential model of childhood internalization problems postulates that young children’s interpersonal behavior is associated with social status in middle childhood, laying the foundations for friendships in adolescence.

**Current Context for Deaf Children: Moving into the Hearing World?**

The health and educational context of deaf children is becoming an increasingly pertinent issue to consider in relation to social development and friendships with hearing peers. Technology has helped develop more efficient interventions, with improved hearing aids and the use of cochlear implants.

The Newborn Hearing Screening Programme introduced in the United Kingdom in 2002 has increased focus on early identification of hearing loss in infants, enabling earlier intervention options for children and their families. Early diagnosis of hearing loss may be associated with better communication outcomes (Bat-Chava & Deignan, 2001). Improved oral communication skills may facilitate social interactions with hearing peers (Bat-Chava, Martin, & Koscw, 2005) and improve children’s perceptions of their deaf peers (Most et al., 1999), thereby leading to improved friendships and increased socioemotional benefits for deaf children.

Alongside the technological and health care advancements, inclusion policies are prioritizing mainstream education for children with learning and sensory disabilities (Department for Education and Employment [DfEE], 1998; Disability Rights Task Force, 1999). Combined with improved audiological interventions, increasing numbers of deaf children are entering mainstream education. In such establishments, the majority of children are not deaf and the predominant communication modality is spoken language. The inclusion of deaf children in mainstream education has been associated with good academic outcomes and greater development of social skills (Geers, 1990; Stinson & Antia, 1999). However, deaf children can face considerable social challenges with their hearing peers.

The emotional cost for deaf children of increased peer rejection, neglect, reduced number of friendships with hearing peers, and the lack of closeness within friendships cannot be ignored. Children’s positive mental and emotional health is a priority under the government’s Every Child Matters (Department for Education and Skills [DfES], 2003) initiative. Furthermore, Coyner (1993) emphasized the importance of children’s social well-being on academic achievement, stating that “the best predictor of academic success in a mainstream program for hard of hearing and deaf students is their acceptance by hearing peers” (p. 90).

The issue of social interactions and relationships between deaf children and hearing peers is clearly an
important and growing area of concern. However, deaf children's social experiences in mainstream schools can vary widely (Christiansen & Leigh, 2002) and thus not all deaf children experience rejection and poor-quality friendships with hearing peers. The reasons behind this are unclear and need to be explored to best support all deaf children.

The review, therefore, aimed to address the following question:

- What factors are associated with and/or directly influence the social interactions between deaf children and their hearing peers?

**Method**

**Search Strategy**

A search strategy of the literature up to and including January 2012 was conducted using a wide range of electronic databases, covering the disciplines of clinical psychology (PsycINFO via Ebsco), education (ERIC), social sciences (IBSS), and health (CINAHL). The large multidisciplinary database, SCOPUS, was used, which included a search of MEDLINE. Individual journals that specifically published research on deaf children were also searched. These included *The Journal of Deaf Studies and Deaf Education*, *Ear and Hearing*, and *Deafness and Education International*. There was no start cut-off date applied to the searches. To ensure that the replication of previous work did not occur, a search for existing systematic literature review papers was conducted. This search did not identify any previously published systematic literature reviews investigating the factors influencing social interactions between deaf children and their hearing peers.

The terms searched were (deaf* OR hear* impair* OR “hard of hear*” OR “hard-of-hear*” OR hear* difficult* OR hear* disorder*) and (child* OR adolescen* OR young OR student* OR pupil* OR boy* OR girl* OR juvenile*) and (peer* OR group* OR friend* OR relation* OR social*OR interact* OR integrat* OR bull* OR isolate* OR alone OR l gol*). Articles that featured these search terms in their title, abstract, or keywords and that met inclusion criteria were identified. When possible, a search limit was put in place, and subsequent searches were confined to peer-reviewed journals in the English language, which used child participants. Titles were then used to assess relevancy. In cases of uncertainty, the abstracts and then the full texts were reviewed. Reference lists and citations of identified key articles were also searched. Key authors identified from the retrieved articles were contacted to investigate whether any relevant articles were soon to be published and to identify any additional relevant articles that had not been identified from the existing search.

**Study Selection Criteria**

Selection criteria were refined after reading the abstracts and full papers identified in the scoping search. Initial searches found that studies used a wide range of methodological designs, different sources for data collection, and frequently included participants who experienced all forms of hearing loss, ranging from mild to profound, unilateral, and bilateral. It was, therefore, decided that excluding mild or unilateral hearing loss, when this applied to the minority of a study’s participants, would restrict the conclusions drawn from the review and lead to an unrepresentative presentation of research in the area. A wide age range of 4–19 years was included to enable consideration of all levels of social development, including development in social skills and social status and how well-established childhood friendships were. See Table 1 for details on selection criteria.

**Search Outcome**

Figure 1 illustrates the steps taken in the search process for this review. Using the search strategy, 2,428 peer-reviewed articles were identified from a wide range of search engines and relevant journals. Following assessment of article titles, 118 articles were selected. Once duplicates were removed and abstracts of the articles were read, 37 articles remained, of which the full articles were read. The references sections and electronic citations of these articles were manually reviewed, producing a further six articles. Personal communication with lead authors led to an additional article being identified and reviewed. In total, 44 full articles were read.
Thirty articles were removed according to the inclusion and exclusion criteria. Over half of these articles were removed as they did not specifically explore factors that affected or were associated with the social interaction of deaf and hearing children, instead exploring descriptive patterns of interactions. Fourteen articles were consequently included for the review and are summarized in Table 2 (in Supplementary Materials). Only directly relevant findings from these studies are reported in this review due to the wide range of research questions and outcomes explored in many of the studies.

**Table 1  Selection criteria**

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<th>Inclusion criteria</th>
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<td>Studies with participants aged 4−19 years old with hearing loss</td>
<td>Studies that only describe the pattern of interaction between deaf children and their hearing peers, instead of investigating the factors that affect this</td>
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<td>Studies including a minority of participants with unilateral hearing loss</td>
<td>Studies that do not directly assess social interaction between deaf children and hearing peers</td>
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<td>Longitudinal studies with one time point that do not meet age inclusion criteria</td>
<td>Studies including participants with additional physical, sensory, developmental, or learning difficulties</td>
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<td>Studies with qualitative, quantitative, or mixed design</td>
<td>Studies only investigating social interaction between deaf children and their deaf peers</td>
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<td>Methodologies that involve collecting data from children and informers other than the child</td>
<td>Intervention studies</td>
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<td>Literature reviews or other non-empirical papers</td>
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<td>Dissertations</td>
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**Data Extraction**

A protocol was specifically developed around the aims of the review to record data from each article.

**Data Synthesis**

Due to the diversity of methodologies and outcome measures, statistical methods of data synthesis were not appropriate. Extracted data were collated and reported qualitatively for the review, generating a comprehensive narrative account of the findings.
Study Quality Assessment

Quality assessment was conducted on all articles included in the review. While studies were not excluded on the basis of their quality rating, this information informed the analysis of the reliability and validity of each study’s findings and overall conclusions. Furthermore, including studies ranging in quality informed analysis of the current research literature in this area and contributed to the review’s recommendations for future research.

A range of quality checklists were available. However, none of these were appropriate for all types of systematic literature reviews (Moja, Telaro, Moschetti, Coe, & Liberati, 2005), and it was challenging to identify reliable checklists that assess studies with varying methodologies. Therefore, a quality control checklist was developed by the researcher that could assess studies using mixed designs and quantitative methodologies. This was important due to the range of methodologies represented in the articles selected for the review. The devised checklist was a combined adaptation of the checklists developed by Downs and Black (1998), Law et al. (1999), and the National Institute for Health and Clinical Excellence (NICE, 2007). A mixed-methods checklist developed by Sirreyeh, Lawton, Gardner, and Armitage (2011) was also referenced to ensure all relevant assessment questions were considered.

The checklist (see Table 3 in Supplementary Materials) consisted of 43 questions, 32 of which were only relevant for quantitative-based methodologies. Mixed design–based methodologies would be assessed by all 43 questions. A point-scoring system was used to compare the quality of different studies. Checklist criteria were rated as “yes” (2 points), “partial” (1 point) and either “no” or “don’t know” (zero points). Quality ratings were converted into percentages to allow direct comparison across studies. To ensure the reliability of quality ratings, an independent researcher rated a randomized selection of half of the articles under review. Using Spearman’s correlation, inter-rater reliability was scored at .743, at <.01 significance level.

Results

Methodological Quality

Studies ranged widely in quality from 58.9% (Bat-Chava & Deignan, 2001) to 83.8% (Antia, Jones, Luckner, Kreimeyer, & Reed, 2011). Bat-Chava and Deignan (2001) had the lowest quality rating using a mixed-design methodology, which compromised the qualitative elements of the study. Furthermore, the study relied on retrospective accounts, lacked multiple informants and a control group, and used a relatively small sample size for the quantitative part of the study. In contrast, Antia et al. (2011) attained the highest quality rating using an extensive longitudinal design, large sample size and drew from multiple sources of informants.

Overall, studies mainly varied by sample size, control groups, use of multiple types of informers, and methods and measures of data collection. Conflicts of interests were rarely referred to, despite the possible influence from cochlear implant manufacturers. Overall, studies included high-quality background theory, rationale for the study, and clear aims. The majority also included a clearly outlined procedure, systematic method of data collection and statistical analysis, and clear conclusions relating back to the research questions.

Study Design

Of the 14 studies, 13 were quantitative. Of these 13, three were longitudinal designs and ten were cross-sectional. Two of the cross-sectional studies included observational data, with videoed peer interactions. One of these also included a parental and child questionnaire. Half of the cross-sectional studies only included one source of data. Of the five including multiple types of informers, one (Wolters, Knoors, Gillessen, & Verhoeven, 2011) included perspectives of parents, teachers, hearing peers, and deaf children. One study used a mixed design (Bat-Chava & Deignan, 2001) and only included parents for interviews and questionnaire responses. It is important to note that in one study (Leigh, Maxwell-McCaw, Bat-Chava, & Christiansen, 2008), parents and deaf adolescents’ ratings of peer acceptance were poorly correlated. This indicates that parents and their children may not evaluate social status in the same way and highlights the need to use multiple sources of data.

Participants

Seven of the 14 studies considered the social interactions of deaf, primary aged children (4–12 years old),
while three considered the social interactions of deaf, secondary aged children (12–19 years old), and four spanned the age groups. Eight studies included participants with cochlear implants, with one study including bilateral cochlear implants (Wolters et al., 2011). Studies ranged in their inclusion criteria according to type and severity of hearing loss. Two studies included participants with unilateral hearing loss. Studies also differed widely in their sample size, from 7 (Lederberg, Ryan, & Robbins, 1986) to 220 (Stinson, Whitmire, & Kluwin, 1996).

Type of Social Interaction Measured

The 14 studies varied in their focus and breadth of exploration into social interactions of deaf children with hearing peers. Research has emphasized the importance of differentiating between varying levels of social interaction, separating out children's social behavior including social skills and overall social competence, social status including a child’s acceptance or rejection by their peers, and friendships considering the quality and stability of long-term peer relationships (Bukowski & Hoza, 1989; Mikami, 2010; Stinson & Antia, 1999). Half of the studies focused solely on the social behavior or social skills of deaf children with their hearing peers (Antia et al., 2011; Bat-Chava et al., 2005; Lederberg et al., 1986; Martin, Bat-Chava, Lalwani, & Wultzman, 2010; Most, Ingber, & Heled-Ariam, 2011; Musselman, Mootilal, & MacKay, 1996; Stinson et al., 1996). One study focused solely on the social status of deaf children among hearing peers (Antia et al., 2011; Bat-Chava et al., 2005; Lederberg et al., 1986; Martin, Bat-Chava, Lalwani, & Wultzman, 2010; Most, Ingber, & Heled-Ariam, 2011; Musselman, Mootilal, & MacKay, 1996; Stinson et al., 1996). One study focused solely on friendships in this population (Roberts & Rickards, 1994), and four studies included a combination of friendship and social status (Bat-Chava & Deignan, 2001; Leigh et al., 2008), social status and social behavior (Wolters et al., 2011), and friendship and social behavior (Martin & Bat-Chava, 2003). Finally, one study considered the full range of social interactions, from social behavior, status, and friendships between deaf children and their hearing peers (Wauters & Knoors, 2007).

Measures Used

Due to the different domains of peer social interaction being assessed, a wide range of measures were used across studies. Two studies used the Social Activity Scale, and three studies used the CBCL, and some studies used similarly constructed sociometric scales of peer ratings and nominations. However, the majority of studies used differing measures. These instruments also varied in their construction, as some were recognized questionnaires and protocol with standardized scores and established reliability and validity, while others were created by the study or were guided by their participant responses (Bat-Chava & Deignan, 2001; Martin & Bat-Chava, 2003; Roberts & Rickards, 1994).

Main Themes From the Studies

The main themes found from the review will be examined from the “inside-out.” First, individual factors relating to the deaf child will be explored alongside the child’s clinical hearing–related characteristics. The review will then begin taking a wider perspective, considering first the influence of peer characteristics in social interactions and then the context of the social interaction.

Child Characteristics

Age. Three (Cappelli et al., 1995; Martin & Bat-Chava, 2003; Roberts & Rickards, 1994) of the five studies (Cappelli et al., 1995; Lederberg et al., 1986; Martin & Bat-Chava, 2003; Roberts & Rickards, 1994; Wauters & Knoors, 2007) that explored the association between age and peer interactions found a relationship. Quality ratings for these studies ranged from 61.8% to 80.9%. These studies collectively considered social skills, social status, and friendship patterns, which were informed by parents, deaf children, and hearing peers. Two of the three studies (Cappelli et al., 1995; Martin & Bat-Chava, 2003) found that age was positively associated with social outcome. Older deaf children had higher social status and a wider repertoire of coping skills in social situations with hearing peers. Older children also demonstrated more focus on peer relationship goals and reported a greater fear of negative evaluation by hearing peers (Cappelli et al., 1995).

When considered together, the studies of Cappelli et al. (1995) and Martin and Bat-Chava (2003) had methodological strengths, collectively exploring social
skills, status, and relationships from the perspectives of children and parents and recruiting participants of similar age ranges (6–12 and 5–11 years old). However, females were disproportionately represented in one study, and gender was not controlled for in this analysis (Cappelli et al., 1995). Gender could have been a confounding factor in social outcomes for this study and thereby could have had a biased effect on results. Furthermore, neither study controlled for communication competence. These factors should be considered in light of findings related to the association of gender and communication with social interactions later in this review.

Age was identified in one study as a mediating factor between friendship patterns and educational setting (Roberts & Rickards, 1994). Only primary aged children with high levels of mainstreaming had more hearing friends than those in less integrated educational settings. This indicates that younger children’s friendships are more influenced by context. While this study had a large sample size, age was not controlled for across educational settings, and ratings were only generated from deaf children, which could have affected results. It is, therefore, important to exercise caution when generalizing findings.

Two of the five studies (Lederberg et al., 1986; Wauters & Knoors, 2007) did not find an association between age and peer interactions. However, there were a number of limitations in the study’s methodological designs, which could have limited results. Furthermore, one study (Wauters & Knoors, 2007) did not control for communication competence in children. Although one of these studies used a “two time point” longitudinal design, the time points were only separated by 1 year. Both these studies had small sample sizes and individually used a relatively smaller age range compared with the other studies. Furthermore, both studies only included primary aged children. It is possible that the most powerful effects of age on social interactions occur across the transition to secondary school and through adolescence, which were not included in these studies.

Gender. Five studies analyzed the relationship between gender and peer social interactions (Martin & Bat-Chava, 2003; Martin et al., 2010; Musselman et al., 1996; Wauters & Knoors, 2007; Wolters et al., 2011). Studies ranged in quality considerably, from 67.7% (Martin & Bat-Chava, 2003; Musselman et al., 1996) to 80.9% (Wauters & Knoors, 2007; Wolters et al., 2011). There was variation in sample size, from 10 (Martin et al., 2010) to 87 participants (Wolters et al., 2011); ratios of male to female participants; and consideration of participants’ communication competence, with three studies not controlling for this (Martin & Bat-Chava, 2003; Martin et al., 2010; Wauters & Knoors, 2007). Collectively, studies included the full range of social interactions, with all studies including exploration of social behaviors, two studies including consideration of social status, and two studies exploring associations with peer relationships.

Three studies found a relationship between gender and peer interaction (Martin et al., 2010; Musselman et al., 1996; Wolters et al., 2011). Two of these (Martin et al., 2010; Wolters et al., 2011) found that young deaf girls were more likely to demonstrate higher levels of social competence, with increased acceptance, prosocial behavior, and agreeableness. While young deaf boys demonstrated improvisation in conversations, they were also found to exhibit more withdrawn and antisocial behavior than girls (Wolters et al., 2011). More pragmatic skills and ability to monitor conversations were associated with peer acceptance in girls, although not with boys (Wolters et al., 2011). Another study (Musselman et al., 1996) found that only girls’ social adjustment was influenced by their educational setting, whereby increased integration with hearing peers was associated with higher social participation and emotional security with hearing peers.

Of the three studies (Martin et al., 2010; Musselman et al., 1996; Wolters et al., 2011), the full range of children, peers, parents, and teachers were recruited. Two studies (Martin et al., 2010; Musselman et al., 1996) only considered social behaviors and the other (Wolters et al., 2011) considered social behaviors and status. The ability to generalize findings was, therefore, reduced as none of these studies explored an association between gender and type or quantity of social relationships.

Concurrently, one study (Martin & Bat-Chava, 2003) found that gender was not associated with the ability to establish relationships with hearing peers or with the frequency of strategies developed. However, the set of coping strategies most associated with
successful peer relationships was mediated by gender. For girls, confidence, the ability to play alone, and ask for repetitions were associated with better peer relationships. High achievement in sport was associated with peer success in boys. While this study considered a wide age range within primary school aged children, it is not possible to generalize findings with regard to older children. Additionally, due to a relative under-representation of male participants, additional coping skills associated with male peer success could exist but were not identified due to low statistical power.

One study (Wauters & Knoors, 2007) that considered the full range of social interactions, did not find an association between gender and peer interactions. This study had a longitudinal design and a high quality rating of 80.9%. However, it had a small sample size and only considered primary school aged children, which may have limited results and reduced the ability to generalize findings with regard to older children.

Self-esteem. One study (Martin et al., 2010) considered the relationship of self-esteem with peer relationships. Deaf girls were found to have higher self-esteem, and when gender was controlled for, self-esteem was associated with increased peer interaction quality, prosocial behavior, and peer group entry. This study had a 72.1% quality rating; however, the small sample size of 10 deaf children limited the reliability of the results. Furthermore, communication competence was not controlled for, which may have acted as a confounding factor.

Child’s ability in academic subjects and sport. Mathematical ability was negatively associated with the level of a deaf child’s social impact, whether that impact be positive or negative (Wauters & Knoors, 2007). No other academic abilities were found to be associated with peer interactions. Another study (Martin & Bat-Chava, 2003) found that the ability to excel in sport was associated with the quality of male peer relationships. These studies had quality ratings of 80.9% and 69.1%, respectively. However, neither of the studies controlled for children’s communication competence, and both had small sample sizes.

Communication competence. Eight studies considered communication use and ability (Antia et al., 2011; Bat-Chava & Deignan, 2001; Bat-Chava et al., 2005; Lederberg et al., 1986; Leigh et al., 2008; Most et al., 2011; Roberts & Rickards, 1994; Wolters et al., 2011). These studies ranged in quality ratings from 58.9% (Bat-Chava & Deignan, 2001) to 83.8% (Antia et al., 2011). All except for one study (Lederberg et al., 1986) found that deaf children’s communication was related to interactions with peers. This study (Lederberg et al., 1986) had one of the lowest quality ratings and had an especially small sample size. Furthermore, it only relied on data collected through relatively brief observations, which may have limited the results found.

Considering the remaining studies together, oral communication, specifically speech intelligibility, ability to improvize in conversations, and pragmatic language skills, was positively associated with the full range of social interactions, social behaviors and competency, popularity, and relationships (Bat-Chava & Deignan, 2001; Bat-Chava et al., 2005; Most et al., 2011; Roberts & Rickards, 1994; Wolters et al., 2011). Satisfaction with home communication was positively related to social competence and self-esteem (Leigh et al., 2008), while classroom communication participation was positively associated with social skills (Antia et al., 2011). These studies collectively explored the perspectives of deaf children, hearing peers, parents, and teachers. While there were methodological weaknesses in the studies, with one using a small sample size (Bat-Chava et al., 2005), three not controlling for confounding variables, such as type of hearing device being used, age of participants, and characteristics of the informers (Leigh et al., 2008; Most et al., 2011; Roberts & Rickards, 1994), and one using a retrospective design (Bat-Chava & Deignan, 2001), the consensus that communication competency is associated with social interactions with hearing peers remained. A number of studies explored the impact of cochlear implantation on communication competence, a matter that is explored later in this review.

Hearing loss. Five studies considered children’s level of hearing (Antia et al., 2011; Bat-Chava & Deignan, 2001; Cappelli et al., 1995; Martin & Bat-Chava, 2003; Roberts & Rickards, 1994). Two of the studies did not find an association between the degree of hearing loss and deaf to hearing peer interactions (Cappelli et al.,
1995; Martin & Bat-Chava, 2003). These studies collectively covered children’s, peers’, and parental perspectives and the full range of social interactions, although one study (Cappelli et al., 1995) had a relatively small sample size. Another study (Antia et al., 2011), which employed an extensive longitudinal design, large sample size, and perspectives from teachers and deaf children, found that functional hearing ratings were positively associated with social behaviors. Hearing difficulties was also identified as a theme from parental narratives (Bat-Chava & Deignan, 2001). Parents reported that their children’s compromised ability to hear speech and detect subtle cues and idioms in conversation negatively affected social interactions with hearing peers. However, parents of children with positive communication outcomes from their cochlear implants may have been more willing to participate. This study had a relatively low quality rating of 58.9%, which may have affected the reliability of findings. Another study (Roberts & Rickards, 1994) found that the degree of hearing loss was related to friendship patterns, whereby the majority of children with mild to moderate hearing loss had mostly hearing friends, whereas some children with severe to profound hearing loss had a more equal balance of hearing and deaf friends. However, this study also found that the educational setting was related to friendship patterns, which is discussed later in this review. As this was not controlled for in analyses, findings may not be reliable.

One study (Bat-Chava & Deignan, 2001) found that the age of children at the time of hearing loss diagnosis was negatively associated with oral communication ability. Studies have found a relationship between communication and social interaction (Antia et al., 2011; Bat-Chava & Deignan, 2001; Bat-Chava et al., 2005; Leigh et al., 2008; Most et al., 2011; Roberts & Rickards, 1994; Wolters et al., 2011). Therefore, age at diagnosis may be indirectly associated with social skills in deaf children.

Impact of cochlear implants. Four studies considered the relationship between cochlear implantation and peer relationships (Bat-Chava & Deignan, 2001; Bat-Chava et al., 2005; Leigh et al., 2008; Martin & Bat-Chava, 2003). Two studies (Bat-Chava & Deignan, 2001; Martin & Bat-Chava, 2003) found that the use of a cochlear implant was not directly associated with any form of social interaction. One of the studies (Bat-Chava & Deignan, 2001) found both improvements and limitations in children’s communication skills with their cochlear implant. Parents also reported their children’s personality became more extroverted following cochlear implantation, which indirectly helped their children’s peer relationships. The quality ratings from these studies were relatively low at 58.9% and 69.1%, and there was a lack of multiple informers. Furthermore, one study (Bat-Chava & Deignan, 2001) was retrospective, thereby reducing reliability. The results from both studies (Bat-Chava & Deignan, 2001; Martin & Bat-Chava, 2003) were generated from the same, larger study, and data were likely to have overlapped. Conclusions from each study should, therefore, not be considered independently.

Two other studies (Bat-Chava et al., 2005; Leigh et al., 2008) found indirect associations between cochlear implant status and the range of peer interactions. The quality of both studies was similar at 76.5% (Bat-Chava et al., 2005) and 75.0% (Leigh et al., 2008). One study (Leigh et al., 2008) found that cochlear implantation was related to children’s increased hearing acculturation, which in turn was positively associated with acceptance by hearing peers and other socialization skills. This study also found that deaf children attending mainstream education are more likely to have a cochlear implant. Attending mainstream education was also associated with an increased level of social competence with hearing peers. Therefore, cochlear implantation was proposed to be influencing social competency and relationships with hearing peers indirectly through increased identification with the hearing world and increased integration with hearing peers in school. However, a confounding factor of parental hearing loss was not controlled for. There were a disproportionate number of deaf parents of deaf children attending segregated schools and who had hearing aids instead of cochlear implants. It is possible that the hearing status of the deaf parents affected their children’s hearing acculturation, which would have affected results.

The other study had mixed results (Bat-Chava et al., 2005). While no relationship between cochlear implant status and age of implantation with social
behaviors was found, there was a positive relationship between duration of cochlear implant use and overall functioning. This effect was moderated by level of hearing loss. The cochlear implant was associated with increased oral communication skills. Socialization improvements in deaf children followed improvements in children’s communication skills with their cochlear implants. It was proposed that increased oral language skills allows for increased conversational involvement, which in turn can further develop theory of mind skills and improve social interactions with hearing peers. A positive relationship between time and socialization skills was also found.

Peer Factors

Three studies considered how the characteristics of hearing peers (Bat-Chava & Deignan, 2001; Lederberg et al., 1986; Roberts & Rickards, 1994) were associated with social behaviors, status, and peer relationships. These studies had relatively low quality scores from 58.9% (Bat-Chava & Deignan, 2001) to 67.6% (Lederberg et al., 1986), with number of informants, lack of control of confounding variables such as age (Roberts & Rickards, 1994) and hearing device used (Lederberg et al., 1986; Roberts & Rickards, 1994), retrospective accounts, and sample sizes being pertinent issues. One study (Roberts & Rickards, 1994), using deaf children’s perspectives, found that the clarity of peer’s speech was positively associated with peer relationships. Another (Bat-Chava & Deignan, 2001) identified themes in parental narratives regarding peer attitudes. Parents reported that hearing peers who invested more effort, patience, and time with their deaf child were more likely to have positive peer relationships. Parents also reported that the more time deaf children and hearing peers spend together, the better their peer relationships. The time children had known one another was also highlighted by another study (Lederberg et al., 1986), which found, through observations, that familiarity played a greater role in social behaviors than the general experience of hearing peers being with deaf children. Results indicated that hearing peers could not generalize their adapted social behaviors and responses to unfamiliar deaf children.

Contextual Factors

Education placement. Seven studies considered the extent of mainstreaming (Leigh et al., 2008; Most et al., 2011; Musselman et al., 1996; Roberts & Rickards, 1994; Stinson et al., 1996; Wauters & Knoors, 2007; Wolters et al., 2011). These studies ranged widely in quality from 61.8% (Roberts & Rickards, 1994) to 80.9% (Wauters & Knoors, 2007; Wolters et al., 2011). Two studies found increased educational integration with hearing peers was positively associated with speech intelligibility, social competence with hearing peers and hearing acculturation (Leigh et al., 2008; Most et al., 2011). These studies collectively considered perspectives of deaf children, teachers, and parents and included primary (Most et al., 2011) and secondary (Leigh et al., 2008) aged children. However, as previously discussed, children’s hearing acculturation may have been affected by a lack of control over the confounding variable of parental hearing status (Leigh et al., 2008). Other confounding variables, such as the hearing device used, were not controlled for in one study (Roberts & Rickards, 1994), which may have affected results. Consequently, these positive results should be interpreted cautiously.

Four studies found more complex associations (Musselman et al., 1996; Roberts & Rickards, 1994; Stinson et al., 1996; Wolters et al., 2011). Two of these studies (Roberts & Rickards, 1994; Stinson et al., 1996) found that age mediated the relationship between the level of mainstreaming and peer interactions. These studies found that younger children in high levels of integration with hearing peers had more hearing friends and higher self-perceived social competence. The opposite was true for older children, who had lower social competence when in the highest rate of integration. While both studies had large sample sizes, they only included perspectives of deaf children and one did not control for communication competence (Stinson et al., 1996) and the other did not control for age. Additionally, the sample was not evenly distributed across educational settings (Roberts & Rickards, 1994).

One study (Musselman et al., 1996) found that children in segregated education settings had poorer peer adjustment and poorer overall perceived social competence compared with partially or fully mainstreamed
children. However, fully and partially mainstreamed deaf students did not differ on social competence. This study only included the perspectives of secondary aged deaf children. A final study (Wolters et al., 2011) found that deaf 12-year-old children in mainstream schools demonstrated lower antisocial and withdrawn behavior and more prosocial behavior with peers compared with children in segregated education. A large sample was used in this study, and perspectives of children, peers, parents, and teachers were considered, which increases the reliability of the study’s findings. However, as only 12-year-old children were considered, findings are limited in how far they can be generalized.

One study (Wauters & Knoors, 2007) did not find an association between level of educational integration with hearing peers and peer relationships for primary aged deaf children. This study had a longitudinal design with a small sample size, which only considered the perspectives of deaf children. This may have limited findings.

Additional contextual factors. Participation in community activities and extracurricular activities was positively associated with social skills for primary aged children (Antia et al., 2011). This longitudinal study had a high quality rating of 83.3%, considering the perspectives of both deaf children and their teachers over 5 years. An observational study (Martin et al., 2010) and a mixed-methods study (Bat-Chava & Deignan, 2001), with quality ratings of 72.1% (Martin et al., 2010) and 58.9% (Bat-Chava & Deignan, 2001), found that group interaction was more difficult for deaf children with hearing peers. However, both studies did not calculate the quantifiable impact of hearing loss on group compared with one-to-one peer interactions. The observational study (Martin et al., 2010) did not include a control group of hearing children interacting in a group. Furthermore, while parental narratives indicated deaf children faced more difficulties in multitalker situations, this additional difficulty was also not quantifiable due to the methodological design.

Summary

There was a high range of variability in study quality, design, participants recruited, and data sources used. Many factors were explored in relation to peer interactions, covering child and hearing peer characteristics along with the context of their interactions. Results showed a complex picture with a lack of consensus across studies. The main factors investigated were the deaf child’s age, communicational competency, and level of mainstreaming, which overall were found to be positively associated with peer interactions. However, mediating factors for some of these domains were also identified, and some studies found no effect. Gender was also explored, and females were more associated with positive peer relationships in some studies. Differences in successful coping skills repertoires between boys and girls were also found. Cochlear implantation, academic ability, and self-esteem may be associated with peer interactions. A small number of studies found group size, the hearing peer’s familiarity, speech, and attitude toward deaf peers were associated with social interactions.

Discussion

The aim of this study was to conduct a thorough systematic literature review of studies that investigated the social interactions between deaf children and their hearing peers and to explore the associated factors that directly impact interactions between deaf and hearing peers.

The review highlighted a wide range of factors that were associated with deaf children’s social behavior, status, and relationships with hearing peers. There was considerable diversity in study design and participants recruited, with widely varying sample sizes, control groups, and participant characteristics. The quality of, and conclusions from, the literature is therefore variable and more limited in terms of generalizing to the wider population. However, the breadth of exploration, considering the wide range of associated factors related to peer interactions, produces a rich source of information and discussion. The review especially highlighted the role of communication, educational placement, the deaf child’s age, and gender.

The range of results, within and across variables, indicates that highly complex interactions are involved between multiple factors in shaping the social interactions of deaf children with hearing peers. Due to the
cross-sectional designs and lack of control of confounding factors, cause and effect could not be established for some variables. It is possible that there is a bi-directional relationship between some of these factors and peer outcomes.

Understanding Results Through a Communication and Developmental Framework

The results from the review could be tentatively considered within a communication and developmental framework, given the prominence of certain findings. Communication can be considered as a relational variable, developed within relationships, which continually influences and gets influenced by relationships. This was highlighted by the review, whereby high levels of consensus were found across studies focusing on the importance of children’s communication in peer relationships (Antia et al., 2011; Bat-Chava & Deignan, 2001; Bat-Chava et al., 2005; Leigh et al., 2008; Most et al., 2011; Roberts & Rickards, 1994; Wolters et al., 2011). Furthermore, satisfaction with communication at home and the communication competency of peers was found to be associated with social outcomes (Leigh et al., 2008; Roberts & Rickards, 1994). Results indicated that there were a number of contributors and mediators to communication competency and social outcomes, such as the type of hearing device used and the age of hearing loss diagnosis (Bat-Chava & Deignan, 2001). Gender is also associated with the communicational skills of deaf children and the value of communication in friendships (Martin & Bat-Chava, 2003; Wolters et al., 2011).

While communication and social competency are clearly related, it is difficult to establish the way they interact and contribute to each other’s development. Bat-Chava et al. (2005) proposed that improvements in oral communication can lead to increased exposure to spoken conversations, which in turn can help children develop a better understanding of others’ views and feelings, thereby fostering the development of social skills and relationships. It is also possible that peer relationships can foster social communication skills (Glick & Rose, 2011). Wright and Oakes (personal communication with Dr Barry Wright, National Deaf Child and Adolescent Mental Health Service) proposed that deaf children may be delayed in picking up communication and social skills due to limited exposure to typical early experiences. Without this exposure to communication, children may struggle to develop age-appropriate theory of mind and social competencies, which in turn may negatively impact the development of friendships and further opportunities to develop social skills.

One way of increasing these oral communication experiences is through mainstream education, which provides high exposure to spoken language and social interactions with hearing peers. The nature of the relationship between educational placement, communication competency, and social outcome is not known, but may be bi-directional. Age also appears to play a role in this. The highest levels of mainstreaming positively influence younger children who are more dependent on their surroundings; however, it can be detrimental for older deaf children (Roberts & Rickards, 1994; Stinson et al., 1996). This may be due to the developmental task of identity formation (Erikson, 1968), whereby deaf children have the additional task of balancing their deaf-hearing identity. To support this, equilibrium between social experiences and friendships with deaf and hearing peers may be optimal (Leigh, 1999).

Alongside educational integration, time also provides more scope for increased social and communication experiences for deaf children. Time and age are positively correlated with social interactions (Bat-Chava et al., 2005; Cappelli et al., 1995; Martin & Bat-Chava, 2003). Time may provide children with a greater opportunity to practice repairing communication breakdowns, develop social skills and their coping repertoire, and increase overall familiarity with hearing peers and social resiliency.

During adolescence, there is more focus and importance placed on peer relationships (Wigfield et al., 1991). This is confounded by the social stress of children’s transition to secondary school (Barone et al., 1991; Pratt & George, 2005). Older deaf children have been found to have more positive social interactions and a larger social coping skills repertoire (Cappelli et al., 1995; Martin & Bat-Chava, 2003). However, they are also more anxious of negative peer evaluation during this life stage (Cappelli et al., 1995). Gender may act independently and/or, within this developmental
frame in differentiating children’s communication styles and social skills necessary for peer success.

Additional factors related to communication styles may influence peer interactions, such as the patience and enthusiasm of hearing children to interacting with their deaf peers (Bat-Chava & Deignan, 2001). The personality of the deaf child (Bat-Chava & Deignan, 2001), especially in how assertive (Martin & Bat-Chava, 2003) and confident (Martin et al., 2010) they are in communicating and interacting with peers, could also be an important factor. This may vary with age and development.

Limitations of the Studies Reviewed

There were methodological and theoretical limitations to the studies considered in this review. In relation to methodological design, one of the prominent issues was the source of the data. One study found that the peer acceptance ratings from parents and deaf children poorly correlated (Leigh et al., 2008). Over a third of the studies in this review only considered the perspectives of one type of informant, typically either the parent or the deaf child. This may have affected reliability and validity of findings regarding deaf children’s social behavior, social competency, and friendship patterns. Without a complete picture of the social interactions between deaf children and hearing peers, it is not possible to comprehend the extent of difficulties children may face and all areas of support children may need; thus, interventions may not be targeted correctly.

Studies in this review were also limited by a relative lack of qualitative methodologies, observational data, longitudinal designs, and control of some confounding variables, such as communication competence. Cause and effect was often not possible to establish. Furthermore, a number of the studies had small sample sizes, and a wide variety of questionnaire formats and types were employed. Collectively, this limited the results and conclusions that could be drawn from within and across studies.

The articles reviewed also spanned a wide time frame, from 1986 to 2011, as there was no single date or time period appropriate to set for cut-off criteria. As discussed in the introduction, the context of issues for deaf children is rapidly changing, due to technological, educational, and health advancements. Therefore, the profiles of the deaf children in some studies are out of date. Some of the earlier studies do not include children with cochlear implants, while the majority of those that do only include children with unilateral cochlear implants. As technology and health policies are developing, increasing numbers of deaf children are being fitted for bilateral cochlear implants. It is important that research uses representative sample groups reflecting this change in device use and considers the possible impact of the additional implant on social skill and friendship development.

Alternative factors that may impact deaf children’s social interactions were not considered. The attachment styles and the deaf children’s relationships with parents and siblings were not explored. Furthermore, children’s emotional literacy or intelligence, attention levels, impulsivity, global executive functioning skills, and emotion regulation were not considered in any of the studies, despite research indicating that deaf children can have difficulties in these areas (Mitchell & Quittner, 1996; Peterson & Slaughter, 2006; Rieffe, 2011). Furthermore, it is important to note that studies have found relationships among these variables in other populations (Hoza, 2007; Mavroveli et al., 2009; McDowell et al., 2002; Sroufe et al., 1990; Stocker & Dunn, 1990). Additionally, even though gender was identified as a possible influencing factor in social interactions, friendships were not considered in terms of same-sex to opposite-sex peer friendships. It is possible that different social and communication skills, types of interactions, and possible challenges are associated with opposite-sex deaf to hearing peer relationships compared with same-sex friendships. If this is the case, support and interventions would need to be adapted to address the differences.

A final theoretical issue relates to the links between social skills and behavior and social status and peer relationships. Only one of the 14 studies reviewed considered social interactions at all three levels and the majority that did not only explored social skills and behavior. However, if a deaf child has good social skills or a large number of hearing friends, it does not necessarily mean those friendships are of a high quality. Therefore, the true or complete social profiles of the children recruited may not have been investigated.
Recommendations for Future Studies in the Field

In line with the discussed limitations of the studies reviewed, it is recommended that future research includes multiple sources of data, larger sample sizes, and longitudinal designs, including observations in naturalistic settings. When designing studies, major childhood developmental and life stage transitions, such as starting secondary school and entering into adolescence as well as the type of social interaction explored, should be considered and explicitly addressed. It is preferable to include the full range of social interactions, from development of social skills and behavior to social status to the quantity, stability, and quality of the peer relationships, both between same-sex and opposite-sex peers. With increasing numbers of children being fitted with bilateral cochlear implants, more research that includes these children also needs to be undertaken. Furthermore, it is crucial to include hearing controls in studies in order to establish the typical patterns of friendship development among children.

Future studies should consider and control for key confounding factors identified in this review. Furthermore, when considering identity issues and acculturation, hearing status of the child’s family should also be considered as a possible confounding variable. Finally, consensus on which report measures used in this research area would allow for more generalization and direct comparisons across studies.

Limitations to this Systematic Literature Review

There were a number of limitations to this systematic literature review. First, due to the limited scope of this review, studies that recruited deaf children with additional developmental, sensory, or learning difficulties were not included. As roughly a third of deaf children (Fortnum et al., 2002) are diagnosed with an additional disability, results from this review cannot be directly generalized to these children. Furthermore, deaf-to-deaf peer relationships were not explored. This is a highly important area and could greatly increase deaf children’s development and resiliency. This was demonstrated in one study that found that the oldest adolescents were negatively affected by full mainstream integration (Stinson et al., 1996). Bicultural acculturation is associated with psychological well-being in deaf individuals (Hintermair, 2008) whom experience life in both the deaf and hearing world. Research into deaf children’s friendships with hearing and deaf peers should consequently be reviewed in order to best understand and support deaf children so they can subsequently develop good-quality friendships.

The review included studies that had a range of methodological designs and that had recruited children with a wide range of hearing loss severity. This was done due to the typical variety of hearing loss presentations in deaf children. Exclusion of this would have severely limited the exploration of the review. However, by including children with such a range of hearing loss, results may not be as reliable. This is compounded by the finding from some studies that the level of hearing loss was an influencing factor on social interactions.

Clinical Implications From the Review

The review indicates that mainstream school programs designed to support the development of deaf children’s friendships should begin at a young age, promoting one-to-one relationships between deaf and hearing children. These programs should have some differentiation according to gender, such as supporting deaf boys to be involved in team sports, while helping girls to increase assertiveness in their communication and repetition requests.

The review also highlighted that deaf children who were involved in community activities and extracurricular activities had more positive social interactions (Antia et al., 2011). While the direction of causality is not known, increasing children’s social experiences will likely increase opportunities to practise and develop communication and social skills.

Finally, research indicated that older adolescents may be at a socioemotional disadvantage in fully integrated educational settings. Further exploration of this and more flexible education or time after school could be beneficial in order to allow children to develop friendships with deaf peers. This is thought to be crucial for deaf children’s emotional well-being (Musselman et al., 1996).

Supplementary Material

Supplementary material is available at http://jdsde.oxfordjournals.org/.
References


