EMPIRICAL MANUSCRIPT

Friendship and Emotion Control in Pre-Adolescents With or Without Hearing Loss

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Abstract

Emotional functioning plays a crucial role in the social development of children and adolescents. We examined the extent to which emotion control was related to the quality of friendships in pre-adolescents with and without hearing loss. We tested 350 pre-adolescents (75 deaf/hard of hearing in mainstream education (DHHm), 48 deaf/hard of hearing in special education (DHHs), and 227 hearing) through self-report. Outcomes confirmed a positive association between emotion control and positive friendships for all groups, with one notable exception: more approach strategies for emotion regulation were associated with more negative friendship features in the DHHs group. In addition, the DHHm group demonstrated high levels of emotion control, while their levels of positive friendship features were still lower compared to the hearing group.

Forming and maintaining friendships are crucial developmental tasks in early adolescence. Positive friendships confer strong protective factors for mental health. Having stable and reciprocal friendships was found to predict higher self-esteem over a 12-year period (Bagwell, Newcomb, & Bukowski, 1998), and related to lower incidence of internalizing and externalizing problems (Bagwell et al., 1998; Blachman and Hinshaw, 2002; Strauss, Forehand, Smith, & Frame, 1986). Friendships in childhood are characterized by sharing pleasurable leisure activities with peers (Aboud and Mendelson, 1996), but friendships in adolescence gain more intimacy and depth. Starting around the teenage years, friends increasingly engage in emotional self-disclosure and provide emotional and social support to one another (Hartup, 1993; Rose and Asher, 1999). These more sophisticated activities require higher levels of emotion control and social attunement. In other words, the capacity to appreciate and regulate emotions becomes increasingly important in these relationships (Kim and Cicchetti, 2010).

Friendship does not come easily to all adolescents, and staying attuned to peers is more challenging for adolescents who face communication challenges such as hearing loss or deafness. Most studies on adolescents who are deaf or hard of hearing (DHH) emphasize that DHH children and adolescents have fewer close friendships than their hearing peers (Kluwin, Stinson, & Colarossi, 2002; Nunes, Pretzlik, & Olsson, 2001; Piso, Knoors, & Vervloed, 2009; van Gent, Goedhart, Knoors, Westenberg, & Treffers, 2012), and that these friendships are of lower quality (Piso et al., 2009). DHH adolescents obviously face practical communication difficulties on a daily basis, but other factors key to maintaining friendships may pose additional barriers to friendship for DHH adolescents. For example, emotion control is a key factor in the development of intimate, high-quality friendships (von Salisch, Lüpschen, & Kanevski, 2013), but it is known to be impaired in DHH children and adolescents, as studies have indicated they show more disruptive and aggressive behaviors than hearing peers (Theunissen

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et al., 2014). It is also known that adolescents with low emotion control are less liked by their peers, and are trusted or confided in less often (Mavroveli, Petrides, Sangareau, & Furnham, 2009).

This study aimed to examine the extent to which emotion control (emotion awareness and regulation) (Eisenberg and Spinrad, 2004; Rieffe, Dirks, Van Vlerken, & Veiga, 2017) is associated with friendship quality in DHH adolescents as compared to their hearing peers, while controlling for their socio-economic status, gender, non-verbal IQ, and level of language skills.

Social and Emotional Learning, Emotion Control, and Friendship in Deaf and Hard of Hearing Pre-Adolescents

Emotional development depends largely on children’s access to their social environment, as this access provides opportunities for social and emotional learning (Rieffe, Netten, Broekhof, & Veiga, 2015). The social context teaches children when to feel what emotion, how to express it, with which intensity, and to what purpose (Saarni, 1999). This emotional learning requires the necessary social opportunities for children, to engage and practice. Yet, hearing loss limits this access for children and adolescents in non-signing environments (Rieffe et al., 2015). For example, non-verbal emotion recognition, as is assessed by tasks comparing and selecting different facial emotional expressions (i.e., positive versus negative facial emotional expressions), is learned in a social context. And even this non-verbal capacity was found to be impaired in young deaf children with a cochlear implant (CI) compared to hearing children (Wiefferink, Rieffe, Ketelaar, De Raeye, & Pijnis, 2013).

Technological developments over the last 20 years in hearing aid technology and CI have enabled DHH children and adolescents to catch up with their hearing peers in many developmental domains. However, engaging in social interactions is still more difficult for DHH pre-adolescents who are using a hearing aid or CI, especially in groups and in noisy environments (Vonen, 2007). In addition to practical difficulties following group conversations and timing one’s comments appropriately, other kinds of situations limit DHH children’s and adolescents’ access to the social world around them, and therefore to opportunities for social learning. Subtitles on television may go too quickly for social learning that DHH youth may not be able to access. subtitles on television may go too quickly for social learning. Subtitles on television may go too quickly for social learning.

To date, emotion regulation in DHH pre-adolescents has received little attention. One study conducted by Rieffe (2012) examined 26 deaf and 26 hearing pre-adolescents (mean age 11 years) through a structured interview. The deaf participants were recruited from a special school for the deaf. Participants were presented with various hypothetical peer conflict scenarios and asked what they could do to feel better, if they encountered such a scenario. DHH pre-adolescents almost exclusively used approach strategies to decrease the intensity of negative emotions, i.e., confronting the peer or trying to solve the problem directly, and seemed unaware of the possibility for using avoidant strategies, i.e., distancing themselves from the emotion-evoking situation (e.g., distracting their attention or minimizing the importance of the situation) (Rieffe, 2012). In addition, the hearing group reported a strong decrease in the intensity of their negative emotions, unlike the deaf group. In other words, the emotion regulation strategies used in this study appeared to be less effective in the deaf group. It is also possible the deaf group approached conflict situations less constructively, given that deaf pre-adolescents are known to act out their anger more bluntly.
than their hearing peers in peer conflict situations (Rieffe and Meerum Terwogt, 2006), and that approach strategies applied by deaf pre-adolescents may intensify a peer conflict situation rather than calm it.

**The Social Environment of School: DHH Students in Mainstream Versus Special Education**

School life plays an important role in the development of friendships. The school environment is a privileged context for social exchanges with peers, and occupies an increasing amount of time as children pass throughout adolescence (Rubin, Bukowski, & Parker, 2006). Over the past 20 years, the number of DHH students receiving their education in regular schools with hearing peers has increased substantially (Leigh, Maxwell-McCaw, Bat-Chava, & Christiansen, 2009; Wauters and Most, 2007). However, mainstreaming DHH students does not necessarily ensure full social integration. DHH students do not engage in social activities as easily as their hearing peers in public schools (Remine and Brown, 2010; Scheetz, 1993; see also the reviews of Batten, Oakes, & Alexander, 2014 and Xie, Potměšil, & Peters, 2014), and they are more likely to be neglected, unaccepted or have no friends compared to hearing peers (Nunes et al., 2001; Wolters, Knoors, Cillesen, & Verhoeven, 2011). Even when they participate in social activities with their hearing classmates, DHH adolescents do not necessarily feel that they establish close and secure friendships (Punch & Hyde, 2011; Stinson, Whitmire, & Kluwin, 1996; van Gent et al., 2012). When compared to DHH students in special educational settings, some studies have found no difference in levels of loneliness (Leigh et al., 2009; Most, 2007), whereas other studies have found that mainstreamed DHH students were less popular, less accepted and had less close friendships compared to DHH students in special education (Wolters et al., 2011) or to DHH students in special education who had no additional disabilities (van Gent et al., 2012). It has been suggested that social difficulties can stem from different reasons in special versus mainstreamed educational settings (Most, 2007). Mainstreamed students face communication barriers and negative attitudes of hearing peers (Xie et al., 2014; Zaidman-Zait and Dotan, 2017). However, DHH students who are assigned to special schools tend to have lower IQ, come from lower socioeconomic background, have more additional disabilities, and present lower levels of social competence compared to mainstreamed DHH peers (van Gent et al., 2012; Wolters et al., 2011), all of which can contribute to the formation of social difficulties.

**Hypotheses**

The aim of this study was to examine the extent to which emotion control (emotion awareness and regulation) is related to friendship quality in three groups of pre-adolescents: DHH pre-adolescents in mainstream education (DHHm), DHH pre-adolescents in special education (DHHs), and hearing peers. First, we predicted that a higher awareness of one’s own and others’ emotions would be associated with higher friendship quality, as measured by more positive and fewer negative friendship features in all three groups (DHHm, DHHs, Hearing). Second, we predicted that use of both avoidant and approach regulation strategies would be associated with higher ratings of friendship quality in all three groups, with one exception: we predicted approach strategies to be negatively correlated with friendship quality in DHHs pre-adolescents, because these strategies were less effective in DHHs pre-adolescents in a former study (Rieffe, 2012). Since we have no information about the use of approach strategies in the DHHm population, we cannot make predictions in this respect. We also accounted for gender differences, and expected girls to show more positive friendship features than boys, because previous studies showed that girls were more likely to demonstrate socially desired behaviors such as peer competence, prosocial behaviors, and social acceptance (Coyner, 1993; Martin, Bat-Chava, Lalwani, & Waltzman, 2010; Wolters et al., 2011).

**Method**

**Participants**

The current study was part of a large ongoing research project investigating the social-emotional development of typically developing children and children with less access to the social environment (deaf and hard of hearing adolescents, adolescents with an Autism Spectrum Disorder; Bos et al., 2018; Netten et al., 2015; Pouw et al., 2013).

A total of 350 pre-adolescents participated in this study (n = 48 DHNs, n = 75 DHHm and n = 227 hearing controls). The mean age of the total group of pre-adolescents was 139 months (SD = 17.06, range 108–180 months). Hearing pre-adolescents were recruited from mainstream schools, and DHH pre-adolescents were recruited from both mainstream schools and special education settings. Inclusion criteria for DHH pre-adolescents were pre- or perilingually detected hearing loss ranging from moderate (40–60 dB) to severe (60–90 dB) to profound (>90 dB) in both ears. All DHH pre-adolescents had hearing parents. A group of hearing peers was matched with the DHH group for age, gender, socioeconomic status and non-verbal IQ. Hearing peers were excluded when they had additional disabilities. Parents were asked to report on additional diagnoses. Also children were not included when the teacher noted cognitive problems or the indices for non-verbal IQ were below 80.

Socioeconomic status was measured through parents’ self-reported educational level and net income. Age-corrected norm scores for non-verbal IQ were obtained by administering two non-verbal subtests (picture arrangement and block design) of the Wechsler Intelligence Scale for Children—Third Edition (WISC-III; Wechsler, 1991). Language skills were measured for hearing and DHH children who used spoken language by administering two subtests (understanding spoken paragraphs and semantic relationships) of the Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiif, & Secord, 1987). DHH children who used sign or sign-supported language received the subsets from the Assessment instrument for the Sign Language of the Netherlands (ASLN; Hermans, Knoors & Verhoeven 2009). For different reasons (school absence on the day of testing, missing information in the medical files), language skills were not administered in 16 DHNs, 1 DHHm, and 28 hearing participants.

Independent t-tests indicated that DHHs pre-adolescents had lower non-verbal IQ scores, lower language skills, and lower socioeconomic status, as compared to DHHm and hearing pre-adolescents. In addition, a chi-square analysis revealed that DHHs pre-adolescents indicated Dutch Sign Language or Sign Supported Dutch more often as their preferred language than DHHm, while the majority of DHHm pre-adolescents preferred spoken language, χ² (1, N = 123) = 53.71, p < .001. No other group differences were found. Table 1 shows descriptive characteristics for the DHHs, DHHm, and hearing pre-adolescents.
Table 1. Characteristics of the participants

<table>
<thead>
<tr>
<th></th>
<th>DHHs</th>
<th>DHhm</th>
<th>Hearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>48</td>
<td>75</td>
<td>227</td>
</tr>
<tr>
<td>Mean age in months (SD)</td>
<td>139.13 (17.86)</td>
<td>140.51 (18.32)</td>
<td>139.15 (16.51)</td>
</tr>
<tr>
<td>Age range in months</td>
<td>110–180</td>
<td>112–178</td>
<td>108–176</td>
</tr>
<tr>
<td>Social economic status* (SD)</td>
<td>3.34 (0.90)</td>
<td>3.80 (0.96)</td>
<td>3.71 (0.83)</td>
</tr>
<tr>
<td>Non-verbal IQ* (SD)</td>
<td>9.62 (2.53)</td>
<td>10.61 (2.85)</td>
<td>10.59 (2.49)</td>
</tr>
<tr>
<td>Language skills* (SD)</td>
<td>6.01 (2.93)</td>
<td>10.76 (3.20)</td>
<td>10.31 (2.36)</td>
</tr>
</tbody>
</table>

Note. DSL = Dutch Sign Language; SSD = Signed Supported Dutch.
When character superscripts differ (e.g., *a,b*), this indicates differences between groups at p < .05 for that particular variable. When character superscripts are the same (e.g., *a,a*), these groups do not differ on that variable.

**Materials**

To measure Friendship Quality, the Best Friend Index (BFI) (Kouwenberg, Rieffe, & Banerjee, 2013) was administered to indicate the presence of both Positive and Negative Friendship features experienced in the context of actual friendships by DHHm, DHHs, and hearing pre-adolescents, respectively. The questionnaire starts by asking whether the participant has a best friend, and to fill in the friend’s name. This encouraged respondents to keep a specific friend in mind while completing the questionnaire. For further analyses, information was gathered also with regards to the hearing status of the best friend. The BFI consists of 11 items representing a Positive Friendship Features scale (companionship, reliable alliance, disclosure, support and affection/admiration) and nine items representing a Negative Friendship Features scale (companionship, reliable alliance, disclosure, support and affection/admiration). An example item for Positive Friendship Features is “I turn to my friend for social support with personal problems,” and an example item for Negative Friendship Features is, “My friend and I argue together.” Participants rated their responses on a 3-point scale (1 = almost never, 2 = sometimes, and 3 = often). Note that it is more common and appropriate to use a 3-point scale instead of a 5-point scale with children and young adolescents in order to avoid empty categories (Rieffe, Oosterveld, Miers, Meeurm Terwogt, & Ly, 2008). The internal validity of the questionnaire is rated as acceptable (Table 2).

To measure emotion awareness, two parts of the Dutch version of the Emotion Awareness Questionnaire Revised (EAQ-R 30) were administered (Rieffe et al., 2008). The EAQ is a self-report questionnaire whose original form consists of 30 items representing six subscales that measure emotion awareness. For the purpose of this study, we used two scales of the original EAQ-R in this study: Awareness Own Emotions (the scales Differentiating and Bodily Awareness), and Attending Others’ Emotions. Examples of statements included: “When I am upset, I don’t know if I feel angry or sad,” (recoded, Own Emotions) and, “If a friend is upset, I try to understand why” (Others’ Emotions). Twenty items were reverse coded. Higher scores indicated better emotion awareness. Following the original scale’s format participants were asked to rate their responses to EAQ-R items on a 3-point scale (1 = not true, 2 = sometimes true, and 3 = often true). Four DHHs and five DHhm participants had missing data due to nonresponses. The internal validity of both scales is rated as acceptable (Table 2).

To measure emotion regulation, the Dutch version of the Coping Scale was administered to indicate which emotion regulation strategies would be used in hypothetical problematic peer scenarios. The Coping Scale (designed by Wright, Banerjee, Hoek, Rieffe, & Novin, 2010) consists of six emotion regulation strategies, which fall into three subscales: Approach (seeking social support & problem solving), Avoidant (distraction from the problem & trivializing through cognitive restructuring), and Maladaptive (externalizing & internalizing) (Rieffe, De Bruine, De Rooij, & Stockmann, 2014). Approach strategies involved approaching the stressor in order to calm down, whereas avoidance strategies involved creating distance from the emotion-evoking situation to calm down. Maladaptive coping involved both internalizing strategies such as worry or rumination (e.g., thinking about something bad happening again) and externalizing strategies such as acting out (e.g., screaming, hitting, or destroying something). Examples of statements included, “I try to think of different ways to solve the problem” (approach strategies), “I do something else to help me forget about it” (avoidant strategies), and “I get angry and throw or hit something” (maladaptive strategies). The total Coping Scale consists of 34 statements. Participants first received a short introduction in which they were asked to imagine they had a problem or that something
bad had happened. Then they were asked to answer what they would do, rating their response to each statement on a 3-point scale (1 = almost never, 2 = sometimes, and 3 = often). The internal validity of these subscales ranged from acceptable to good (Table 2).

**Procedure**

The study was approved by the ethics committee of Leiden University, the Netherlands. Prior to data collection, written parental consent was obtained for all participants and anonymity was guaranteed. Participants were informed that their responses would be treated confidentially and that we would not give individual outcomes to anyone. Assessment of all hearing and DHH participants took place at school or at home, and all participants were assessed individually in a private and quiet room. All the children were first administered the IQ and language measures in spoken or signed Dutch according to their mode of communication. Following that they received the social-emotional questionnaires. All the questionnaires were presented at the same order on a laptop in written Dutch, where items were presented one-by-one and answers were given by clicking on the presented three response buttons using a computer mouse. For DHH pre-adolescents proficient in sign language or sign-supported Dutch, a video clip of the item in Dutch sign language was presented one-by-one, in addition to the written Dutch version. Researchers that were able to use sign language were present throughout data collection, so participants could request clarification when needed.

**Statistical Analyses**

To examine differences between DHHs, DHHm, and hearing pre-adolescents on friendship quality, emotion awareness, and emotion regulation, we conducted three mixed analyses of covariance. Subsequently, to correct for the influence of socioeconomic status, gender, non-verbal IQ, and language skills, these variables were added as covariates. Since these mixed analyses of covariance did not produce different results concerning the effect of socioeconomic status and non-verbal IQ on emotion control and friendship quality, these outcomes were not reported for the sake of brevity.

We computed Pearson’s correlation to examine relationships between friendship quality, emotion awareness, and emotion regulation. Fisher’s r-to-Z transformations were used to assess whether the strength of the correlations differed between the three groups (hearing, DHHm, and DHHs).

**Results**

**Friendship Quality**

Table 2 shows the mean scores per group (DHHs, DHHm, Hearing) on all variables included in this study (see Appendix for mean scores separated for DHH participants with CI or HA). Three DHHs (6.3%), 7 DHHm (9.3%), and 12 Hearing pre-adolescents (5.3%) could not name a best friend (note: no group difference, \( \chi^2 (df=2) = 5.17, p = .475 \)). Data from these participants were not included in the analysis of Friendship Features.

A 3 (Group: DHHs, DHHm, Hearing) × 2 (Friendship: Positive Friendship Features, Negative Friendship Features) mixed analysis of covariance was carried out, and language skills and gender were added as covariates. This analysis revealed a main effect for Friendship (\( F(1, 280) = 151.58, p < .001, \eta^2_p = .35 \)) and for Gender (\( F(1, 280) = 61, p = .001, \eta^2_p = .05 \)), which were qualified by a Group x Friendship interaction (\( F(2, 280) = 14.66, p < .001, \eta^2_p = .10 \)) and a Gender x Friendship interaction (\( F(1, 280) = 24.50, p < .001, \eta^2_p = .08 \)). Language skills were unrelated to Friendship Features.

Post-hoc t-tests showed that DHHs pre-adolescents reported more Negative Friendship Features than DHHm and Hearing pre-adolescents. For Positive Friendship Features, we found DHHs < DHHm < Hearing pre-adolescents (Table 2).

Outcomes indicated that girls reported more Positive Friendship Features than boys (\( M_{girls} = 2.68, M_{boys} = 2.51, t(326) = -5.65, p < .001, d = .62 \)). No differences were observed in Negative Friendship Features. \( M_{girls} = 1.24, M_{boys} = 1.25, t(326) = .48, p = .630, d = .05 \).

**Emotion Awareness**

A 3 (Group: DHHs, DHHm, Hearing) × 2 (Emotion Awareness: Own Emotions and Others’ Emotions) mixed analysis of covariance was carried out, and language skills and gender were added as covariates. The outcomes showed main effects for Emotion Awareness (\( F(1, 293) = 8.95, p = .003, \eta^2_p = .03 \)), Gender (\( F(1, 293) = 11.62, p = .001, \eta^2_p = .04 \)), and Language skills (\( F(1, 293) = 12.83, p < .001, \eta^2_p = .04 \)), which was qualified by an interaction effect for Language skills x Emotion Awareness (\( F(1, 293) = 8.52, p = .004, \eta^2_p = .03 \)). Language skills were positively related to Others’ Emotions, but unrelated to Own Emotions. In addition, an interaction was found for Group x Emotion Awareness (\( F(2, 293) = 4.43, p = .012, \eta^2_p = .01 \)).
Emotion Regulation

A 3 (Group: DHHs, DHHm, Hearing) × 3 (Emotion Regulation Approach, Maladaptive, Avoidant) mixed analysis of covariance was carried out, and language skills and gender were added as covariates. The outcomes showed a main effect for Emotion Regulation (F(2, 600) = 131.14, p < .001, η² = .04), which was qualified by an interaction of Gender × Emotion Regulation (F(2, 600) = 6.05, p = .002, η² = .02).

Post-hoc t-tests showed that the highest scores were reported for Approach > Avoidant > Maladaptive. Girls reported use of Approach Strategies more often than boys, Mgirls = 2.16, Mboys = 2.07, t(348) = -2.05, p = .041, d = .22. No differences were found for Avoidant (Mgirls = 1.86, Mboys = 1.94, t(348) = 1.93, p = .054, d = .21) and Maladaptive strategies (Mgirls = 1.41, Mboys = 1.46, t(348) = -1.60, p = .110, d = .17).

Further correlational analyses through Fisher’s r-to-Z transformations revealed significant differences in the strength of the correlations for DHHs pre-adolescents versus DHHm and hearing pre-adolescents (Table 3). The strength of these correlations was higher in the DHHs group for positive friendship features with own emotions and avoidant strategies, and for negative friendship features with own emotions, approach strategies, and maladaptive strategies. Strikingly, approach strategies were related to more negative friendship features in the DHHs group, whereas in the DHHm and hearing groups they were related to fewer negative friendship features. Partial correlations correcting for the influence of socioeconomic status, gender, non-verbal IQ, and language skills did not produce different results.

Discussion

Having close friends is of great importance during childhood and adolescence. Friends rely increasingly on each other for emotional support, especially during the early teenage years (Hartup, 1993), and having at least one best friend is a strong protective factor for preventing symptoms of psychopathology (Deater-Deckard, 2001). But unlike parent–child relationships, friendships are voluntary (Von Salisch, 2001), and this makes friendships more vulnerable. It puts a stronger demand on adaptive skills for emotion control (Rose and Asher, 1999), and based on previous studies, DHH children and adolescents are known to struggle in this area.

The outcomes of the present study confirmed the importance of emotion control (emotion awareness and emotion regulation) in positive, constructive friendships. Higher levels of emotion awareness, with greater use of emotion regulation strategies involving approach (such as problem solving) and less use of internalizing and externalizing maladaptive strategies (e.g., keep worrying or slamming a door, respectively) were associated with friendships with more positive and fewer negative features. Our findings showed that regardless of hearing status girls were more aware of others’ emotions, used more approach strategies and had more positive friendship features. This comes with no surprise as previous literature has shown that girls, deaf or hearing, displayed better social understanding, prosocial behaviors, and social competence (Bosacki, 2000; Martin et al., 2010; Wolters et al., 2011).

When hearing status was examined, DHH pre-adolescents in mainstream education (DHHm) and hearing pre-adolescents showed no significant differences in emotion awareness and emotion regulation. Also when mean scores were compared, DHHm and hearing pre-adolescents showed similar levels in all aspects of emotion control and friendship features, except for a lower level of positive friendship features in the DHHm group.

In contrast, we found differences between DHH pre-adolescents in special education (DHHs) and both other groups on many outcomes in our study. Lower awareness in DHHs participants of their own emotions for emotion regulation was more strongly correlated with negative friendship features in this group than in the DHHm pre-adolescents. Most strikingly, and opposite to the outcomes of the other two groups, the use of approach strategies for emotion regulation among DHHs participants were correlated with more, instead of fewer, negative features.

Table 3. Pearson correlation for friendship quality, emotion awareness, and emotion regulation

<table>
<thead>
<tr>
<th></th>
<th>PFF</th>
<th>NFF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotion awareness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own emotions</td>
<td>-.01</td>
<td><strong>.38</strong>&lt;sup&gt;+.13&lt;/sup&gt;/-.10&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Others’ emotions</td>
<td>.45</td>
<td>-.21</td>
</tr>
<tr>
<td><strong>Emotion regulation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach strategies</td>
<td>.40</td>
<td>-.12</td>
</tr>
<tr>
<td>Avoidant strategies</td>
<td>.03</td>
<td><strong>.28</strong>&lt;sup&gt;+.13&lt;/sup&gt;/+.04&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Maladaptive strategies</td>
<td>-.02</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. PFF = Positive Friendship Features; NFF = Negative Friendship Features. Text in bold indicates significant correlation at p < .05.

<sup>1</sup> Differences between groups only presented when significant differences were found (p < .05). When character superscripts differ (e.g., a, b), this indicates differences between groups at p < .05 for that particular variable. When character superscripts are the same (e.g., ab), these groups do not differ on that variable.
friendship features. This particular outcome aligns with a previous study by Rieffe (2012) in which DHH teenagers also reported less positive effects from their use of approach strategies in peer conflict situations. Moreover, the intensity of their negative emotions did not decrease to the same extent as in their hearing peers after the use of approach emotion regulation strategies. It is possible that DHHs’ well-known theory of mind difficulties (Ketelaar, Rieffe, Wierfink, & Fijns, 2012; Peterson, 2004; Schick, De Villiers, De Villiers, & Hoffmeister, 2007)—also reflected in their lower levels of awareness of others’ emotions in the present study—prevent members of the DHHs group from developing theory of mind-based emotion regulation strategies that calm the situation (e.g., by imagining another’s perspective).

In the context of friendships in special education settings, it is possible that even when one partner approaches the situation constructively it can be interpreted or reacted upon aggressively by the other DHH peer due to difficulties in social understanding and emotional control, thus contributing to the higher rates of negative friendships features founded in this study. Furthermore, approach strategies also involve seeking social support. Due to communication barriers with hearing family members and peers (Berkowitz and Jonas, 2014), DHs pre-adolescents may share their feelings with other DHH classmates, which may in turn increase the intensity of emotions and peer conflicts in an already small classroom micro-community.

But then the question remains, why do DHHm pre-adolescents show similar skills in emotion control as their hearing classmates, while their friendships hold fewer positive features, as was also found previously (Gilman, Easterbrooks, & Frey, 2004; Piso et al., 2009)? If lower levels of emotion control cannot explain the fewer positive friendship features for the DHHm group, then what does explain this discrepancy in the quality of friendships of DHHm pre-adolescents, as compared to hearing pre-adolescents?

Several studies have shown that DHH adolescents feel more emotionally secure with DHH peers and value those friendships more highly than friendships with hearing peers (Musselman, Mootial, & Mackay, 1996; Stinson et al., 1996). But DHH adolescents in mainstream classes are often the only ones in their class with hearing loss. Moreover, acceptance by hearing peers may present an additional challenge (Kluwin et al., 2002). Although one study found no differences between nine-year-old children with and without hearing loss on peer acceptance in elementary school (Wauters and Knors, 2008), studies on DHH adolescents in high schools showed they were less socially accepted, less popular, more socially withdrawn, and lonelier than their hearing classmates (Schorr, 2006; van Gent et al., 2012; Wolters et al., 2011). The increased feelings of loneliness with age could be due to the changing nature of social interactions during pre-adolescence and adolescence, involving more conversations, group gatherings and noisy environments in after-school activities, such as loud music venues (Punch and Hyde, 2011). Whereas one-on-one contact in a quiet setting could work well for DHHm pre-adolescents, group participation or interacting in noisy environments are more likely to be difficult for these adolescents who are trying to engage socially with others. These kinds of situations could put DHHm pre-adolescents at a social disadvantage as compared to their hearing peers.

Limitations of This Study and Future Directions

All outcomes in this study were based on self-report measures. Future studies could gather additional information based on peer and teacher reports. This study could also gain additional value by including levels of reciprocity in peer friendships among DHH children and pre-adolescents, as reciprocity is an essential feature in high-quality friendships.

Note that we can only draw limited conclusions about any causal mechanisms involved in the correlations, we found since this study involves cross-sectional data.

Finally, we can only speculate about the different outcomes that we found between DHH pre-adolescents in special versus mainstream education. Most likely, adolescents with less developed skills for emotion control were more often assigned to special education because of the nature of the selection process. Yet, the smaller classes and unique culture of special education could help DHHs pre-adolescents catch up with their peers. In other words, we want to stress the fact that different factors could have been affecting the placement of DHH children in mainstream or special schools, and that students have not been randomly assigned to either school context. Therefore, we should not draw any conclusions based on our outcomes on possible development trajectories within the different school settings. Yet, future studies should monitor the respective speed of the social and emotional development in pre-adolescents attending mainstream or special education.

Conclusion

The outcomes of this study confirmed the importance of emotion control in relation to high-quality friendships for pre-adolescents with and without hearing loss. Concern is warranted by the finding that DHH pre-adolescents in special education (DHHs) showed lower levels of emotion control and lower friendship quality than both their DHH and hearing peers in mainstream education, and benefited less from the same emotion regulation strategies that were helpful for the DHHm and hearing participants. However, DHH pre-adolescents in mainstream education (DHHm) faced challenges too, as this study found their friendships had fewer positive features.

Challenges faced by DHs and DHHm groups alike may be explained by their limited access to their social environment, despite their use of hearing aids and/or CI’s; or by hearing peers being less accepting of classmates with special needs. The more protected environment of elementary school, with one teacher supervising an entire class fulltime, is missing in high school, and this may make DHH pre-adolescents more vulnerable to peer rejection or ostracism. The changing nature of social interactions during adolescence, becoming more centered on group conversations and noisy environments, add to the formation of social difficulties in mainstreamed settings. Schools that want to improve quality of life and academic performance for DHH students might want to address both DHH and hearing students, creating awareness of each-others’ unique situation and position in the group, in their efforts to promote social inclusion. Furthermore, more research is needed on environmental factors that can promote social inclusion of DHH students, such as attitudes of hearing peers or acoustical accessibility in schools.

Supplementary Data

Supplementary data is available at Journal of Deaf Studies and Deaf Education online.

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Conflict of interest
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